Ocean Outfall Legislation Program

5-Year Progress Report: Progress from 2008 through 2019, Section 403.086(9)(f), Florida Statutes

Task Authorization 49

DECEMBER 2019

OCEAN OUTFALL LEGISLATION PROGRAM
MIAMI-DADE COUNTY

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Executive Summary

Miami-Dade Water and Sewer Department (WASD) operates three regional wastewater treatment facilities, serving more than 2.5 million customers. The Ocean Outfall Legislation (OOL), Section 403.086(9), Florida Statutes, requires all southeast Florida utilities utilizing ocean outfalls for disposal of treated wastewater to:

- Eliminate the normal use of ocean outfalls by the end of 2025
- Reduce nutrient discharges by implementing advanced wastewater treatment (AWT) by 2018 or equivalent
- Reuse 60 percent (60%) of the baseline wastewater flow by 2025

Per the OOL, WASD is required to eliminate the normal use of the North District Wastewater Treatment Plant (NDWWTP) and Central District Wastewater Treatment Plant (CDWWTP) ocean outfalls, except under certain defined conditions. The law also requires reporting, including a 5-Year Progress Report (this report), that provides the Florida Department of Environmental Protection (FDEP) the current status, steps remaining to complete the projects, and any obstacles that the utility is facing.

Projects Completed and Progress Toward OOL Goals

WASD provided FDEP an update to its Compliance Plan in 2016 (CH2M and Hazen, 2016) and updated it again in 2017 (OOL, 2017). Since the 2017 report, new circumstances have precipitated changes to WASD's OOL projects that are necessary to meet the OOL objectives. This progress report provides a focused list of projects necessary to comply with the OOL's December 31, 2025 objective. As such, this report also provides FDEP a Compliance Plan 2019 Update. The OOL Program status toward meeting the three (3) primary goals are summarized below:

- The NDWWTP and CDWWTP are permitted to discharge 263 million gallons per day (mgd) annual average daily flow to the ocean outfalls (120 mgd and 143 mgd, respectively). Projects are planned for NDWWTP and CDWWTP that will reduce the outfall use over 95 percent (95%) by the end of 2025. The OOL Program includes projects to install five (5) additional municipal wells at NDWWTP and up to nine (9) new municipal wells at CDWWTP. Additionally, other projects that comprise the OOL Program are high-level disinfection facilities (which include filters and chlorine contact chambers), pump stations, and other ancillary facilities like pipelines, valving, and electrical upgrades.
- Currently, WASD operates four (4) existing municipal wells at NDWWTP (installed during and operated after the OOL baseline period) and two (2) new industrial wells at CDWWTP (installed as part of the OOL Program, online in November 2019). WASD will rely primarily on these existing injection wells to meet the OOL AWT goal. The nutrient diversion projections indicate that about 4.5 million pounds of total phosphorus (TP) and 60 million pounds of total nitrogen (TN) will be diverted before the end of 2025. Operators are maximizing the use of these existing wells (within permit limits) to meet the nutrient reduction goals by the deadline.
- The OOL requires that WASD implement up to 117.5 mgd of technically, environmentally, and economically feasible reuse capacity, which represents 60 percent (60%) of the baseline outfall flows as defined in the statute. WASD's main project to meet the reuse goal was a joint project with Florida Power and Light (FPL) to provide cooling water for their proposed new nuclear reactors at Turkey Point. Since FPL canceled the new reactors, this project is being reassessed. WASD expects to have a new agreement by next year to supply a substantial amount of reclaimed water to Turkey Point, but it will be at a reduced volume. WASD updated its Wastewater Reuse Feasibility Study and has found

limited new opportunities. Regardless, WASD is evaluating all potential cost-effective projects to increase the reuse of reclaimed wastewater and will meet the OOL requirements.

Summary of Progress and Challenges

This 5-year Progress Report provides FDEP with projects, status (including what remains to be accomplished), potential challenges to meeting the OOL deadlines, schedule milestones (and a more detailed schedule in an Appendix), and a comprehensive discussion on how WASD will finance the OOL Program. The new injection wells at CDWWTP are being drilled, and a draft permit has been obtained for the NDWWTP wells. The wastewater treatment plant upgrade designs are in progress at CDWWTP and NDWWTP.

The environmental permitting for the NDWWTP OOL projects is extensive since 17 acres of saltwater wetlands will be impacted. Wetland permits are required from FDEP, Miami-Dade County, and the U.S. Army Corps of Engineers. Each agency requires different levels of information, with the most restrictive being a relatively fixed-site plan prior to initiating permitting. The Conceptual Design of the NDWWTP has been completed (October 2019), which established the site plan. Environmental permitting for the new site development is underway, and submittal of applications is scheduled for March 2020. Multiple reviews and commission hearings are going to be required to obtain approval. The federal permit will also need to be reviewed by applicable agencies on potential species impacts and cultural resources. WASD initiated the permitting process by obtaining a wetland jurisdictional determination and has conducted wetland and species review. WASD is currently contracting cultural resource surveys of both NDWWTP and CDWWTP. Despite the progress to date, there is still a long process to obtain the dredge and fill permits and the required mitigation credits. A 2-year duration is included in the schedule to obtain the permits, although the duration is subject to the agencies' findings and commission approvals.

WASD's OOL Program includes 13 major construction projects at the NDWWTP and CDWWTP (five [5] and eight [8] packages, respectively), plus two (2) additional reuse projects, for a total expected cost of about $1.67 billion. No other utility is required to complete such an ambitious capital program to comply with the OOL. In addition to the OOL, WASD is also constructing capital improvements at all wastewater plants to meet the court-approved Consent Decree, plus other needs. The Consent Decree projects are focused on upgrading existing facilities to meet the current treatment capacity. Section 5 of this report summarizes WASD's $7.5 billion water and sewer capital plan and how WASD intends to finance these projects.

These concurrent construction projects at each plant are challenging to accomplish, given the limited space. Therefore, WASD conducts regular coordination meetings with all entities (including operations, designers, contractors) to achieve adequate staging area, safety protocols, and, most importantly, continuous operations of the facilities. Coordination and planned sequencing will continue to occur throughout the Program, as projects will require facilities to be taken off-line for an extended period during construction. Construction cannot be accelerated beyond a threshold that will compromise plant operations. Conversely, any project construction delay could have a significant schedule impact on other projects, which is a significant risk factor. Finally, the magnitude of work is substantial, and there are limited construction contractors with the experience and capability to work on the size of facilities that WASD operates. This may cause potential increased costs and delays in retaining contractors.

Conclusion

This 2019 Compliance Plan Update includes projects considered essential to complying with the OOL, and WASD has committed substantial program management and design resources to implement the projects. This report provides details on WASD's revised plan to meet the OOL objectives; in summary:

- Existing AADF capacity at the two (2) WWTPs with ocean outfalls is sufficient through 2035. Maximizing the use of existing assets is the preferred alternative given the change in flow projections based on historical data and new methodology.
- Given the relatively constant wastewater flows, conveyance system capacity increases are not required prior to the end of 2025. In addition, improvements for conveyance system capacity are not required to meet the OOL. Therefore, if identified and determined to be needed, WASD will pursue conveyance projects through the regular capital improvement plan process.
- The proposed West District Wastewater Treatment Plant will be deferred. The facility is still in WASD's plan for future capacity; however, it is not needed to comply with the legislation, nor will it be needed by 2025.

Additionally, WASD has successfully executed loan agreements with both the State Revolving Fund Loan Program and the Water Infrastructure Finance and Innovation Act Program for financing the construction of the municipal deep injection wells. These alternative financing programs will continue to be pursued for the remaining projects. WASD remains committed and on schedule to successfully meet the requirements of the Ocean Outfall Legislation.

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Acronyms and Abbreviations

AADF	annual average day flow
AO	Administrative Order
ASR	aquifer storage and recovery
AWT	advanced wastewater treatment
AWS	alternative water supplies
BWF	base wastewater flow
CDMP	Miami-Dade County Comprehensive Development Master Plan
CDWWTP	Central District Wastewater Treatment Plant
CH2M	CH2M HILL, Inc
Code	Code of Miami-Dade County
EDB	electrical distribution building
EPA	U.S. Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
FPL	Florida Power & Light
F.S.	Florida Statutes
GIS	geographic information system
Hazen	Hazen and Sawyer
HLD	high-level disinfection
I/I	inflow/infiltration
mgd	million gallons per day
mg/L	milligrams per liter
MYCIP	Multi-Year Capital Improvement Plan
NDWWTP	North District Wastewater Treatment Plant
NOAA	National Oceanic and Atmospheric Administration
OFW	Outstanding Florida Waters
OOL	Ocean Outfall Legislation
PHF	peak hour flows
PS	Pump Station
RDII	rain-derived inflow and infiltration
SDWWTP	South District Wastewater Treatment Plant
SLR	Sea level rise
SSOAP	Sanitary Sewer Overflow Analysis and Planning
TN	total nitrogen
TP	total phosphorus
USACE	U.S. Army Corps of Engineers
UIC	Underground Injection Control
USGS	U.S. Geologic Survey
WASD	Miami-Dade Water and Sewer Department
WIFIA	Water Infrastructure Finance and Innovation Act
WWTP	wastewater treatment plant

SECTION 1

Introduction and Background

On June 30, 2008, Governor Charlie Crist signed Senate Bill 1302 related to wastewater disposal/ocean outfalls (Section 403.086(9), Florida Statutes [F.S.]). This law requires all southeast Florida utilities utilizing ocean outfalls for disposal of treated wastewater to:

- Eliminate the normal use of ocean outfalls by the end of 2025
- Reduce nutrient discharges by implementing advanced wastewater treatment (AWT) by 2018 or equivalent
- Reuse 60 percent (60%) of the wastewater flows by 2025

On June 24, 2013, the statute was amended to provide greater flexibility to meet reuse requirements and to allow the use of the ocean outfalls for peak flows management, not to exceed five percent (5%) of the annual baseline flows. These revisions to the F.S. Title XXIX, Section 403.086 in 2008 and 2013, (Chapters 2008-232 and 2013-31, respectively), are referred to as the Ocean Outfall Legislation (OOL). Miami-Dade Water and Sewer Department's (WASD) wastewater system currently has two wastewater treatment plants (WWTPs) that utilize ocean outfalls as a means to dispose the treated effluent. Per the OOL, WASD is required to eliminate the normal use of the North District Wastewater Treatment Plant (NDWWTP) and Central District Wastewater Treatment Plant (CDWWTP) ocean outfalls, except under certain defined conditions. WASD's South District Wastewater Treatment Plant (SDWWTP) does not discharge to the ocean and utilizes injection wells as its primary disposal method. In addition, to meet the other two components of the legislation, WASD is also required to:

- If technically, environmentally, and economically feasible, implement 117.5 million gallons per day (mgd) of additional reuse capacity on an annual basis. This flow rate is equivalent to 60 percent (60%) of the average baseline flow from the NDWWTP and CDWWTP outfalls, as calculated from the 2003 through 2007 baseline average flow of 195.8 mgd.
- Meet an equivalent advanced wastewater treatment goal for outfall discharges prior to the end of 2025. As an equivalent, WASD has selected to divert nutrient discharges from the ocean outfalls prior to 2025.
- Perform various compliance reporting activities.

1.1 Florida Statute Requirements

This report was prepared to address Section 403.086(9)(f), F.S., which specifically states:

> (f) By December 31, 2009, and by December 31 every 5 years thereafter, the holder of a department permit authorizing the discharge of domestic wastewater through an ocean outfall shall submit to the secretary of the department a report summarizing the actions accomplished to date and the actions remaining and proposed to meet the requirements of this subsection, including progress toward meeting the specific deadlines set forth in paragraphs (b) through (e). The report shall include the detailed schedule for and status of the evaluation of reuse and disposal options, preparation of preliminary design reports, preparation and submittal of permit applications, construction initiation, construction progress milestones, construction completion, initiation of operation, and continuing operation and maintenance.

The deadlines referred to in this section are for those activities described earlier, each of which are address in this report.

In response to this report and those from the other affected southeast Florida utilities, the Secretary of the Department will provide a consolidated report to the Governor, President of the Senate, and Speaker of the House of Representatives. The report will include a summary of the overall progress to date and any obstacles to continued progress to meeting the OOL; specifically, the law states:

> (g) By July 1, 2010, and by July 1 every 5 years thereafter, the department shall submit a report to the Governor, the President of the Senate, and the Speaker of the House of Representatives on the implementation of this subsection. In the report, the department shall summarize progress to date, including the increased amount of reclaimed water provided and potable water offsets achieved, and identify any obstacles to continued progress, including all instances of substantial noncompliance.

As dictated by the legislation, this report is the third 5-Year Progress Report and is due to the Florida Department of Environmental Protection (FDEP) by December 31, 2019. WASD's compliance with reporting requirements for the OOL has been regular since the OOL was passed. The first Progress Report was submitted to the FDEP in 2009. The 2009 Progress Report included information about WASD's alternatives under consideration to comply with the OOL (WASD, 2009). In 2013, a detailed OOL Compliance Plan was submitted, where the analysis of alternatives and the recommended plan was provided (WASD, 2013). In 2014, WASD submitted to FDEP the second 5-Year Progress Report that generally restated the 2013 Compliance Plan and notified FDEP that work was continuing at refining the recommended plan (WASD, 2014). The Compliance Plan was updated in 2016, providing the work completed to date (CH2M and Hazen, 2016), and then again in 2017 to resolve some open project plans (OOL, 2017). Since the 2017 report, WASD embarked on a considerable planning analysis that consisted of evaluating historical flows, hydraulic and process capacity of the current system, positive yields from water conservation measures, and future needs, including flow and loads projections. This endeavor precipitated long-term planning initiative and, most important, an updated Compliance Plan to meet the intent of the legislation. This Progress Report and Compliance Plan will provide an overview and description of the changes as well as the overall status as required by Florida Statutes.

1.2 Report Organization

WASD's 2019 5-Year Progress Report is organized in the following sections:

- Section 2: Compliance Plan 2019 Update
  - Revised Wastewater Flow Projections
  - Unavoidable Project Execution Schedule Obstruction
  - OOL Compliance Plan 2019 Update
- Section 3: Compliance Status
  - Elimination of Ocean Outfalls for Normal Use
  - Diversions of Nutrients
  - Implementation of Reuse
- Section 4: OOL Schedule
- Section 5: Financial Plan
  - State Revolving Fund Loan Program
  - Water Infrastructure Finance and Innovation Act Loan Program
  - Commercial Paper Notes
  - Miami-Dade Water and Sewer Financial Plan
- Section 6: References

The Compliance Plan 2019 Update (Section 2) provides an overview and description of the changes, with each subsection reviewing the contributing factors that have led to the recent program modifications. The subsequent Compliance Status (Section 3) and each subsection discusses the status of accomplishing the associated goal, the actions remaining to complete the goal, and any obstacles or risks that may exist in meeting the OOL schedule or objective. The Progress Report concludes with providing both the existing program schedule and the accompanying financial plan in Sections 4 and 5, respectively.

SECTION 2

Compliance Plan 2019 Update

The OOL requires the elimination of normal use of the ocean outfalls by the end of 2025; however, WASD must consider their future needs beyond this milestone. The planning horizon utilized for the basis of future wastewater management in Miami-Dade County is the year 2035. The 2013 Compliance Plan and subsequent updates utilized this planning horizon and included improvements needed for both the OOL and future master planning. Conversely, this report, although still utilizing the 2035 planning horizon, will focus on improvements required by 2025 to adhere to the legislation. In addition to focusing strictly on compliance projects, the program has also been modified because of other contributing factors, which are further discussed below.

2.1 Revised Wastewater Flow Projections

In 2016, WASD provided FDEP an update to its Compliance Plan (CH2M and Hazen, 2016). This plan included predicted future flow rates that needed to be managed within the 2035 planning horizon. The forecasted future flows were developed as a collaborative and coordinated planning effort between the OOL program and WASD's federal court-approved Consent Decree program. The primary data source utilized to derive the flow projections were new population-based wastewater projections, as well as climate change impacts (including rising sea level rise [SLR] impacts). As a result of this coordination, the projected 2035 average flows included in both the 2016 and 2017 Compliance Plan Updates were forecasted as 441 mgd.

However, as shown in Figure 2-1, wastewater average annual daily flow (AADF) in the region has not increased in more than a quarter-century, despite increases in population. In fact, the flow has slightly decreased since 1991. This trend is consistent with Miami-Dade County's per capita water consumption and overall drinking water production, as presented in the Department's reporting to the South Florida Water Management District, which has decreased significantly during the past decade. Additionally, on May 1, 2018, the Miami-Dade County Board of County Commissioners adopted an ordinance to amend sewage flow rates by land use within Section 24-43.1(5) of the County Code. The established flow rates for various land uses within Miami-Dade County were reduced based on a comprehensive water demand study undertaken by the Department of Regulatory and Economic Resources on a five-year cycle. The study indicated that water demands for various land use (e.g., single-family homes, townhomes, apartments, and fast-food restaurants) had decreased over the study period. The results of the latest study and corresponding code amendment are consistent with the results of previous water demand studies which have reflected the continued decline in water consumption throughout Miami-Dade County over more than a decade.

The evolution of water demands and subsequent wastewater generation can be attributed to the following factors:

- Deceleration of population growth
- Water conservation program yielding reduced per capita water consumption
- Permanent year-round irrigation restrictions
- Landscape ordinances requiring Florida Friendly Landscaping
- Florida Building Department Code changes requiring high-efficiency fixtures for new construction
- Evolving trends in housing demographics (apartment development versus single-family homes), and water use practices

- Increases in water and sewer rates
- Inflow and infiltration (I/I) reduction efforts

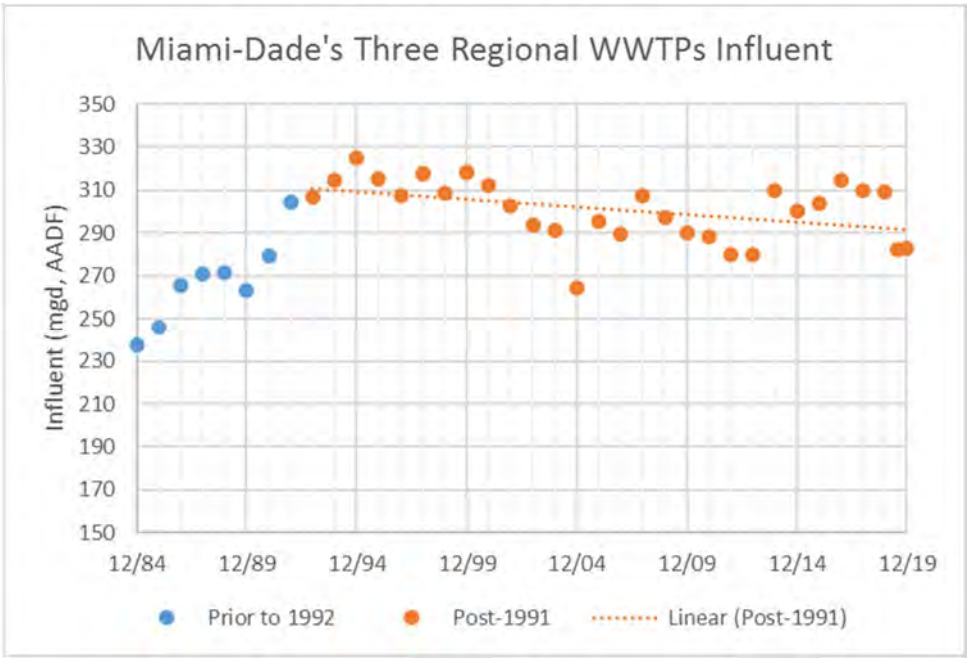


Figure 2-1. Actual Wastewater Regional System Annual Average Daily Flow
5-Year Progress Report: Progress from 2008 through 2019, OOL

The Miami-Dade Regulatory and Economic Resources Department recently updated population projections through 2040. The current projections indicate continued growth, but at a much slower rate than was previously estimated. The new projections have an annual growth rate of slightly less than one percent (1%) per year (Table 2-1). The total increase in population from 2020 through 2035 is approximately 17 percent (17%).

Table 2-1. Miami-Dade Regulatory and Economic Resource Population Projections
5-Year Progress Report: Progress from 2008 through 2019, OOL

Year	Miami-Dade Population
2020	2,732,449
2025	2,872,847
2030	3,050,487
2035	3,205,140

Source: Miami-Dade Department of Regulatory and Economic Resources, Planning Research and Economic Analysis Section

Miami-Dade County has been highly proactive in driving water efficiency and water conservation with the intent of reducing per-capita consumption. Over the past several years, the scale of redevelopment within the County has been significant, replacing tens of thousands of housing units and millions of square feet of commercial and industrial space. The pace of redevelopment, coupled with Miami-Dade County building and land use policies, has led to a significant decrease in per capita water consumption (over 15 percent [15%]). The actions taken by Miami-Dade County include updates to Section 8-31 and 32-84 of

the Code of Miami-Dade County (Code) requiring the implementation of water use efficiency techniques for indoor water use (e.g. high-efficiency fixtures and appliances). Additionally, all developments are required to comply with the landscape standards in Sections 18-A and 18-B of the Code, including Florida Friendly Landscaping principles, resulting in reduced demands. To further conservation efforts, outdoor water restrictions have been implemented to limit watering of lawns 2 days per week per household in the early mornings and evenings to minimize losses in evapotranspiration. Moreover, per Section 8A-381 (c) of the Code, multifamily residential developments are required to include a sub-meter for each individual dwelling unit to enhance monitoring and encourage conservation. Beyond these policy drivers, the impact of significant increases in water and sewer rates over the past several years cannot be overstated as an incentive for customers to conserve water and maximize efficiency.

Miami-Dade County Comprehensive Development Master Plan (CDMP) land use policies have also been instrumental in driving decreases in water demand and wastewater generation. Over the past 2 decades, land use policy has incentivized high-density development in areas of existing infrastructure and public services (such as transit, sanitary sewer, etc.). This, in turn, has led to a pivot from growth in suburban single-family homes, with higher average water consumption, to condominiums, apartments, and in some cases, micro-apartments that have much lower water demands. Furthermore, the densification of areas with existing infrastructure has significantly slowed the pace of sanitary sewer system expansion and thus the rate of I/I in piping systems. These policy objectives continue to be advanced, as evidenced in 2018, when the Miami-Dade Board of County Commissioners approved density increases along all rapid transit corridors and existing "Urban Center Zoning Districts" with the intent of focusing future development in these areas. The CDMP amendments allow for densities between 18 and over 100 units per acre within 1 mile of the more than 100 miles of transit corridors and existing "Urban Center Zoning Districts." Miami-Dade County land use policy is not only guiding growth toward areas of existing development and infrastructure, but also it is limiting future growth in undeveloped and environmentally vulnerable areas. It should be noted that the Urban Expansion Area Task Force recommends maintaining the urban development boundary essentially unchanged over the long-term future, with only a few areas in consideration for limited expansion.

Beyond the County policy efforts to maximize efficiency and reduce water consumption, WASD has been very successful in executing its water conservation program. The program was established in 2007 and involves driving the implementation of best management practices for indoor water use and irrigation. Miami Dade County is on target to reduce its water use through the conservation program by 19.62 million gallons per day by 2026. The program also includes an education component conducting outreach to various organizations within the county (homeowner associations, county agencies, municipalities, schools, colleges, universities, and not for profit organizations) to inform residents on the importance of water conservation. The Water Use Efficiency Plan also includes a water loss reduction component that implements an annual leak detection survey of the county's entire water distribution system. Cutting edge technology, including implementation of mobile/fixed network systems, is used to detect leaks that are timely addressed.

Although strides have been made with regards to water efficiency, WASD recognizes that I/I accounts for a significant portion of wastewater flows generated within its service area. As such, a concerted effort has been made to pursue this opportunity and reduce I/I. WASD's multi-year efforts with regard to I/I have yielded a noteworthy impact, and during the past several years, WASD has prioritized these reduction efforts. WASD performed sanitary sewer evaluation surveys on approximately 34.06 million feet (6,451 miles) of sewage collection mains and laterals. During 2018, more than 8,342 repairs were performed to the gravity system; 921,149 feet of gravity sewers and 7,023 manholes were inspected with closed-circuit television. These activities help to reduce the amount of extraneous water that enters the wastewater collection system through aging infrastructure and defects in existing pipe systems. This reduces wastewater flow volume to the collection system and WWTPs, thus preserving the system's hydraulic capacity and reducing wet weather flows (WASD, 2019c). Currently, I/I still accounts for over 30 percent

(30%) (100+ mgd) of WASD's wastewater flows, indicating that continued improvement and opportunity for further flow reduction is viable.

Because of these internal and external drivers, WASD has experienced decreases in wastewater generation, and average flows have remained consistently flat over the last 20 years. Observing this historical trend, in 2018, WASD embarked on a thorough re-evaluation of its 2035 projections, including AADF and peak hour flows (PHF). The methodology WASD used to analyze wastewater flow projections utilized the flow measured at the existing WWTPs between 2010 to 2017 and assessed the impact of rainfall, groundwater table elevation, population, sea level rise, climate change, and I/I reduction.

The U.S. Environmental Protection Agency's (EPA) Sanitary Sewer Overflow Analysis and Planning (SSOAP) Toolbox was applied to WASD's WWTPs flows to disaggregate the influent flow to each WWTP into the following components for each year from 2010 to 2017:

- Base Wastewater Flow (BWF): Flow generated by residential, commercial, and industrial users is one of the primary estimates from SSOAP. This component is the most correlated to the population being serviced.
- Groundwater Infiltration: Groundwater that enters the system through defects. The average percent of pipe submergence was calculated using the mainline gravity sewer network included in WASD's geographic information system (GIS), groundwater table data for 141 United States Geological Survey (USGS) wells, and tide data from National Oceanic and Atmospheric Administration (NOAA). Using the USGS groundwater table data and the NOAA tide data, digital terrain model surfaces were developed to represent the average groundwater elevation.
- Rain-Derived I/I (RDII): I/I that enters the system during and immediately after larger rain events. The average systemwide RDII was plotted against the gauge adjusted radar rainfall data weighted over the service area for each year to determine the existing correlation with rainfall volumes.

Once the influent flow to each WWTP from 2010 to 2017 was disaggregated, data for each component was analyzed to determine how it is impacted by rainfall, groundwater table elevation, and population; and then projected for future growth. For example, population growth only impacts the BWF component of the wastewater influent. In addition, the following two (2) factors were included for projecting AADF through 2035:

- Groundwater Infiltration caused by SLR: Groundwater that enters the system through defects because of a higher groundwater table from SLR. The digital terrain model for the groundwater table was raised for sea level rise, and the change in percentage of pipe submergence was estimated.
- Rain-Derived I/I caused by Climate Change: I/I that enters the system because of rain events with future larger rain depths. A correlation analysis was used to examine the more variable rainfall volumes expected in the future and its potential effect on the AADF.

The thorough re-evaluation resulted in a substantial reduction in 2035 projected flows. The systemwide wastewater projections are now anticipated to be 366 mgd by 2035, as opposed to the 441 mgd in the Compliance Plan 2016 and 2017 Updates. The updated projections are still considered reasonable, as well as conservative, given the consideration of climate change, sea level rise, and other non-traditional factors without considering the potential impact that these environmental phenomena might have on population growth. In total, the projected increase over current (2019) annual average daily flow is over 25 percent (25%), outpacing population growth significantly.

Figure 2-2 illustrates the updated projected AADF flows, as well as the recently observed monthly and annual flow for the NDWWTP and CDWWTP. Growth is still anticipated, but at a pace that better reflects the recent influent data than the previous projections, as demonstrated by the graph in Figure 2-3. In addition, this flow projection methodology is more robust than the traditional per-capita factor because unique local factors beyond population growth are evaluated separately, which provides a more reliable and realistic forecast for complex flow projections.

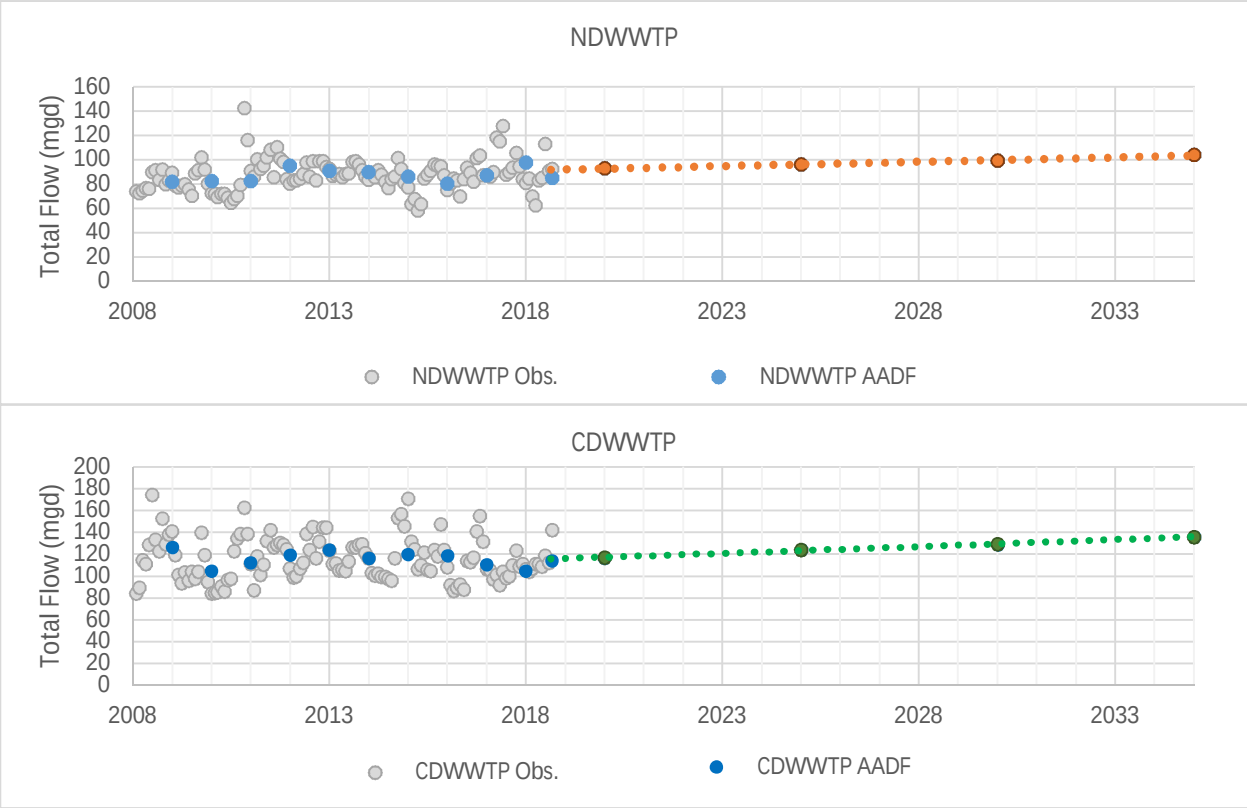


Figure 2-2. Actual and Projected Wastewater Flows for NDWWTP and CDWWTP
5-Year Progress Report: Progress from 2008 through 2019, OOL

The actual wastewater flow recorded at the three (3) existing WWTPs and the new projected AADF described above has compelled WASD to update its OOL Compliance Plan (WASD, 2019a). The current permitted AADF capacity of WASD's three (3) regional WWTPs is 375.5 mgd. The systemwide permitted AADF will increase with the expansion of SDWWTP from 112.5 to 131 mgd AADF. The resulting overall permitted capacity of the existing WWTPs will be 394 mgd AADF by the end of 2025, while the revised projected 2035 flow projection has been reevaluated at 366 mgd. Therefore, with slower growth in the projected wastewater treatment demand, the need for additional treatment capacity (beyond SDWWTP) is no longer pressing until after 2035, as illustrated in Figure 2-3.

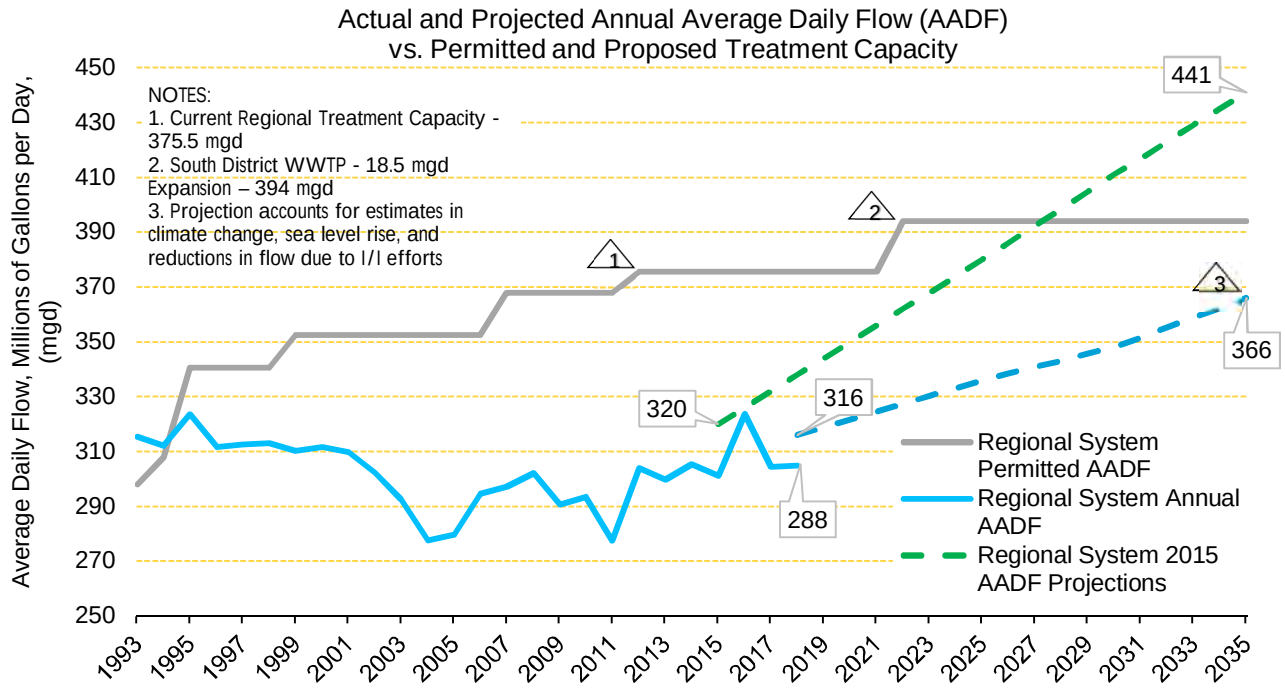


Figure 2-3. Actual and Projected AADF vs. Permitted and Proposed Treated Capacity
5-Year Progress Report: Progress from 2008 through 2019, OOL

Given this insight and understanding of the historical flow trends, WASD has reevaluated the alternative analysis performed in 2013 and has made the following conclusions:

- Existing AADF capacity at the two WWTPs with ocean outfalls is sufficient through 2035. Maximizing the use of existing assets is the preferred alternative given the change in flow projections based on historical data and new methodology.
- Given the relatively constant wastewater flows, conveyance system capacity increases are not required prior to the end of 2025. In addition, improvements for conveyance system capacity are not required to meet the OOL. Therefore, if identified and determined to be needed, WASD will pursue conveyance projects through the regular capital improvement plan process.
- The proposed West District Wastewater Treatment Plant can be deferred. The facility is still in WASD's plans for future capacity purposes; however, it is not needed to comply with the legislation, nor will it be needed by 2025.

2.2 Unavoidable Project Execution Schedule Obstructions

WASD's substantial regulatory, capital improvement-related, and rehabilitation/replacement programs must be carefully coordinated to ensure its compliance with all local, state, and federal permits and other regulatory requirements. In addition, WASD must also coordinate improvement projects in such a way that daily operations are not negatively impacted. Design related conflicts must be resolved among the affected parties quickly and in a cost-effective manner for the utility's customers. These design challenges are being coordinated between the various consultants, WASD's program managers, and WASD's operational staff.

In addition to the design coordination, the Consent Decree construction projects are ongoing at all WWTPs. The Consent Decree projects are focused on upgrading existing facilities to meet the current treatment capacity. The OOL projects are focused on eliminating the use of ocean outfalls. Because of the stringent deadlines of both programs, some projects overlap or have conflicting footprints. The staging

and coordination of the building contractors is also a challenge given the limited available space at the existing WWTPs and the close proximity of new facilities. The Consent Decree and OOL Programs have worked to modify the construction schedule to allow for orderly construction while still providing no major delays. The coordination is ongoing as OOL projects progress from planning to design. In addition, the operation of the WWTPs must continue during construction, which caused project schedules to be modified such that essential services can be maintained throughout the program. Appendix A provides the construction phasing plan that was developed for the CDWWTP and NDWWTP. Some adjustments to the previously submitted construction schedule were made to accommodate the staging and workflow for the construction.

Another major concern previously expressed in the Compliance Plan updates is the availability of contractors to deliver projects on schedule and at budget given all the construction projects under development. For example, WASD prequalified injection well drilling contractors to develop a pool of qualified candidates to bid for the various WWTP work. Only two (2) of the contractors that submitted qualifications were determined acceptable. One contractor dropped out when the first request for bids was released in 2018. The diminished pool of contractors generated about a 6-month delay to the negotiation with the sole bidder. The injection well drilling at CDWWTP is not on a critical path, so this was only a minor delay to these projects that are now under construction. However, it is easy to extrapolate the effort and time delays that could potentially occur due to the saturated construction market and the lack of qualified and/or available candidates.

Construction of essential infrastructure at NDWWTP cannot be started until all regulatory permits and approvals are obtained from federal, state, and local agencies. The time commitments for obtaining necessary permits at this location adds a layer of complexity in meeting the schedule milestones. The new high-level disinfection (HLD) facilities and injection wells are being located on an adjacent 29-acre parcel that contains 17 acres of wetlands (saltwater). This parcel is the most feasible option available in this congested part of Miami-Dade County and will have the least environmental impacts to the region. However, the permitting associated with the land is anticipated to be an extensive and lengthy process. Acknowledging this constraint, WASD has taken steps to facilitate the construction permitting process:

- The layout of the new facilities proposes to place the wells on the upland portion of the parcel, to reduce environmental impacts and to alleviate permitting requirements.
- The Underground Injection Control (UIC) Permit application for the wells has been submitted, and a draft permit obtained (October 25, 2019).
- A wetland jurisdictional determination from FDEP and the County has been obtained.
- A wetland exemption request from FDEP, the County, and the U.S. Army Corps of Engineers (USACE) was submitted for installing injection wells on adjacent uplands (October 2019).
- The City of North Miami Development process is anticipated to begin by February 2020. This process consists of several layers, with multiple approvals required by the City Council.
- The USACE Section 404, FDEP Environmental Resource Permit, and County Class I Wetland Impact Permit process is anticipated to be submitted by March 2020.

The extensive permitting and development approvals at this site certainly add a higher level of risk to complying with the legislation. WASD is committed to meeting the legislation and is mitigating potential risk by obtaining as much approval as possible prior to detailed design. WASD also intends to place particular focus on those activities that are under their control, such as procurement and construction staging, to facilitate meeting the project schedule. In addition, the injection wells were strategically placed in uplands so they could be started before wetland permit completion. WASD is planning on accepting the risk associated with starting limited construction in the uplands before gaining approval from the various agencies.

Another schedule risk is that the Miami-Dade Board of County Commissioners must approve the County's comparable saltwater wetland impact permit. The NDWWTP is in the City of North Miami; therefore, it is required to obtain approval from its City Council for both development review (zoning) and planning department acceptance (Comprehensive Plan). The City's process requires a site plan that cannot deviate substantially from completion. The conceptual design at NDWWTP was recently completed (October 2019), and WASD will subsequently start the City approval process.

2.3 OOL Compliance Plan 2019 Update

This 2019 Progress Report provides a Compliance Plan update focused on those projects required to comply with the OOL. All other infrastructure projects, including conveyance system, Consent Decree, rehabilitation and replacement, and other capital improvement projects, will continue to be implemented by WASD, as required and needed.

All projects to comply with the legislation will be conducted at the NDWWTP and CDWWTP, with the goal to eliminate the ocean outfall discharges by December 31, 2025, with the exception of the allowed 5 percent (5%) of baseline flow volume. Any project elements included to improve treatment processes are only incidental to meeting the OOL objectives. Table 2-2 lists the planned design capacity for the WWTPs based on the revised flow projections and incorporating all OOL Program improvements.

Table 2-2. WASD Revised 2035 Design Criteria for OOL Program Improvements
5-Year Progress Report: Progress from 2008 through 2019, OOL

Description	NDWWTP	CDWWTP
AADF (mgd)	120	143
PHF (mgd)	270	335
Peaking Factor	2.25	2.34

PHF = peak hour flow
Peaking factor equals PHF divided by AADF.

Projects needed at NDWWTP and CDWWTP to eliminate the normal use of the ocean outfalls include the installation of injection wells, HLD (which include filters and chlorine contact chambers), pump stations, and other ancillary facilities like pipelines, valving, and electrical upgrades. The OOL Compliance Plan 2019 Update projects are listed in Table 2-3. A brief description of the upgrades at each plant is included below.

Table 2-3. OOL Compliance Plan 2019 Updated Project List
5-Year Progress Report: Progress from 2008 through 2019, OOL

Reference ID	Project Name
CDWWTP Projects	
CE-1	CDWWTP - Municipal Injection Wells Pump Station (PS)
CE-2	CDWWTP - Municipal Injection Wells
CE-3	CDWWTP - Industrial Injection Well Surface Facilities
CE-4	CDWWTP - Industrial Waste Deep Injection Well System
CT-2A	CDWWTP - High-Level Disinfection (HLD) Improvements and Filtration Pilot Test
CT-2B	CDWWTP - Preliminary Site Preparations
CT-3B	CDWWTP - Oxygenation Train and Secondary Clarifiers
CT-3C	CDWWTP - Electrical Distribution Buildings Number 2 and 3 (EDB2 and EDB3)
NDWWTP Projects	
NE-1	NDWWTP - Municipal Injection Wells PS
NE-2	NDWWTP - Municipal Injection Wells
NT-2B	NDWWTP - Site Preparations and Stormwater
NT-2C	NDWWTP - HLD Facilities
NT-3	NDWWTP - EDB2 (for HLD facilities)
Reclaimed Water Facility Projects	
SR-2	SDWWTP to FP&L - Reclaimed Water Pipeline
XR-1	Reclaimed Water Reuse Projects

2.3.1 CDWWTP Improvements

An assessment of alternatives for meeting the OOL requirements was conducted, and the upgrade and expansion of conventional processes was selected. As outlined in Table 2-3, the upgrades will be implemented with eight (8) projects, all of which will be located on the existing CDWWTP site. Figure 2-4 illustrates the location of the OOL projects at the WWTP.

Improvements to address the ocean outfall discharge volume limitations are outlined below with associated construction project:

- HLD unit processes for secondary effluent consisting of (CT-2A):
  - Disk filters
  - Chlorine contact tanks
  - Satellite bulk sodium hypochlorite storage and feed system for HLD disinfection
  - Filter backwash waste treatment system
- Stormwater and other site improvements associated with OOL updates (CT-2A).
- Conversion of the existing Effluent Pump Station to a Transfer/Outfall Pump Station (CT-2A).

- Addition of step feed capability to oxygenation trains of Plants 1 and 2 (CT-2B for Plant 1, and Plant 2 is being implemented under Consent Decree project 2.04).
- Return activated sludge pumping capacity and piping (CT-3B).
- Addition of one (1) oxygenation train to Plant 1 (CT-3B).
- Three (3) new final settling tanks for Plant 1 (CT-3B).
- Various yard piping (varies).
- Construction of new Electrical Distribution Buildings 2 and 3 (EDB2 and EDB3) (CT-3C).
- Construction of a new municipal injection well pump station (CE-1).
- Construction of nine (9) new municipal injection wells and associated monitoring wells. This includes the piping to connect the wells to the new pump station (CE-2).

Some project components may be phased because the full scope of work is not required to meet the OOL objectives by the end of 2025. For example, the 2025 flow projections would indicate that only eight (8) injection wells are needed by 2025. Still, the design (and potentially the construction) will be for all nine (9) wells to provide for 2035 capacity for delivery efficiency purposes.

At CDWWTP, WASD is currently evaluating regulatory alternatives with FDEP and EPA, with the understanding that the portion of the Floridan aquifer in the vicinity of Virginia Key does not serve as a source of drinking water and is not reasonably expected to serve as a source of drinking water in the future. If a regulatory alternative is agreed upon, WASD will re-evaluate the need for the HLD components of the CDWWTP projects. Removing the HLD components will reduce the capital cost and schedule risk associated to the CDWWTP improvements, in fact, it is likely that WASD will achieve compliance prior to 2025.

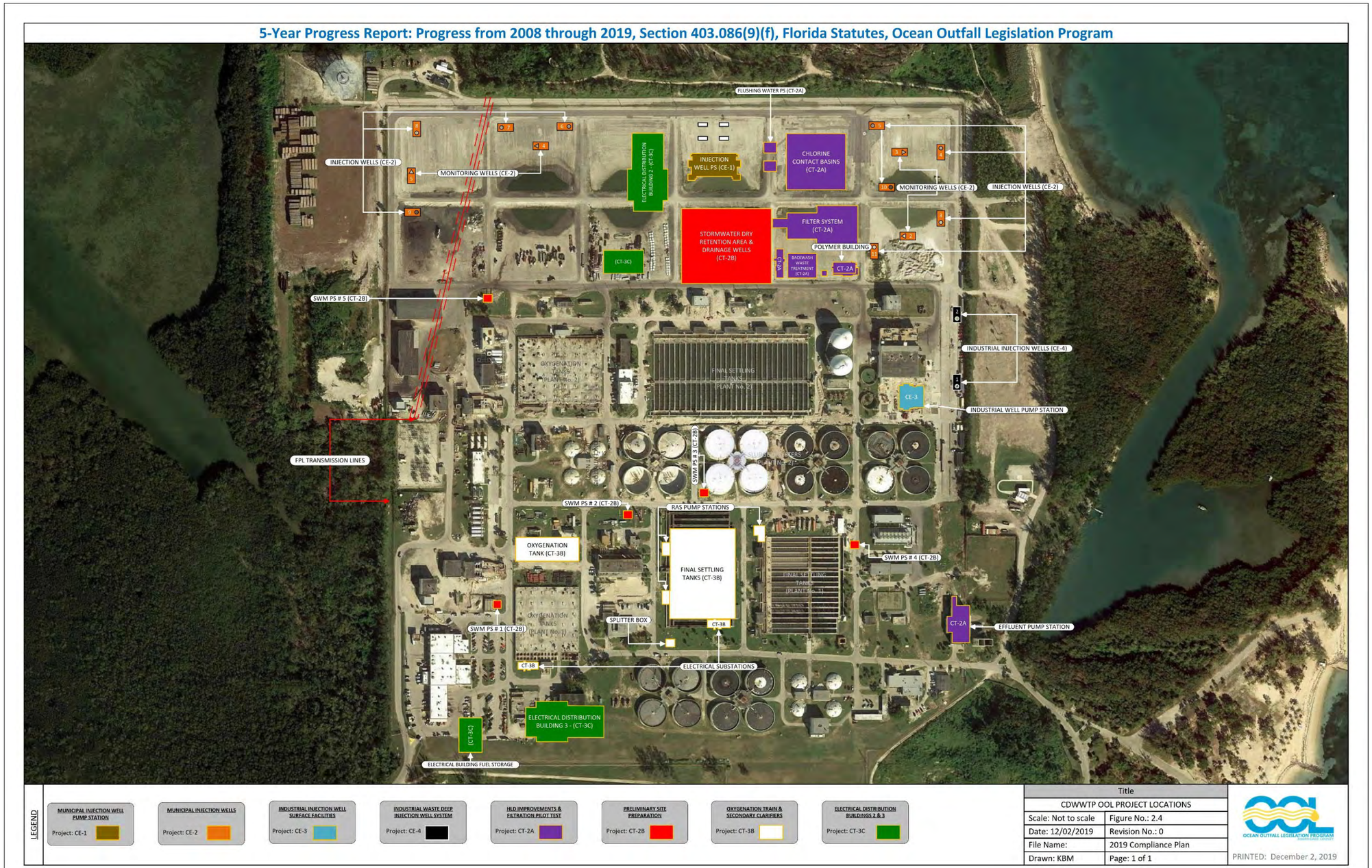


Figure 2-4. CDWWTP OOL Projects Locations
5-Year Progress Report: Progress from 2008 through 2019, OOL

2.3.2 NDWWTP Improvements

A similar assessment of alternatives for meeting the OOL requirements was conducted at NDWWTP, and the upgrade of conventional processes without equalization was selected. As outlined in Table 2-3, the upgrades will be implemented with five (5) projects.

Improvements to address the ocean outfall discharge volume limitations are outlined below with associated construction project:

- Conversion of the existing Effluent Pump Station to a Transfer/Outfall Pump Station (NE-1)
- HLD unit processes for secondary effluent consisting of (NT-2C):
  - Disk filters
  - Chlorine contact tanks
  - Satellite bulk sodium hypochlorite storage and feed system for HLD disinfection
  - Filter backwash waste treatment system
- Various adjustments of gates for hydraulic function (NT-2C)
- Various yard piping
- Electrical Distribution Building 2 (EDB2) (NT-3)
- Stormwater retention pond for the OOL projects (NT-2B)
- Construction of a new Injection Well Pump Station (NE-1)
- Five (5) new municipal injection wells and two (2) associated monitoring wells (NE-2)

The NDWWTP Conceptual Design Report submitted to FDEP included another project, Project NT-2A: addition of step feed capability. However, this project is not required to meet the legislation, and thus, is not part of this OOL Compliance Plan 2019 Update. Project NT-2A will be completed prior to 2035 to provide the additional capacity needed to meet the design flows and loads.

Most of the new facilities will be located on a WASD owned, undeveloped parcel adjacent to the existing NDWWTP site. Figure 2-5 illustrates the location of the OOL projects at the WWTP.

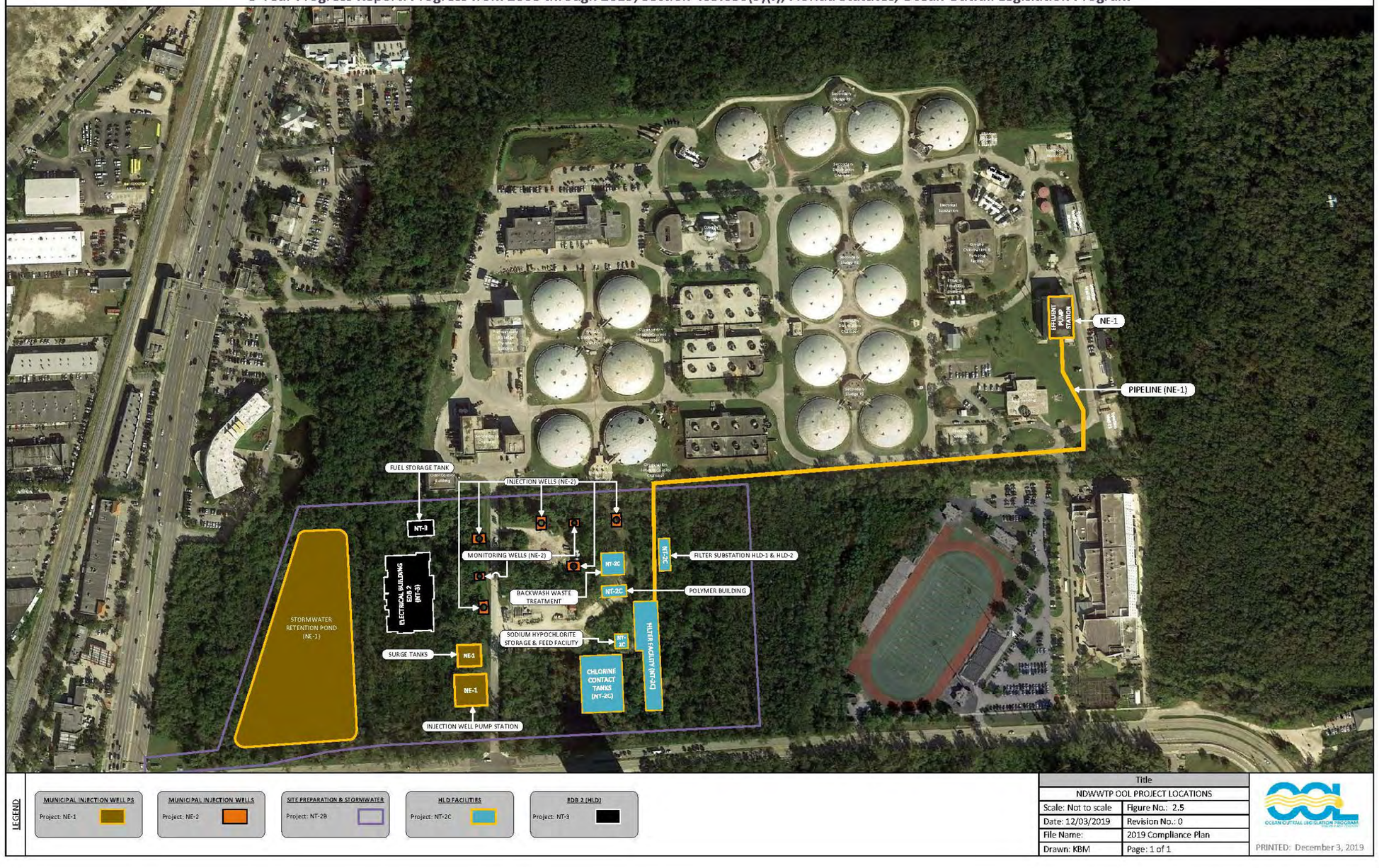


Figure 2-5. NDWWTP OOL Projects Locations
5-Year Progress Report: Progress from 2008 through 2019, OOL

2.3.3 Reclaimed Water Improvements

The OOL Program includes two reclaimed water projects, as presented in the 2017 Compliance Plan Update (OOL, 2017). The Florida Power and Light (FPL) reclaimed water project at Turkey Point Power Plant utilizing SDWWTP reclaimed water is included as SR-2; any future potential wastewater reuse projects remain consolidated as a single placeholder (XR-1). WASD and FPL are actively coordinating the scope of Project SR-2. This project is intended to provide FPL with additional water resources for operational requirements at the FPL Turkey Point Nuclear Power Facility, including water for application in cooling towers and potentially the cooling canal system. Project XR-1 is for the development of additional reuse capacity as demands and technically, environmentally, and economically feasible alternatives arise. An explanation of WASD's Reclaimed Water Program is provided in Section 3.3.

SECTION 3

Compliance Status

The OOL requires that the 5-year Progress Report provides the status of accomplishing the statute's goals, actions remaining to complete the goals, and any obstacles that may exist. This section of the report discusses these subjects for each of the three (3) main OOL objectives: outfall discharge reduction, nutrient diversion, and reclaimed water reuse management.

3.1 Elimination of Ocean Outfalls for Normal Use

This section describes the status of the projects which are primarily required to eliminate the normal use of ocean outfalls for the disposal of the treated wastewater effluent. The primary strategy available to WASD to eliminate the normal use of the ocean outfalls at CDWWTP and NDWWTP is to install injection wells, which is a common approach utilized in southeast Florida. Currently, there are four (4) existing municipal wells at NDWWTP (installed and operated prior to the OOL Program) and two (2) new industrial wells at CDWWTP (installed as part of the OOL Program). In addition, the OOL Program includes projects to install five (5) additional municipal wells at NDWWTP and up to nine (9) new municipal wells at CDWWTP.

The OOL does not require the alternative discharge system to have the capacity to dispose of peak hour flow rates. In addition, the amended statute allows for greater flexibility to use of the ocean outfalls for peak flow management, as long as 5 percent (5%) of the annual baseline flow is not exceeded. This limit was determined to be a combined outfall total of 3,573 million gallons per year (enforced with a 5-year rolling average starting January 1, 2026). Injection well capacity greater than the AADF flow is required to reduce usage to under 95 percent (95%). Projected AADF and peak flow rates were analyzed to determine how to comply with the 5 percent (5%) allowance threshold. OOL projects, as identified in Section 2.3, were selected to the projected capacity to comply with this reduced discharge volume.

The current project status, actions remaining, and identified obstacles/risks for the elimination of ocean outfalls for normal use projects are further discussed below.

3.1.1 2019 Status

CDWWTP

Currently, the draft Conceptual Design Report is being modified to reflect updated flow projections; however, project designs are well underway. The design consultants have been tasked and are proceeding with design efforts. The construction of the two (2) industrial wells are complete and operational. However, under the UIC regulatory program, the initial operational testing is a part of the construction and testing permit, which expires in December 2020. This construction permit will need to be renewed, and an FDEP UIC Operation Permit obtained before the industrial wells are considered fully approved. Construction has started on the municipal injection wells, and the remaining facilities are under design with construction completion by the end of 2025. Table 3-1 identifies each project and associated status.

Table 3-1. OOL Outfall Reduction CDWWTP Projects Status
5-Year Progress Report: Progress from 2008 through 2019, OOL

Reference ID	Project Name	Status
CDWWTP Projects		
CE-1	CDWWTP - Municipal Injection Wells Pump Station (PS)	Design (~70%)
CE-2	CDWWTP - Municipal Injection Wells	Construction (started 9/19[a])

Table 3-1. OOL Outfall Reduction CDWWTP Projects Status
5-Year Progress Report: Progress from 2008 through 2019, OOL

Reference ID	Project Name	Status
CDWWTP Projects		
CE-3	CDWWTP - Industrial Injection Well Surface Facilities	Completed (11/19)
CE-4	CDWWTP - Industrial Waste Deep Injection Well System	Completed (2018)
CT-2A	CDWWTP - HLD Improvements and Filtration Pilot Test	Pilot test completed; conceptual design completed
CT-2B	CDWWTP Preliminary Site Preparations	Conceptual design completed
CT-3B	CDWWTP - Oxygenation Train and Secondary Clarifiers	Design (~30%)
CT-3C	CDWWTP - Electrical Distribution Buildings Number 2 and 3 (EDB2 and EDB3)	Design (~30%)

[a] Seven of the nine wells are contracted to be constructed. The other two will follow later.

NDWWTP

The four (4) municipal injection wells at NDWWTP are permitted to operate at 71 mgd, based on the peak discharge limit of 10 feet per second velocity down the casings. It was identified that there were some limitations in the pumping station that prevented full use of the capacity. Since WASD made modifications in 2018 and is now discharging much closer to the permitted limit (i.e., between 60 and 68 mgd), this increase has augmented the pace of nutrient diversions from the outfall, and the existing injection wells can be reliably used to eliminate discharge to the outfall in the future.

The Conceptual Design Report has been completed for all projects, and the permitting process has been initiated. WASD is currently negotiating the scope and fee for the design of the facilities. As previously presented in Section 2.2, substantial environmental (wetland and fill) and development (zoning-related) permitting is required before the start of construction. To mitigate this issue, WASD obtained wetland jurisdictional determinations from the state and local regulatory agencies and strategically located the injection wells on uplands to reduce environmental impacts and to facilitate early construction. Upland exemption letters have been requested from the agencies to assure that they will allow this partial phasing of the work. WASD anticipates that permit approvals may take more than 1 year to obtain. Some permits will not be finalized until design documents are nearly complete. Still, WASD intends to obtain enough agreement with associated agencies to continue to advance the design and not impact project schedules. Table 3-2 identifies each project at NDWWTP and their associated status.

Table 3-2. OOL Outfall Reduction NDWWTP Projects Status
5-Year Progress Report: Progress from 2008 through 2019, OOL

Reference ID	Project Name	Status
NDWWTP Projects		
NE-1	NDWWTP - Municipal Injection Wells PS	Conceptual design completed
NE-2	NDWWTP - Municipal Injection Wells	Design (~90%)
NT-2B	NDWWTP - Site Preparations and Stormwater	Conceptual design completed
NT-2C	NDWWTP - HLD Facilities	Conceptual design completed
NT-3	NDWWTP - EDB2 (for HLD facilities)	Conceptual design completed

Status is current mid-December 2019

3.1.2 Actions Remaining to Accomplish the OOL Outfall Elimination Objective

WASD's OOL Program includes 13 major construction projects at the CDWWTP and NDWWTP (eight [8] and five [5] packages, respectively), and two (2) re-use projects, for a total budget of about $1.67 billion. No other utility is required to complete such an extensive capital program to comply with the OOL. In addition to the OOL, WASD is also constructing capital improvements at all wastewater plants to meet the requirements of its Consent Decree with the EPA and Department of Justice, as well as implementing projects for other needs.

The actions remaining for both CDWWTP and NDWWTP are briefly discussed below. A detailed schedule for all the projects is presented in Section 4.

CDWWTP

Most of the current construction occurring at CDWWTP is related to the Consent Decree. As these ongoing projects are finished, the OOL contractors will then mobilize in a phased approach to begin construction work on OOL Program projects. The coordination between programs for staging areas and sequencing of projects is provided in Appendix A. Critical work, including injection well drilling, is being conducted in advanced to facilitate project coordination and program schedule.

The municipal injection wells have recently started to be drilled (mobilization October 2019), and the supporting pump station, oxygenation train, and electrical buildings are in design. The remaining design packages (site preparations and HLD facilities) are scheduled to start by April 2020 (Section 4). Once the Conceptual Design Report is submitted and approved by FDEP, the project designs will be completed and permitted with the City of Miami. The Miami-Dade County Department of Regulatory and Economic Resources, Department of Environmental Management must approve the environmental permitting. Furthermore, because the plant is more than 50 years old, the state Division of Historical Resources has requested a cultural resource study, which WASD is planning to conduct starting in January 2020. Following 100 percent (100%) design and permitting, WASD will develop the construction bid packages for contractor procurement and then construction.

As acknowledged in Section 2.3, WASD is currently evaluating regulatory alternatives, which, if agreed upon with FDEP and EPA, will provide a basis for reconsideration of elements of the CDWWTP design and will reduce the schedule and projects associated with these improvements.

NDWWTP

The Conceptual Design Report has been completed and was submitted to FDEP in October 2019. Scope of Work for detailed design services has been defined, and the process to engage design consultants for the facilities has commenced. It is anticipated that designers will be engaged and started by no later than May 2020 (Section 4).

As presented previously for CDWWTP, coordination between construction projects requires careful phasing to allow for ongoing plant operations and typical construction activities. The injection wells have been located in uplands such that the construction can be initiated sooner and be finalized prior to the construction of other components (Appendix A). WASD plans to begin drilling the wells at risk, before the environmental permitting is completed.

The design and permitting process with FDEP and the City of North Miami is expected to take about 2 years due to its unique land characteristics. Federal (Clean Water Act, Section 404), state (FDEP Environmental Resource Permit), and local (County Class I) wetland permitting will be started (applications submitted) in March 2020. The local development approval process will start with the City of North Miami in February 2020.

3.1.3 Obstacles to Achieving Outfall Use Elimination Objective

Section 2.2 describes the overall obstacles to comply with the requirements of OOL. The limited availability of construction contractors is a significant problem for all utilities. WASD is undertaking considerably more capital improvement projects than any other southeast Florida utility subject to the OOL. It is challenging and almost impossible to implement the extensive scope of all projects simultaneously. Furthermore, it is difficult to conduct the work on the large regional plants (all greater than 100 mgd capacity) while maintaining the essential services during construction. Specific issues are discussed below for each WWTP.

CDWWTP

The highlighted risks/obstacles below have been identified and are continually being monitored and addressed/mitigated as the program advances:

- The most significant obstacle is the coordination of all the work that is ongoing at the site while keeping wastewater treatment service fully operational during construction. WASD has required the program managers to develop staging plans to accommodate the work such that the lay-down storage and construction work can be managed (Appendix A). Construction phasing and oversite will be an ongoing challenge. Therefore, WASD is working to minimize delays that may cause adverse compliance and/or operational issues.
- During pre-design, groundwater contamination was found at the EDB3 location. This finding will require extra steps in the design process to develop a remediation and management plan. However, this work has already been incorporated and accounted for in the presented schedule.
- The municipal injection well projects are moving forward at CDWWTP. The new injection wells will be usable prior to the end of 2025. WASD will require approval from FDEP's UIC Program for the use of the wells for operational testing. Any delays related to regulatory approval(s) may affect the schedule for the alternative disposal option.

NDWWTP

As previously discussed, the environmental permitting and development/zoning-related approvals for the NDWWTP are substantial. Although WASD has owned the adjacent parcel for a significant amount of time, intended for future use, the permitting process must be completed in accordance with current regulations. The site is mostly wooded and contains substantial wetlands, mostly saltwater. There may be unavoidable schedule impacts because of the staggered approvals from different agencies. The collective permitting and development related activity has been given a 2-year period in the schedule (presented in Section 4). However, WASD has limited control over the timing that the various agencies may take in approving the application for the NDWWTP expansion. Currently, this uncertainty is managed as a program schedule risk and not an obstacle, per se.

WASD initiated wetland jurisdictional determinations from the FDEP and Miami-Dade County Regulatory and Economic Resources. Both agencies have approved the wetland boundaries. However, the USACE would not rule on the wetlands until after a Section 404 permit application is filed. The project will avoid the most sensitive mangrove wetlands on the site, but there will still be 17 acres of wetland impact, in addition to the upland work. Mitigation for these impacts will be from mostly saltwater mitigation banks, which currently have a sufficient amount of credits available. There may be a need for wood stork mitigation too. The need for wood stork mitigation, or any other species, is still to be determined. Nonetheless, WASD is confident that resolution will occur during the permitting process since, to date, discussions with the agencies have been encouraging.

The permitting process at both the County and the City of North Miami requires project site plans to be highly defined. With the site plan now complete (Conceptual Design Report completed and submitted in October 2019), the wetland permitting is currently being coordinated and anticipated to be submitted in March 2020.

After discussing the project with the USACE, WASD has subsequently conducted both wetland and wildlife species field investigations to facilitate the permitting process. In addition, cultural survey assessment is to commence in early 2020. Lastly, the USACE approval process typically takes longer to complete than the state process; however, WASD is committed to actively pursue permit approval and timely respond to any comments from USACE.

Since substantial saltwater wetlands are being mitigated, the County will need to obtain approval from the Miami-Dade Board of County Commissioners. Prior to that occurring, the standard substantial permit justification will need to be processed through the regulators. FDEP has similar permit justification steps. Stormwater permitting will be deferred until the designs are nearly completed. The City of North Miami will require commissioner approval all along the design process.

Continuous coordination between the design and the wetland permitting process is vital for the completion of design at this facility. Since most of the site is forested wetlands, access to obtain soil boring data could be impacted until full coordination with regulatory agencies. Since the foundation of the structures requires site-specific investigations to complete the structure designs, WASD is pursuing an expedited permit approval.

3.2 Diversion of Nutrients

WASD is anticipated to meet the AWT and management requirements of the OOL, Section 403.086(9), F.S., by reducing cumulative nutrient loadings discharged to the outfalls between December 31, 2008 and December 31, 2025. The nutrient loading reduction will be equivalent to what would have been achieved if AWT nutrient levels (total nitrogen [TN] = 3 milligrams per liter [mg/L]; total phosphorous [TP] = 1 mg/L) were implemented from December 31, 2018 through December 31, 2025. The target reduction during this period are 59,900,000 pounds (29,950 tons) of TN and 2,900,000 pounds (1,450 tons) of TP (OOL, 2017). Because the OOL applies to WASD outfalls inclusively, the target nutrient reduction is the combined results for both the NDWWTP and CDWWTP.

WASD will continue to report progress to the FDEP annually. Both the NDWWTP and the CDWWTP have Administrative Orders (AOs) attached to their current operating permits to implement the OOL. Section III, Paragraph 3 in both AOs requires the submittal of an annual cumulative load reduction report by March 1 of each year beginning in 2013. The previously reported load reduction from the outfalls accounts for the treated effluent sent to the four existing injection wells at NDWWTP. At CDWWTP, WASD proposed new industrial injection wells to increase its ability to remove nutrient loading from the ocean outfalls by the end of 2025. This accounting for the diversion at NDWWTP will continue, and beginning in 2019, the two new industrial wells at CDWWTP will begin regular use (in November).

In the Spring of 2018, operations at NDWWTP changed after new Consent Decree capital projects were completed. New aeration and solids retention practices have caused the nitrogen concentrations in the effluent to noticeably decrease by 1 to 3 mg/L per month. The nitrification of ammonia and subsequent denitrification (release to the atmosphere) has consistently reduced the nitrogen load sent to NDWWTP's outfall during the past year. The historical tracking of TN load reduction solely by measuring flow down the wells does not account for changes in concentration that result from changes in the treatment process operations.

The two industrial wells at CDWWTP will accept the discharge of in-plant waste streams from the air scrubber wastewater, sludge dewatering centrate, and landfill leachate from an adjacent facility (WASD, 2013). The in-plant wastes have high nutrient concentrations (higher than the effluent to the outfall) and

are currently returned to the headworks. Removing these waste streams will reduce outfall effluent nutrient concentrations. Consequently, to capture this reduction in nutrient load to the outfall from treatment plant operational changes, an updated approach to quantify the load reduction is described in Appendix B. Future projections were made to track compliance with the AWT requirement going forward.

3.2.1 2019 Status

The nutrient diversions reported previously were updated to capture the new approach described in Appendix B. Table 3-3 and 3-4 provides the updated diverted loads for TN and TP, respectively. Supporting information is provided in Appendix B.

Table 3-3. Updated Diverted TN Load from the Outfalls

5-Year Progress Report: Progress from 2008 through 2019

Year	NDWWTP Annual (lbs TN/yr)	CDWWTP Annual (lbs TN/yr)	Discounted Total Cumulative Load (lbs TN)	Discounted Total Cumulative Load (tons TN)
2009	1,451,299	0	1,220,906	610.5
2010	1,445,083	0	2,435,596	1,217.8
2011	2,090,387	0	4,295,590	2,147.8
2012	2,538,247	0	6,603,445	3,301.7
2013	2,273,106	0	8,646,158	4,323.1
2014	2,518,451	0	10,934,216	5,467.1
2015	2,170,189	0	12,874,011	6,437.0
2016	2,306,747	0	14,950,365	7,475.2
2017	2,148,815	0	16,868,787	8,434.4
2018	1,529,165	0	17,536,870	8,768.4
2019 through Sept.	2,120,662	109,779	19,594,990	9,797.5
		Goal	59,900,000	
			32.7%	

Discounted Total Cumulative Load: The annual diversions were reduced by an agreed baseline adjustment of 230,393 lbs TN to account for the limited use of the NDWWTP injection wells during the baseline period

Table 3-4. Updated Diverted TP Load from the Outfalls

5-Year Progress Report: Progress from 2008 through 2019

Year	NDWWTP Annual (lbs TP/yr)	CDWWTP Annual (lbs TP/yr)	Discounted Total Cumulative Load (lbs TP)	Discounted Total Cumulative Load (tons TP)
2009	112,998	0	84,801	42.4
2010	114,156	0	170,760	85.4
2011	195,945	0	338,508	169.3
2012	220,689	0	531,000	265.5

Table 3-4. Updated Diverted TP Load from the Outfalls
5-Year Progress Report: Progress from 2008 through 2019

Year	NDWWTP Annual (lbs TP/yr)	CDWWTP Annual (lbs TP/yr)	Discounted Total Cumulative Load (lbs TP)	Discounted Total Cumulative Load (tons TP)
2013	170,247	0	673,049	336.5
2014	285,337	0	930,190	465.1
2015	247,520	0	1,149,512	574.8
2016	224,181	0	1,345,496	672.7
2017	173,054	0	1,490,353	745.2
2018	131,178	0	1,588,508	794.3
2019 through Sept.	207,387	9,562	1,784,367	892.2
		Goal	2,900,000	
			61.5%	

Discounted Total Cumulative Load: The annual diversions were reduced by an agreed baseline adjustment of 28,197 lbs TP to account for the limited use of the NDWWTP injection wells during the baseline period

3.2.2 Actions Remaining to Accomplish the OOL AWT Objective

The projected diversion of nutrients from the outfalls in the future are shown in Figures 3-1 and 3-2 for TN and TP, respectively. The operation of the existing injection wells at NDWWTP and diversions to the new injection wells at CDWWTP at permit limits are anticipated to meet the OOL target reductions. Although the reduction in TP is ahead of schedule, the reduction in TN is projected to be achieved at approximately the compliance date of December 31, 2025. As such, variation in TN diversions may impact the ability to meet the target by the specified date. WASD will closely monitor nutrient diversions and take the corresponding action necessary to maximize compliance with the targeted reduction.

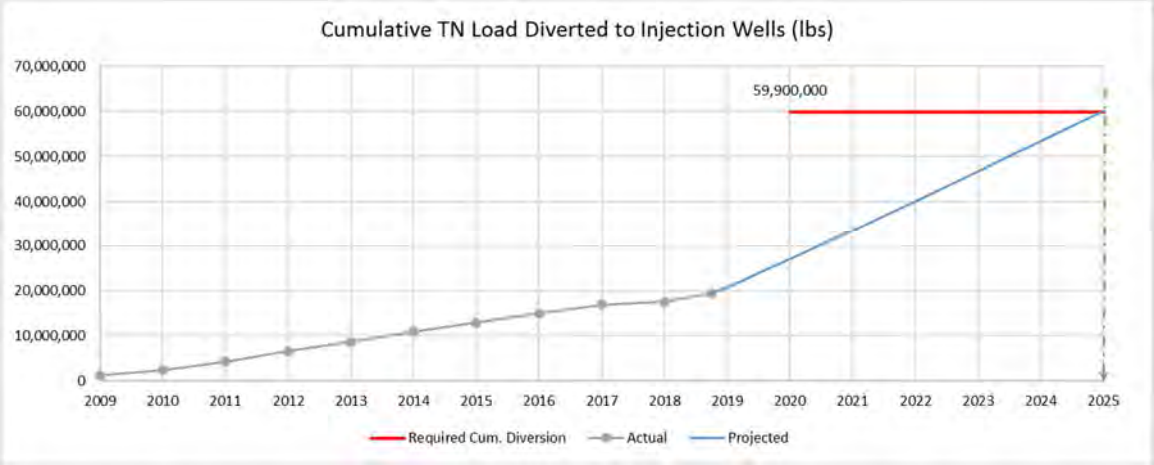


Figure 3-1. Projected TN Diversions from the WASD Outfalls
5-Year Progress Report: Progress from 2008 through 2019

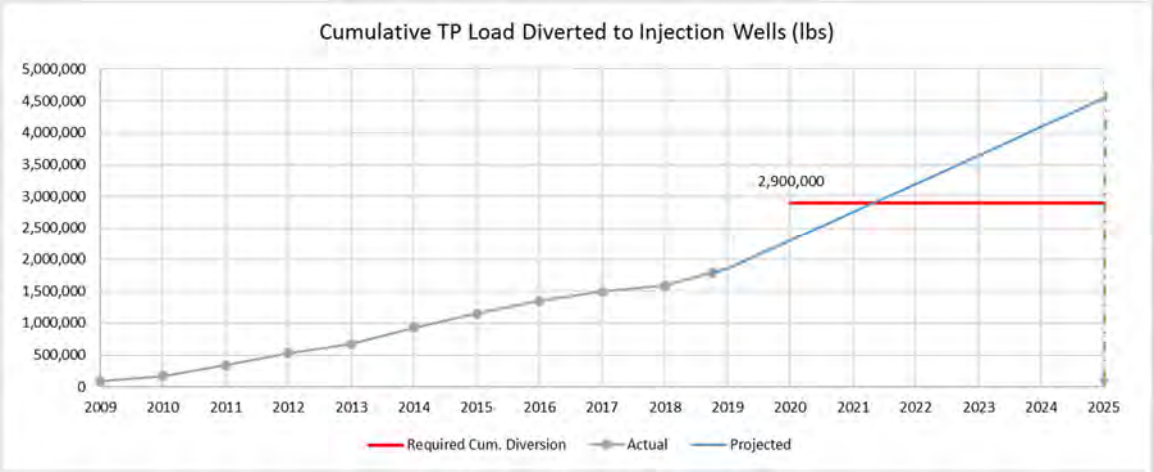


Figure 3-2. Projected TP Diversions from the WASD Outfalls
5-Year Progress Report: Progress from 2008 through 2019

3.2.3 Obstacles to Achieving AWT Objective

Based on the projections, there should be no obstacle for meeting the target reduction in TP. The goal of reducing the cumulative load of 2,900,000 pounds of TP from the outfall discharge should be exceeded by the end of 2021.

Similarly, WASD should meet the goal of reducing the cumulative load of 59,900,000 pounds of TN from the outfall discharge by the end of 2025. However, the projection is based on limited data and the best professional judgment. Now that the use of the industrial injection well is authorized for the initial testing period, no further obstacles are foreseen, if the normal operation continues and the diversion to the new injection wells remains high (near permit limits). Furthermore, the blending of centrate to keep the discharge into the industrial wells under secondary limits may reduce the projected diversion volume (and load). The actual future performance will differ from the projection because of natural variability. WASD will continue to track and report the diverted loads as required by their permits.

3.3 Implementation of Reuse

The OOL requires that WASD implement up to 117.5 mgd of technically, environmentally, and economically feasible reuse capacity, which represents 60 percent (60%) of the baseline outfall flows as defined in the statute. While the laudable intent of this provision is to maximize the efficiency of beneficial use of water resources, several factors have prevented the feasibility of significant reuse of reclaimed wastewater in Miami-Dade County. These factors have been noted in correspondence and meetings with FDEP and reinforced in the recent update of WASD's reuse feasibility studies (Tetra Tech, 2018). Among the pertinent factors limiting practical wastewater reuse opportunities are the significant reductions in per capita and overall water use within WASD's service area. Moreover, the configuration of WASD's collection and treatment system for irrigation reuse applications that are the most common in Florida creates limitations in economically feasible implementations. Lastly, the extraordinary treatment requirements needed to reclaim wastewater to meet the standards associated with Everglades restoration, protection of Outstanding Florida Waters (OFW), and any potential indirect potable reuse applications, once again results in economically and environmentally feasible implementation challenges.

As previously described in Section 2.1, because of a very successful water conservation program, the deceleration of population growth, permanent year-round irrigation restrictions, landscape ordinances, high-efficiency fixtures for new construction, changing trends in housing demographics, evolving water use practices, and the availability of alternative water supplies (AWS), WASD is able to meet long term water supply needs, thus impacting the feasibility of reuse within the context of water supply.

In FDEP's 2015 Report to the Florida Legislature on Recommendations for Changes to the Requirements of the Ocean Outfall Legislation, the Department acknowledged that land application reuse opportunities (that is, irrigation) within Miami-Dade County are limited with regards to economic feasibility due to the urbanized nature of the community. Other alternatives, such as aquifer recharge, face several regulatory and economic challenges in Miami-Dade County. Miami-Dade's geographical position between two ecologically sensitive national parks and the unique connectivity between the Biscayne Aquifer and the surrounding water resources requires aquifer recharge to have a significantly higher level of treatment than in other areas of the State. Additionally, aquifer recharge within wellfield protection areas of the County is generally inconsistent with the intent of the wellfield protection provisions of Chapter 24 of the Code, which regulates environmental protection. WASD's experience of piloting and designing aquifer recharge projects has clearly indicated that the economic and environmental impact of aquifer recharge is much greater than that of other available water supplies. This has led to the elimination of several projects from WASD's capital improvement plan and regulatory permits. An example of this dynamic was the replacement of the South District Water Reclamation Facility project (intended for surficial wellfield recharge) for a Floridan aquifer water treatment facility (South Miami Heights Water Treatment Plant). This replacement resulted in approximately $300 million in savings for County ratepayers and an equivalent impact on the surficial aquifer.

Using reclaimed water for restoration or hydration of wetlands contiguous to, or part of, the OFW is subject to the most stringent water quality criteria and narrative standards contained in Florida law. Therefore, in addition to meeting standard requirements of Chapter 62-610, F.A.C. (which regulates the reuse of reclaimed water [Reuse]), Chapter 62-611, F.A.C. (which regulates the discharge of domestic wastewater to wetlands [Wetlands Application]), and Chapter 62-302 F.A.C. (numerical Class III standards), reclaimed water discharged to an OFW or which may affect a downstream OFW must meet antidegradation standards. Secondary treatment and high-level disinfection prior to environmental discharge, which is permittable in other applications, does not meet OFW requirements.

The constraints previously described limits the use of tertiary treated water (HLD) to mostly industrial reuse applications. Therefore, WASD's reuse planning consists primarily of partnerships with industrial users, such as FPL and other governmental stakeholders.

3.3.1 2019 Status

Pursuant to conditions in its Water Use Permit from 2007, WASD has invested tens of millions of dollars in pilot testing and designing various wastewater treatment technologies by which reclaimed wastewater could be made suitable for environmental restoration purposes. These projects, with significant participation by stakeholders, have concluded that the best available treatment technologies would be required to achieve adequate disinfection, nutrient, and microconstituent goals to make reclaimed wastewater consistent with Everglades standards. These technologies are extremely expensive to build and operate and require extraordinary amounts of energy, clearly making reclaimed wastewater the least economically feasible option for these needs.

An initial agreement with FPL to provide up to 90 mgd of HLD quality effluent for use in cooling towers for two (2) additional nuclear units at Turkey Point was the centerpiece of WASD's initial reuse strategy until FPL determined not to construct the new units. Discussions with FPL are continuing with respect to a smaller scale project at the Turkey Point Nuclear Power Facility. This project is intended to provide FPL with additional water resources to meet operational requirements at the FPL Turkey Point Nuclear Power Plant, including water for application in cooling towers and potentially the cooling canal system.

3.3.2 Actions Remaining to Implement More Reuse

Development of an agreement with FPL for wastewater reuse from the SDWWTP may be concluded by the spring of 2020, but the volume of such reuse is likely to be significantly lower than the previous agreement. Given that current drinking water supplies are projected to be adequate until at least 2035, reclaimed wastewater is not cost-effective, nor is it a needed alternative to meet drinking water demands within the timeframe specified in the OOL statute.

Under the OOL, Section 403.086(9), F.S., feasible reuse may meet public and natural systems demands and shall consider unmet water supply need and integration with other AWS commitments. Specifically, feasible reclaimed water shall consider future regional water demands, availability of traditional supplies, need for the development of AWS, and the degree that reuse may offset potable water supplies. The availability of adequate water supply defers the need for reclaimed water and diminishes its economic feasibility. Reuse that does not fulfill a water supply need more cost-effectively than other AWS is considered economically infeasible.

In consultation with FDEP and South Florida Water Management District leadership, as well as other environmental stakeholders, WASD is currently evaluating a broader definition of reuse. This comprehensive definition would include all AWS options in conjunction with needs beyond direct potable water supply, including coastal wetlands rehydration that can help to limit saltwater intrusion into the Biscayne aquifer as sea level continues to rise. Part of this strategy includes the capture of surplus stormwater during the wet season for storage in Aquifer Storage and Recovery (ASR) wells in the Floridan aquifer from which freshwater can be recovered in the dry season for both environmental and drinking water needs. The feasibility of using ASR for a variety of purposes is enhanced by an exemption from the requirement to treat water before it is stored in the Upper Floridan formation.

The above approach is consistent with the existing regulatory framework in the State of Florida. Section 373.250, F.S. gives equal standing to conservation and reuse practices, and hence both are encouraged for the betterment of public interest. WASD has been aggressively implementing a conservation program that has reduced per capita water demand, with the result being less use of the water supply than what was required more than a decade ago. WASD continues to operate well within its permitted allocation, with no anticipated additional water supply need through 2035. The lack of water supply needed prior to 2025 and commitment to pursue AWS options provides a basis for reducing the feasible reuse required.

In the OOL statute, "reuse" is not a defined term, and a broader interpretation is consistent with the evolving "one water" approach to managing water resources more efficiently and cost-effectively. The narrower definition of "reuse" that is restricted to reclaimed wastewater results in an approach that considers the most expensive option to meet all types of water supply needs. This is far more expensive than using brackish water, ocean water, water allocated from the C-51 project, or ASR systems to capture local surplus wet season water. A broader approach will allow regional and state funding coalitions to pursue more efficient uses of water resources. Opportunities include uses to rehydrate coastal wetlands, contribute to other aspects of Everglades restoration, enhance seasonal accommodation of agriculture where localized flooding has become a problem, and limit some of the adverse consequences of sea level rise.

WASD's plan going forward is to continue discussions with FPL for reuse opportunities that can be cost-effectively realized while also expanding the working definition of reuse to include all other AWS options. As state plans are initiated for accelerating attention to water resources and the consequences of SLR, the timing is appropriate to integrate those plans with water utilities, WASD specifically, to optimize water management for multiple beneficial purposes. This approach represents the best opportunity to identify specific projects that are technically, economically, and environmentally feasible and that have definable benefits to WASD customers to justify the proportional financial investment.

3.3.3 Obstacles to Achieving Reuse Goal

WASD's continuing efforts to increase reuse utilization is well documented; however, it is not currently technically, environmentally, and economically feasible to achieve 117.5 mgd of reuse. Collectively, and over the long term, it is anticipated that WASD's reclaimed water program will grow to become a significant component of its water supply portfolio. Large-scale reuse applications are expected to focus on potential FPL applications initially but will become increasingly diversified over time. Implementation of reuse opportunities is expected to be initiated prior to the OOL 2025 deadline and extend well beyond that timeframe as external factors, beyond WASD's direct control, relating to timing, need, and feasibility.

The importance of reclaimed water, as an essential part of WASD's integrated water supplies, is expected to grow as lower cost permitted supplies are exhausted and the development of more costly supplies is required to support continued growth. Consequently, regular assessment and evaluation of needs and cost-effective alternatives will continue to be ongoing as part of WASD's regular planning efforts.

Given the continued work toward efficiently using reclaimed water in the context of future regional water supply demands and ongoing coordination with FPL and other stakeholders to advance feasible reuse opportunities, WASD is compliant with the OOL's reuse requirements.

SECTION 4

OOL Schedule

The OOL Program schedule is regularly updated and maintained based on meeting the OOL mandates. The overall scheduling strategy is to keep essential elements moving on an aggressive schedule and delay other elements to improve the management of site work and operations, as well as cash flow to better meet the revenue sources. The projected flow rates provided in Section 2.1 were for 2035 conditions, and the OOL requires compliance at 2025. Therefore, some projects will be constructed in phases depending on the actual observed growth in demand to better manage the financing, labor resources, and other construction issues. The schedule provided in this section is the OOL Program's WASD approved baseline as of December 2, 2019. As indicated in Table 4-1, all essential work will be substantially complete by the end of 2025. While construction will be substantially complete by the dates listed, some additional close-out activities will occur after 2025 prior to final project completion.

The injection wells are moving forward on an independent schedule that paces the construction of wells (drilling) to occur at no more than two regional WWTPs at a time. Drilling has started at the CDWWTP. Permitting for the NDWWTP injection well work has begun, and WASD is obtaining approval for drilling on the uplands at the expansion site. The injection well schedule acknowledges that there may be a delay after the wells are drilled before the WWTPs can be upgraded to use the injection system. WASD intends to coordinate with FDEP to keep the UIC construction permits valid until all work is completed prior to testing and acceptance.

The NDWWTP has extensive permitting requirements because most of the new work is on an undeveloped site with wetlands. The permitting schedule for this site is assumed to be two (2) years, but the actual time may vary and is dependent on outside factors. In addition, the City of North Miami must approve the development and zoning applications separately (included in the permitting task).

Table 4-1 and Figure 4-1 provide a summary of the OOL Program schedule for the projects that are strictly related to meeting the OOL objectives. Appendix C provides a more detailed schedule of the entire project duration and phases in a Gantt chart.

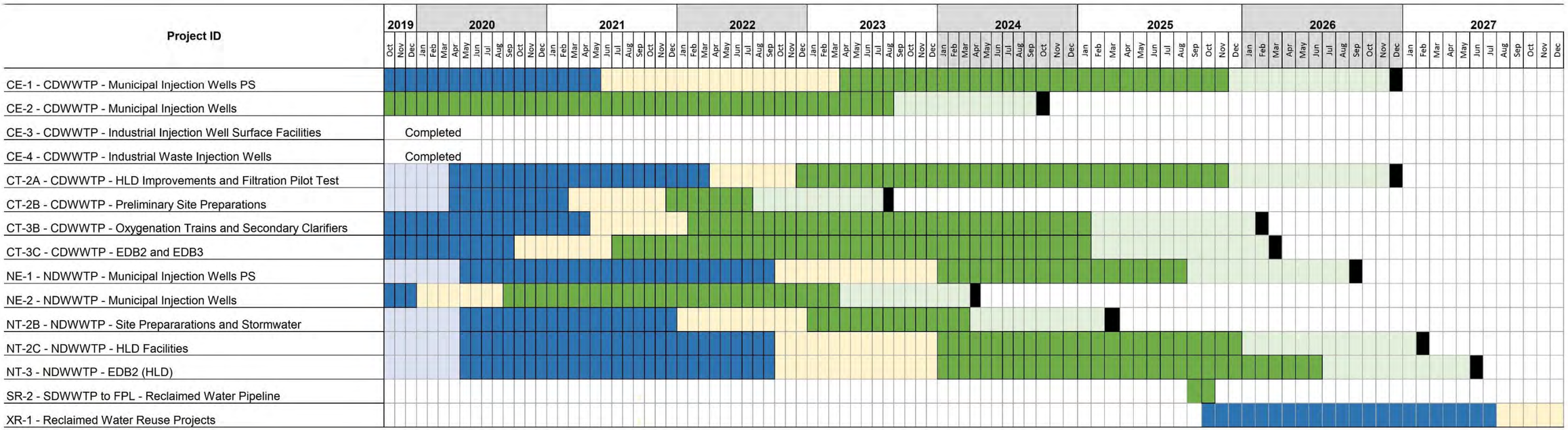
Table 4-1. OOL Compliance Projects Delivery Schedule
5-Year Progress Report: Progress from 2008 through 2019, OOL

Project ID	Project Start	Design Start	Design Completion	Construction Start	Construction Substantial Completion	Project Complete
CE-1 - CDWWTP - Municipal Injection Wells PS	March 2016	February 2019	May 2021	March 2023	November 2025	December 2026
CE-2 - CDWWTP - Municipal Injection Wells	December 2015	June 2017	May 2018	August 2019	August 2023	October 2024
CE-3 - CDWWTP - Industrial Injection Well Surface Facilities	January 2014	October 2014	August 2016	May 2017	May 2019	November 2019
CE-4 - CDWWTP - Industrial Waste Injection Wells	July 2012	July 2012	November 2012	October 2014	September 2017	September 2017
CT-2A - CDWWTP - HLD Improvements and Filtration Pilot Test	March 2016	April 2020	March 2022	December 2022	November 2025	December 2026
CT-2B - CDWWTP - Preliminary Site Preparations	March 2016	April 2020	February 2021	November 2021	July 2022	August 2023
CT-3B - CDWWTP - Oxygenation Trains and Secondary Clarifiers	March 2016	January 2019	April 2021	January 2022	January 2025	February 2026
CT-3C - CDWWTP - EDB2 and EDB3	March 2016	January 2019	September 2020	June 2021	January 2025	March 2026
NE-1 - NDWWTP - Municipal Injection Wells PS	June 2018	May 2020	September 2022	December 2023	August 2025	September 2026
NE-2 - NDWWTP - Municipal Injection Wells	December 2015	January 2019	December 2019	September 2020	March 2023	April 2024
NT-2B - NDWWTP - Site Preparations and Stormwater	June 2018	May 2020	December 2021	December 2022	March 2024	March 2025
NT-2C - NDWWTP - HLD Facilities	June 2018	May 2020	September 2022	December 2023	December 2025	February 2027
NT-3 - NDWWTP - EDB2 (HLD)	June 2018	May 2020	September 2022	December 2023	June 2026[a]	July 2027
SR-2 - SDWWTP to FPL - Reclaimed Water Pipeline	October 2025	by others	by others	October 2025	October 2025	October 2025
XR-1 - Reclaimed Water Reuse Projects	October 2025	October 2025	August 2027	March 2028	March 2030	February 2031

Notes:

Most projects have a year of acceptance testing prior to closeout.

[a] FPL power available June 2025 for commissioning of HLD facilities and new Injection Well Pump Station. Backup power will be provided later.



Notes:

Fiscal Year (FY) ends September 30 of each year. Each vertical bar is a month.

Most projects have a year of acceptance testing prior to closeout.

NT-2 will have FPL power available June 2025 for commissioning of HLD facilities and new Injection Well Pump Station. Backup power will be provided later.

CT-2A HLD-related projects may be deferred pending the resolution of continuing collaboration on regulatory alternatives with FDEP and EPA.

Figure 4-1. OOL Compliance Projects Updated Construction Schedule
5-Year Progress Report: Progress from 2008 through 2019, OOL

SECTION 5

Financial Plan

WASD has, for many years, used a formal, comprehensive capital program and budgeting process. Under this process, capital programs are projected forward over a 6-year period and beyond. A detailed budget is adopted by the Board of County Commissioners and appropriated for the first year of each multi-year period. Both program and budget commitments are reviewed each year and modified as necessary.

WASD continually refines its processes on cost estimation, identifying project interdependency, and re-evaluates project scopes to refine the capital plan. Using this approach, WASD has deferred projects beyond the horizon of the Multi-Year Capital Plan (MYCIP), reducing previous 15-year plans from $13.3 billion for Fiscal Year 2018 to $11.4 billion for Fiscal Year 2019. Additionally, to focus on near term projects, WASD has changed the period of the MYCIP to 10 years for Fiscal Year 2020. WASD also reduced the Fiscal Year 2020 MYCIP due largely to revised flow projections, which defer the need for certain new water and wastewater treatment plants and associated conveyance from 2025 to 2035, or beyond. The Fiscal Year 2020 MYCIP is $7.5 billion for water and wastewater, including the $1.67B required for OOL Compliance.

Set forth in Table 5-1 is a summary of the MYCIP for Fiscal Year 2020. The funding of the MYCIP includes proceeds of the Outstanding Bonds, Additional Bonds, Subordinate Obligations (including loans and commercial paper notes), and certain annual revenue sources for WASD. These MYCIP capital expenditures consist of the design, construction, construction management, and program management expenses associated with capital improvements related to wastewater treatment, collection facilities, and pumping stations, expansion of improvements to the water treatment plants, water main rehabilitation, and other similar projects. These projects are consistent with the improvements identified in the Water and Wastewater Facilities Master Plans, the 2014 Consent Decree, OOL, and the Interim Peak Flow Management Plan. The capital improvement projects are necessary to:

- Provide additional capacity to serve additional customers
- Meet the requirements of the regulatory actions imposed by FDEP and the EPA
- Provide back-up reserve capacity in the water and wastewater transmission systems
- Comply with level service requirements contained in the Comprehensive Development Master Plan
- Improve operating efficiencies of the utility

Table 5-1. OOL Adopted Fiscal Year 2020 Multi-Year Capital Plan

5-Year Progress Report: Progress from 2008 through 2019, OOL

ADOPTED FISCAL YEAR 2020 MULTI-YEAR CAPITAL PLAN

($ in thousands)

WATER

Fund Description	Prior	2020	2021	2022	2023	2024	2025	Future	Total
Water Renewal & Replacement Fund	$165,812	$61,930	$40,337	$40,000	$40,000	$40,000	$40,000	$40,000	$468,079
Plant Expansion Fund - Water	$25,338	$10,867	$288	$0	$0	$0	$0	$0	$36,493
State Revolving Loans - Water	$40,789	$6,560	$6,958	$307	$0	$0	$0	$0	$54,614
Fire Hydrant Fund	$6,021	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$6,449	$27,470
General Obligation Bonds	$14,246	$1,265	$776	$403	$261	$0	$6,895	$0	$23,846
Water Special Construction Fund	$14,769	$2,000	$2,000	$2,000	$2,000	$2,000	$2,627	$0	$27,396
Future WASD Revenue Bonds	$0	$105,637	$104,951	$92,896	$77,821	$65,962	$64,485	$222,642	$734,394
Miami Springs Construction Fund	$8,657	$4,653	$0	$0	$0	$0	$0	$0	$13,310
W Construction - 2013 Bonds	$27,158	$0	$0	$0	$0	$0	$0	$0	$27,158
WASD Water Commercial Paper - 2015	$121,051	$500	$0	$0	$0	$0	$0	$0	$121,551
Total Water	**$423,841**	**$195,912**	**$157,810**	**$138,106**	**$122,582**	**$110,462**	**$116,507**	**$269,091**	**$1,534,312**

WASTEWATER

Fund Description	Prior	2020	2021	2022	2023	2024	2025	Future	Total
Wastewater Renewal & Replacement Fu	$198,669	$64,635	$59,083	$55,000	$55,000	$55,000	$55,000	$55,000	$597,387
Plant Expansion Fund - Wastewater	$129,976	$51,039	$64,821	$31,491	$18,454	$20,753	$18,000	$0	$334,534
General Obligation Bonds	$17,790	$10,887	$15,803	$19,081	$20,535	$30,900	$27,393	$0	$142,389
Wastewater Special Construction Fund	$5,518	$500	$500	$500	$500	$500	$500	$0	$8,518
Future WASD Revenue Bonds	$0	$240,857	$342,074	$415,176	$494,465	$542,269	$495,125	$1,261,149	$3,791,115
State Revolving Loans - Wastewater	$21,046	$7,892	$11,523	$585	$0	$0	$0	$0	$41,046
Miami Springs Construction Fund	$867	$0	$207	$252	$0	$0	$0	$0	$1,326
S Construction - 2013 Bonds	$168,230	$0	$0	$0	$0	$0	$0	$0	$168,230
WASD Wastewater Commercial Paper -	$746,135	$59,600	$0	$0	$0	$0	$0	$0	$805,735
WIFIA LOAN	$15,529	$10,122	$27,493	$32,349	$14,207	$0	$0	$0	$99,700
Total Wastewater	**$1,303,760**	**$445,532**	**$521,504**	**$554,434**	**$603,161**	**$649,422**	**$596,018**	**$1,316,149**	**$5,989,978**
Combined Water and Wastewater	**$1,727,601**	**$ 641,444**	**$ 679,314**	**$ 692,540**	**$ 725,743**	**$ 759,884**	**$ 712,525**	**$1,585,240**	**$7,524,290**

FY 2019 - 20 Adopted Budget and Multi-Year Capital Plan

OUTFALL LEGISLATION **PROJECT #: 962670**

DESCRIPTION: Eliminate outfall flows to the ocean

LOCATION: Systemwide
Various Sites

District Located: Systemwide
District(s) Served: Systemwide

REVENUE SCHEDULE:	PRIOR	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	FUTURE	TOTAL
Future WASD Revenue Bonds	0	42,577	43,687	81,836	151,655	206,305	239,376	515,628	1,281,064
State Revolving Loan Wastewater Program	41,046	0	0	0	0	0	0	0	41,046
WASD Revenue Bonds Sold	106,063	0	0	0	0	0	0	0	106,063
Wastewater Connection Charges	19,652	16,420	15,910	14,240	12,088	20,753	18,000	0	117,063
Wastewater Special Construction Fund	1,064	0	0	0	0	0	0	0	1,064
WIFIA Loan	99,700	0	0	0	0	0	0	0	99,700
TOTAL REVENUES:	**267,525**	**58,997**	**59,597**	**96,076**	**163,743**	**227,058**	**257,376**	**515,628**	**1,646,000**
EXPENDITURE SCHEDULE:	**PRIOR**	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**2023-24**	**2024-25**	**FUTURE**	**TOTAL**
Construction	150,284	70,850	90,724	118,689	163,714	208,893	236,786	474,378	1,514,318
Land Acquisition/Improvements	1,634	770	986	1,289	1,779	2,271	2,574	5,156	16,459
Planning and Design	11,436	5,391	6,903	9,032	12,457	15,894	18,016	36,094	115,223
TOTAL EXPENDITURES:	**163,354**	**77,011**	**98,613**	**129,010**	**177,950**	**227,058**	**257,376**	**515,628**	**1,646,000**

5.1 State Revolving Fund Loan Program

Under the State Revolving Fund Loan Program, WASD has received various loan commitments in the aggregate amount of $339,605,447 for the construction of wastewater treatment facilities. Draws against wastewater treatment loan commitments totaled $319,605,447 as of September 30, 2019. WASD has also received loan commitments in the aggregate amount of $108,014,191 for drinking water construction projects. Draws against drinking water loan commitments totaled $75,305,041 as of September 30, 2019. Default in payment of principal and interest on any of the loans described above or any future loans could cause an acceleration of the entire amount of such loans.

5.2 Water Infrastructure Finance and Innovation Act Loan Program

In 2017, EPA selected WASD to be one of 12 entities invited to apply for funding through the inaugural Water Infrastructure Finance and Innovation Act (WIFIA) loan program. WASD closed on approximately $99.7 million in WIFIA funding at an interest rate of 2.89 percent (2.89%) on March 22, 2019, for its Ocean Outfall Reduction and Resiliency Enhancement Project. WIFIA will fund up to 49 percent (49%) of the project's estimated costs on a reimbursement basis, or $99.7 million of this project's costs. The remainder of the project is being funded through the State Revolving Fund Loan Program and WASD's cash on hand.

WASD is expected to close on approximately $326 million in funding as part of the second round of the WIFIA loan program. The funding will provide up to 49 percent (49%) or $326.2 million for the design and construction of five new electrical distribution buildings at the three (3) regional WWTPs. The remainder of the project cost is being funded through the State Revolving Fund Loan Program and WASD's cash on hand.

WASD has been invited to apply for approximately $206.7 million as part of the third round of the WIFIA loan program. The funding will provide up to 49 percent (49%) or $206.7 million for the design and construction of WWTP Plant Step Feed and Oxygenation Train Rehabilitation; Filter Backwash; Headworks and Oxygenation Trains; Clarifiers, HLD and Chlorine Contact Basins; and Injection Wells Pump Stations modifications. WASD is currently completing its application. Final funding is dependent upon approval by the EPA and the Board of County Commissioners. It is anticipated that the remainder of this project will be funded through the issuance of subordinate debt in 2020.

5.3 Commercial Paper Notes

On May 26, 2016, the County issued its Water and Sewer System Commercial Paper Notes, Series A-1 (Tax-Exempt) ("Series A-1 CP Notes") and its Water and Sewer System Commercial Paper Notes, Series B-1 (Tax-Exempt) (the "Series B-1 CP Notes"). Re-funded CP Notes will be funded with a portion of the proceeds of the Series 2019B Bonds, together with other available funds. The commercial paper program also allows for the issuance of Water and Sewer System Commercial Paper Notes, Series A-2 (Taxable) (together with the Series A-1 CP Notes, the "Series A CP Notes") and Water and Sewer System Commercial Paper Notes, Series B-2 (Taxable) (together with the Series B-1 CP Notes, the "Series B CP Notes") but to date, none have been issued. No more than $400,000,000 in Series A CP Notes and Series B CP Notes (collectively, the "CP Notes") may be outstanding at any one time. Payment of all outstanding Series A-1 CP Notes is secured by and payable under an irrevocable transferrable direct-pay Letter of Credit issued by Barclays Bank PLC, which expires on May 17, 2021. Payment of all outstanding Series B-1 CP Notes is secured by and payable under an irrevocable transferrable direct-pay Letter of Credit issued by Sumitomo Mitsui Banking Corporation, acting through its New York Branch, which expires on May 17, 2021.

On November 6, 2019, the County replenished its Water and Sewer System Commercial Paper Notes and sold revenue bonds 2019 B-1 Series in the amount of $400 million. At this point in time, WASD has a $400 million in a revolving credit line and $400 million in revenue bonds.

5.4 Miami-Dade Water and Sewer Financial Plan

Annually through the budget development process, WASD prepares a budget that includes the annual operating budget, as well as the capital budget, and MYCIP supported largely by debt issuances backed by proprietary revenues. WASD is a proprietary agency supported entirely from fees and charges charged to water and wastewater systems users. Water and wastewater retail bills are adjusted annually to ensure that funding is adequate to cover both operating costs and capital requirements. WASD plans annual budgets to ensure that continuing services are sustainable within the expected revenues over a 5-year period. The 5-year financial plan should not be considered a 5-year budget (Table 5-1). It is a tool used to forecast short-term future needs to cover new costs that come online as the capital improvements are completed and to identify new capital funding needs as new improvements move into the 5-year time frame. WASD continuously participates in rate and debt management to maintain residential water and wastewater bills below its neighbors and peers.

As shown in Figure 5-1, the FY 2020 Adopted Budget and MYCIP for the Water and Sewer Department totals $7.524 billion in a 10-year period. Table 5-2 identifies debt service funding requirements for a 5-year period, including existing debt service and future debt requirements.

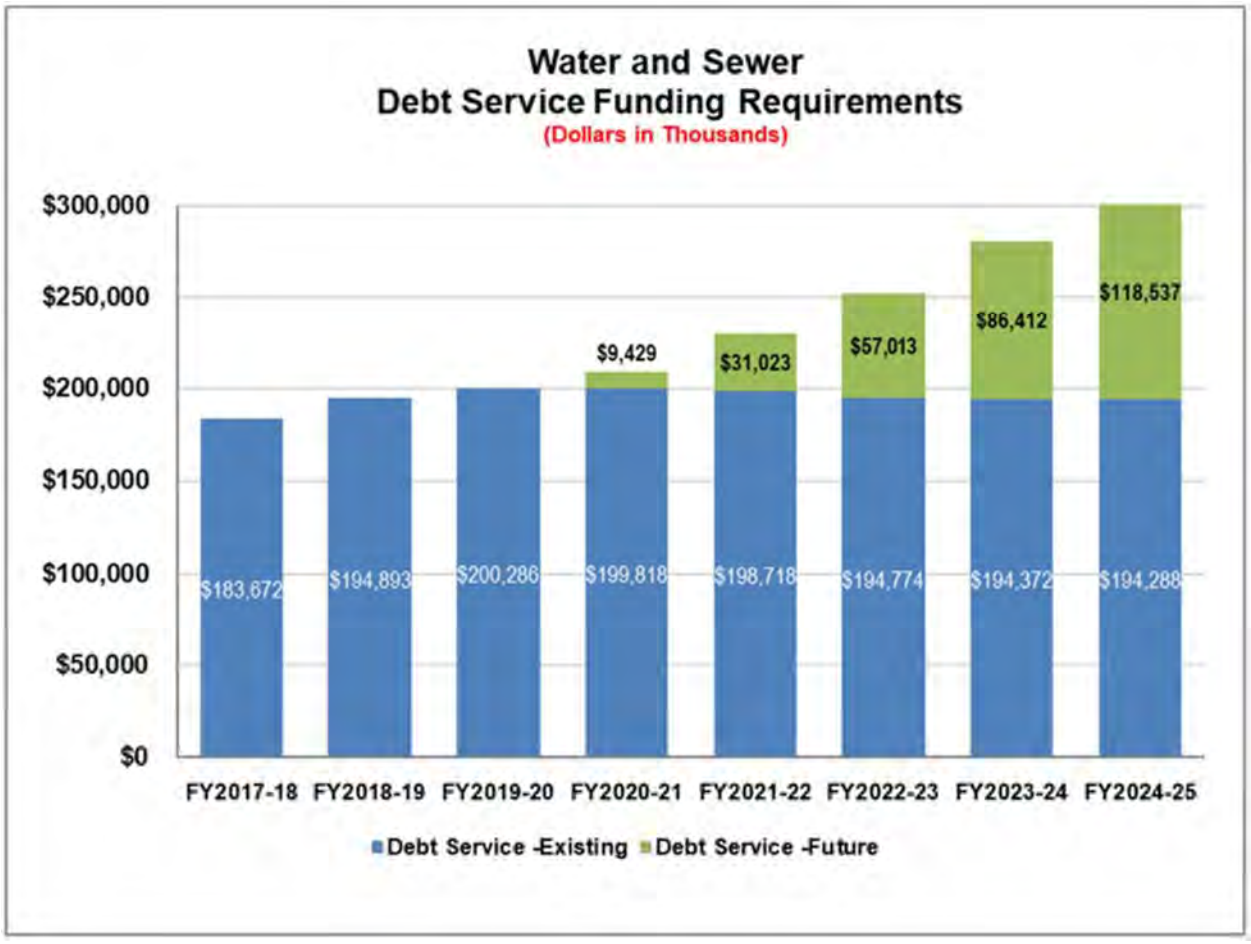


Figure 5-1. Miami-Dade Water and Sewer Debt Service Funding Requirements
5-Year Progress Report: Progress from 2008 through 2019, OOL

Revenue increases will be necessary over the period of this analysis to support operating and maintenance expenses, as well as debt service requirements to support the system while maintaining adequate reserves and overage ratios. Table 5-2 illustrates WASD's forecasted cash flows and coverage requirements.

Table 5-2. Miami-Dade Water and Sewer Cash Flow

5-Year Progress Report: Progress from 2008 through 2019, OOL

WATER AND SEWER CASH FLOWS								
(Dollars In Thousands)				Retail Revenue Increase 7%	Retail Revenue Increase 8%	Retail Revenue Increase 7%	Retail Revenue Increase 7%	Retail Revenue Increase 9%
Water and Wastewater Operations	FY 2017-18 Actual	Revenues at 100% FY 2018-19 Projected	Revenues at 98%,95% FY 2019-20 Adopted	Revenues at 98%,95% FY 2020-21 Future	Revenues at 98%,95% FY 2021-22 Future	Revenues at 98%,95% FY 2022-23 Future	Revenues at 98%,95% FY 2023-24 Future	Revenues at 98%,95% FY 2024-25 Future
Revenues								
Retail Water	$ 268,275	$ 276,925	$ 302,479	$ 322,140	$ 346,300	$ 368,810	$ 394,626	$ 430,143
Wholesale Water	39,310	36,463	30,120	38,001	38,762	39,538	40,329	41,135
Retail Wastewater	295,564	319,401	317,918	338,583	363,976	387,635	414,769	452,098
Wholesale Wastewater	78,425	82,168	76,268	81,920	84,377	86,908	89,516	92,201
Other Operating Revenue	30,275	30,672	32,322	32,484	32,646	32,809	32,973	33,138
Total Operating Revenues	**$ 711,849**	**$ 745,629**	**$ 759,107**	**$ 813,128**	**$ 866,061**	**$ 915,700**	**$ 972,213**	**$ 1,048,715**
Expenses								
Water Operating and Maintenance	$ 174,372	$ 199,878	$ 202,166	$ 209,698	$ 217,444	$ 225,375	$ 233,312	$ 241,783
Wastewater Operating and Maintenance	248,936	244,296	278,196	288,490	299,085	309,945	320,794	332,330
Total Operating Expenses	**$ 423,308**	**$ 444,173**	**$ 480,362**	**$ 498,188**	**$ 516,529**	**$ 535,320**	**$ 554,106**	**$ 574,113**
Non-Operating								
Other Non-Operating Transfers	$ 12,042	$ 17,542	$ 168	$18,006	$27,380	$32,202	$41,421	$62,369
Interest Income	(9,566)	(13,396)	(14,150)	(14,779)	(15,078)	(16,125)	(16,638)	(18,158)
Debt Service - Existing	183,672	194,893	200,286	199,818	198,718	194,774	194,372	194,288
Debt Service - Future	0	0	0	9,429	31,023	57,013	86,412	118,537
Capital Transfers	102,393	102,417	92,441	102,466	107,490	112,515	112,540	117,566
Total Non-Operating Expenses	**$ 288,541**	**$ 301,456**	**$278,745**	**$ 314,940**	**$ 349,532**	**$ 380,380**	**$ 418,108**	**$ 474,602**
Required Primary Debt Service Coverage Ratio	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Actual/Projected Primary Debt Service Coverage Ratio	1.81	1.82	1.60	1.72	1.71	1.66	1.63	1.65
Required State Revolving Loan Debt Service Coverage Ratio	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
Actual/Projected State Revolving Loan Debt Service Coverage Ratio	5.85	6.31	3.82	5.31	5.99	7.36	7.79	9.48

SECTION 6

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Appendix A

Construction Phasing Plans

CENTRAL DISTRICT WASTEWATER TREATMENT PLANT PROJECTS

FOR ILLUSTRATIVE PURPOSES ONLY

TEMPORARY GATE
FLUSHING WATER PS (CT-2A)
INJECTION WELLS (CE-2)
MONITORING WELLS (CE-2)
ELECTRICAL DISTRIBUTION BUILDING 2 - (CT-3C) 06/21 – 01/25
INJECTION WELL PS (CE-1)
CHLORINE CONTACT BASINS (CT-2A)
MONITORING WELLS (CE-2)
INJECTION WELLS (CE-2)
TEMPORARY GATE
CD 2.16/2.12/2.13/ 2.18(2) 08/2020 - 03/2023 THICKENING/ DEWATERING BUILDING
Cake Silos
Bio Filters Building
ELECTRICAL BUILDING FUEL STORAGE
(CT-3C) 06/21 – 01/25
HYPO STORAGE & PUMPING (CT-2A)
ELECTRICAL BUILDING CT-2A
STORMWATER DRY RETENTION AREA & DRAINAGE WELLS (CT-2B)
11/21 – 07/22
FILTER SYSTEM (CT-2A)
POLYMER BUILDING
BACKWASH WASTE TREATMENT (CT-2A)
CT-2A
SANITARY LIFT STATION
TEMPORARY GATE
TO BE DEMOLISHED 2.10
SWM PS # 5 (CT-2B)
CD 2.01(7) 03/2020 - 09/2021 ELECTRICAL SUBSTATIONS
2.10
2.17(A)
2.10
2.10
2.19(2)(A)
COGEN SWITCHGEAR BUILDING
O_2 TRAINS P2 UNOX - 2.06
ELECTRICAL BUILDING RAS 1 & 2
ODORIZING CHEMICAL BUILDING
RAS ELECTRICAL BUILDINGS 3, 4 & 5
RAS PUMP STATIONS CD 2.10/2.01(3)
OXYGENATION TANKS (PLANT No. 2)
CD 2.06 STRUCTURAL REHAB 11/15 - 04/20
CHLORINATION DAY TANK 1
CD 2.08 (3) STRUCTURAL REHAB 11/18 - 04/22 SECONDARY CLARIFIERS PLANT 2 (PLANT No. 2)
GAS SPHERE CONDITION ASSESSMENT
INDUSTRIAL INJECTION WELLS (CE-4)
HEADWORKS 2 ELECTRICAL BUILDING
2.04
CE-3
INDUSTRIAL WELL PUMP STATION
DIGESTER CLUSTER 1 CONTROL BUILDINGS
FPL TRANSMISSION LINES
VPSA BUILDING CD 2.27
SECONDARY CLARIFIERS (PLANT No. 1)
SWM PS # 3 (CT-2B)
SLUDGE THICKENERS (PLANT No. 2)
DIGESTERS REHAB
DIGESTER CLUSTER CONTROL BUILDING
DIGESTER CLUSTER CONTROL BUILDING
SWM PS # 2 (CT-2B)
2.15
RAS PUMP STATIONS
CD 2.17(B) CHLORINATION MAIN STORAGE BUILDING
OXYGENATION TANK (CT-3B)
DIGESTER GAS FLARES
FINAL SETTLING TANKS (CT-3B)
01/22 – 01/25
CD 2.07 (3) STRUCTURAL REHAB 11/19 - 04/22
PLANT 1 RAS ELECTRICAL BUILDING
SWM PS # 4 (CT-2B)
CT-4
RELOCATED STORE BUILDING PROPOSED LOCATION
HEADWORKS 1 ELECTRICAL BUILDING
2.03
COGEN BIOGAS FACILITY
CD 2.19/ 2.01
OXYGENATION TANKS (PLANT No. 1)
SWM PS # 1 (CT-2B)
SPLITTER BOX
CT-3B
2.11 ELECTRICAL BUILDING
CT-2A 12/22 – 11/25
EFFLUENT PUMP STATION
CT-3B
ELECTRICAL SUBSTATIONS
ADMIN BUILDING
CD 2.02
ELECTRICAL DISTRIBUTION BUILDING 3 - (CT-3C) 06/21 – 01/25
(CT-3C) 06/21 – 01/ 25
ELECTRICAL BUILDING FUEL STORAGE

LEGEND

CD	CONSENT DECREE PROJECTS (REHAB)
CD	CONSENT DECREE PROJECTS (NEW)
OOL	OCEAN OUTFALL LEGISLATION PROJECTS
OOL	FUTURE OCEAN OUTFALL LEGISLATION PROJECTS
	10" LEACHATE EFFLUENT PIPE
CIP	CAPITAL IMPROVEMENT PLAN PROJECTS

Title	
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MIAMI-DADE COUNTY

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CENTRAL DISTRICT WASTEWATER TREATMENT PLANT CONSENT DECREE PROJECTS

FOR ILLUSTRATIVE PURPOSES ONLY

CD 2.19(2)A SPOIL PILE 02/12 - 10/19

CD 2.10 SPOIL PILE 12/18 - 07/20

CD 2.16/2.12/2.13/2.18(2) 08/20 - 03/23

CD 2.16/2.12/2.13/2.18(2) 08/2020 - 03/2023 THICKENING/ DEWATERING BUILDING

Cake Silos

Bio Filters Building

CD 2.15(1) 10/16 - 02/20

CD 2.15(2) 07/18 - 02/20

CD 2.19(2)A 07/17 - 10/19

TO BE DEMOLISHED 2.10

COGEN SWITCHGEAR BUILDING

CD 2.01(7) 03/2020 - 09/2021 ELECTRICAL SUBSTATIONS

CD 2.10(1)/ 2.01(3) 12/18 - 11/23

CD 2.10/2.01(3) 12/18 - 11/23

2.10

2.17(A)

2.19(2)(A)

RAS ELECTRICAL BUILDINGS 3, 4 & 5

RAS PUMP STATIONS CD 2.10/2.01(3)

CD 2.10(1)/ 2.01(3) 12/18 - 11/23

O_2 TRAINS P2 UNOX - 2.06

ELECTRICAL BUILDING RAS 1 & 2

ODORIZING CHEMICAL BUILDING

CD 2.01(7)

2.01(7) 03/20 - 09/21

CD 2.06 STRUCTURAL REHAB 11/15 - 04/20

CHLORINATION DAY TANK 1

CD 2.17A 04/16 - 07/18

CD 2.08 (3) STRUCTURAL REHAB 11/18 - 04/22 SECONDARY CLARIFIERS PLANT 2 (PLANT No. 2)

HEADWORKS 2 ELECTRICAL BUILDING

2.04

CD 2.04 08/16 - 12/19

DIGESTER CLUSTER 1 CONTROL BUILDINGS

CD 2.15(1) 03/15 - 02/20

CD 2.27(2) 03/19 - 09/22

VPSA BUILDING CD 2.27

CD 2.27(2) 03/19 - 09/22

DIGESTERS REHAB

DIGESTER CLUSTER CONTROL BUILDING

CD 2.15(3) 12/19 - 06/21

DIGESTER CLUSTER CONTROL BUILDING

CD 2.15(2) 07/18 - 02/20

FPL TRANSMISSION LINES

CD 2.03/04 09/16 - 12/19 PARKING AREA

CD 2.03/04

CD 2.27(2) 03/19 - 09/22

CD 2.19(2)A 02/17 – 10/19

CD 2.19(2)B 08/17 - 10/19

2.15

DIGESTER GAS FLARES

CD 2.15(1)/(2) 01/19 - 01/20

OFFICE TRAILER CURRENT – 01/20

CD 2.15(3) 03/20 - 06/21

CD 2.17(B) CHLORINATION MAIN STORAGE BUILDING

CONTRACTOR PARKING FOR CRAFT

CD 2.07 / 2.09 01/21 – 02/24

CD 2.07 (3) STRUCTURAL REHAB 11/19 - 04/22

PLANT 1 RAS ELECTRICAL BUILDING

2.11 ELECTRICAL BUILDING

CD 2.07/ 2.09 01/21 – 02/24

CD 2.11

HEADWORKS 1 ELECTRICAL BUILDING

2.03

CD 2.03 08/16 - 06/19

COGEN BIOGAS FACILITY

CD 2.19/ 2.01

CD 2.19(2)A/2.01(6) 07/17 - 10/19

ADMIN BUILDING

CD 2.C2

PMCM CONSTRUCTION TRAILER & PARKING AREA

XXXXXX xx/xxxx - xx/xxxx

XXXXXX xx/xxxx - xx/xxxx

CD 2.10/2.01(3) 12/18 - 11/23

CD 2.12/2.13/2.16/2.18(2) 08/20 - 03/23

CD 2.11/2.27/PCL 03/19 - 05/22

CD 2.15(3) 12/19 - 06/21

CD 2.09 01/21 - 02/24

CD 2.01(7) 03/20 - 09/21

PARKING LOT

LEGEND

CD	CONSENT DECREE PROJECTS (REHAB)
CD	CONSENT DECREE PROJECTS (NEW)
CD	CONSENT DECREE CONSTRUCTION STAGING AREAS

Title	
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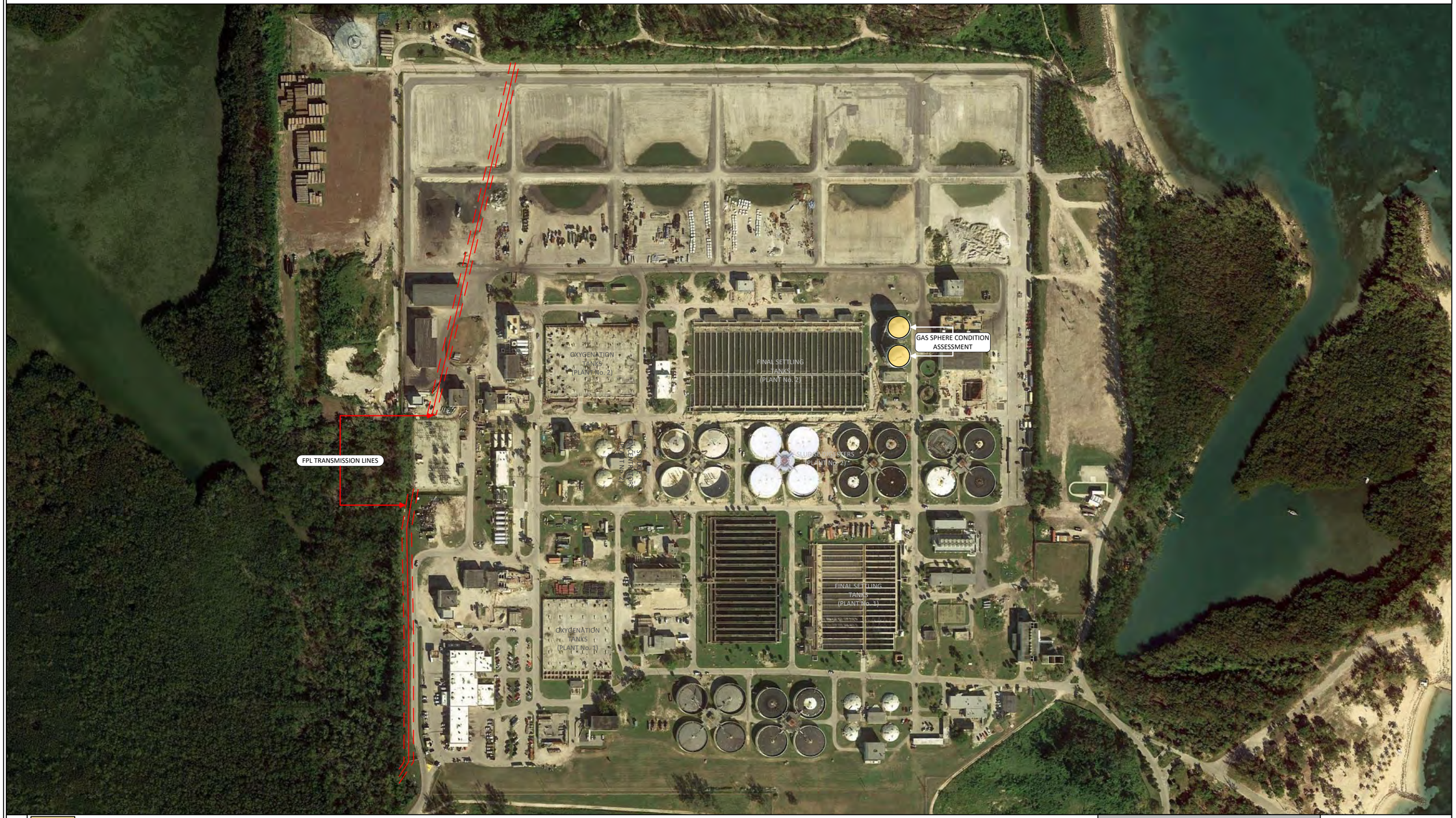
CENTRAL DISTRICT WASTEWATER TREATMENT PLANT CAPITAL IMPROVEMENTS PLAN PROJECTS



FOR ILLUSTRATIVE PURPOSES ONLY

LEGEND

CIP CAPITAL IMPROVEMENT PLAN PROJECTS

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OCEAN OUTFALL LEGISLATION PROGRAM
MIAMI-DADE COUNTY

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CENTRAL DISTRICT WASTEWATER TREATMENT PLANT OOL PROJECTS

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TEMPORARY GATE
FLUSHING WATER PS (CT-2A)
INJECTION WELLS (CE-2)
MONITORING WELLS (CE-2)
ELECTRICAL DISTRIBUTION BUILDING 2 - (CT-3C)
INJECTION WELL PS (CE-1)
CHLORINE CONTACT BASINS (CT-2A)
MONITORING WELLS (CE-2)
INJECTION WELLS (CE-2)
TEMPORARY GATE
ELECTRICAL BUILDING CT-2A
STORMWATER DRY RETENTION AREA & DRAINAGE WELLS (CT-2B)
FILTER SYSTEM (CT-2A)
POLYMER BUILDING
(CT-3C)
BACKWASH WASTE TREATMENT (CT-2A)
CT-2A
SANITARY LIFT STATION
TEMPORARY GATE
SWM PS # 5 (CT-2B)
INDUSTRIAL INJECTION WELLS (CE-4)
OXYGENATION TANKS (PLANT No. 2)
FINAL SETTLING TANKS (PLANT No. 2)
CE-3
INDUSTRIAL WELL PUMP STATION
FPL TRANSMISSION LINES
SWM PS # 3 (CT-2B)
SLUDGE DIGESTERS (PLANT No. 2)
SWM PS # 2 (CT-2B)
RAS PUMP STATIONS
OXYGENATION TANK (CT-3B)
FINAL SETTLING TANKS (CT-3B)
SWM PS # 4 (CT-2B)
CT-4
RELOCATED STORE BUILDING PROPOSED LOCATION
FINAL SETTLING TANKS (PLANT No. 1)
OXYGENATION TANKS (PLANT No. 1)
SWM PS # 1 (CT-2B)
SPLITTER BOX
CT-3B
CT-2A
EFFLUENT PUMP STATION
CT-3B
ELECTRICAL SUBSTATIONS
ELECTRICAL DISTRIBUTION BUILDING 3 - (CT-3C)
(CT-3C)
ELECTRICAL BUILDING FUEL STORAGE

LEGEND

CDM SMITH **MUNICIPAL INJECTION WELL PS** Project: CE-1 PCTS: 10732 Schedule: 03/23 – 11/25	**DESIGN CONSULTANT TBD** **MUNICIPAL INJECTION WELLS** Project: CE-2 PCTS: 10734 Schedule: 08/19 – 08/23	**DESIGN CONSULTANT TBD** **INDUSTRIAL IW SURFACE FACILITIES** Project: CE-3 PCTS: 12982 Schedule: COMPLETED	**STANTEC CONSULTING** **INDUST. WASTE DEEP IW SYSTEM** Project: CE-4 PCTS: 12661 Schedule: COMPLETED	**BLACK & VEATCH** **HLD Improvements & Filtration Pilot Test - FUTURE** Project: CT-2A PCTS: 10728 Schedule: 12/22 – 11/25	**BLACK & VEATCH** **PRELIMINARY SITE PREP** Project: CT-2B PCTS: TBD Schedule: 11/21 – 07/22	**CDM SMITH** **OXYGENATION TRAIN & SECONDARY CLARIFIERS** Project: CT-3B PCTS: TBD Schedule: 01/22 – 01/25	**BROWN & CALDWELL** **EDB 2 & EDB 3** Project: CT-3C PCTS: TBD Schedule: 06/21 – 01/25	**DESIGN CONSULTANT TBD** **NEW STORAGE BUILDING** Project: CT-4 PCTS: TBD Schedule: XX/XX – XX/XX

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CENTRAL DISTRICT WASTEWATER TREATMENT PLANT 2019 STAGING AREAS

FOR ILLUSTRATIVE PURPOSES ONLY

TEMPORARY GATE
CE-2
08/19 – 08/23
CD 2.19(2)A
SPOIL PILE
02/12 - 10/19
CD 2.10
SPOIL PILE
12/18 - 07/20
INJECTION WELLS (CE-2)
MONITORING WELLS (CE-2)
TEMPORARY GATE
MONITORING WELLS (CE-2)
INJECTION WELLS (CE-2)
CD 2.15(1)
10/16 - 02/20
CD 2.15(2)
07/18 - 02/20
CD 2.19(2)A
07/17 - 10/19
TEMPORARY GATE
COGEN SWITCHGEAR BUILDING
TO BE DEMOLISHED 2.10
CD 2.10(1)/ 2.01(3)
12/18 - 11/23
CD 2.10/2.01(3)
12/18 - 11/23
2.10
2.17(A)
2.10
2.10
2.19(2)(A)
RAS ELECTRICAL BUILDINGS 3, 4 & 5
RAS PUMP STATIONS CD 2.10/2.01(3)
CD 2.10(1)/ 2.01(3)
12/18 - 11/23
O_2 TRAINS P2 UNOX - 2.06
ELECTRICAL BUILDING RAS 1 & 2
ODORIZING CHEMICAL BUILDING
CHLORINATION DAY TANK 1
CD 2.17A
04/16 - 07/18
GAS SPHERE CONDITION ASSESSMENT
INDUSTRIAL INJECTION WELLS (CE-4)
CD 2.06 STRUCTURAL REHAB
11/15 - 04/20
CD 2.08 (3) STRUCTURAL REHAB
11/18 - 04/22
SECONDARY CLARIFIERS PLANT 2
(PLANT No. 2)
CE-3
HEADWORKS 2 ELECTRICAL BUILDING
2.04
CD 2.04
08/16 - 12/19
INDUSTRIAL WELL PUMP STATION
DIGESTER CLUSTER 1 CONTROL BUILDINGS
CD 2.15(1)
03/15 - 02/20
CD 2.27(2)
03/19 - 09/22
VPSA BUILDING
CD 2.27
CD 2.27(2)
03/19 - 09/22
DIGESTERS REHAB
DIGESTER CLUSTER CONTROL BUILDING
CD 2.15(3)
12/19 - 06/21
DIGESTER CLUSTER CONTROL BUILDING
CD 2.15(2)
07/18 - 02/20
FPL TRANSMISSION LINES
CD 2.03/04
09/16 - 12/19
PARKING AREA
CD 2.03/04
CD 2.27(2)
03/19 - 09/22
CD 2.19(2)A
02/17 – 10/19
CD 2.19(2)B
08/17 - 10/19
2.15
DIGESTER GAS FLARES
CD 2.15(1)/(2)
01/19 - 01/20
CD 2.15(1) & (2)
CD 2.03/2.04
01/19 - 01/20
2.09 STAGING AREA
OFFICE TRAILER
CURRENT – 01/20
CD 2.17(B)
CHLORINATION
MAIN STORAGE
BUILDING
CONTRACTOR
PARKING FOR CRAFT
CD 2.07 (3)
STRUCTURAL REHAB
11/19 - 04/22
PLANT 1
RAS ELECTRICAL
BUILDING
HEADWORKS 1 ELECTRICAL BUILDING
2.03
CD 2.03
08/16 - 06/19
COGEN BIOGAS FACILITY
CD 2.19/
2.01
CD 2.19(2)A/2.01(6)
07/17 - 10/19
2.11
ELECTRICAL
BUILDING
CD 2.11
03/19 – 07/20
CD 2.11
ADMIN BUILDING
CD 2.02
PMCM CONSTRUCTION TRAILER & PARKING AREA
CD 2.10/2.01(3)
12/18 - 11/23
CD 2.11/2.27/PCL
03/19 - 05/22
CD 2.15(3)
12/19 - 06/21
PARKING LOT

LEGEND

CD	CONSENT DECREE PROJECTS (REHAB)	CIP	CAPITAL IMPROVEMENT PLAN PROJECTS		COMPLETED PROJECTS
CD	CONSENT DECREE PROJECTS (NEW)	CD	CONSENT DECREE CONSTRUCTION STAGING AREAS		10" LEACHATE EFFLUENT PIPE
OOL	OCEAN OUTFALL LEGISLATION PROJECTS (NEW)	OOL	OCEAN OUTFALL LEGISLATION CONSTRUCTION STAGING AREAS		
OOL	OCEAN OUTFALL LEGISLATION PROJECTS (REHAB)	CIP	CAPITAL IMPROVEMENT PLAN CONSTRUCTION STAGING AREAS		

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CENTRAL DISTRICT WASTEWATER TREATMENT PLANT 2020 STAGING AREAS

FOR ILLUSTRATIVE PURPOSES ONLY

TEMPORARY GATE
CE-2
08/19 – 08/23
CD 2.10
SPOIL PILE
12/18 - 07/20
INJECTION WELLS (CE-2)
MONITORING WELLS (CE-2)
TEMPORARY GATE
CT-2B
SITE PREPARATION WORK
11/2021 – 07/2022
Cake Silos
CD 2.16/2.12/2.13/
2.18(2)
08/2020 - 03/2023
THICKENING/
DEWATERING
BUILDING
Bio Filters Building
CD 2.16/2.12/2.13/2.18(2)
08/20 - 03/23
CD 2.15(1)
10/16 - 02/20
CT-2B
SITE PREPARATION WORK
11/2021 – 07/2022
MONITORING WELLS (CE-2)
INJECTION WELLS (CE-2)
TEMPORARY GATE
COGEN SWITCHGEAR BUILDING
TO BE DEMOLISHED 2.10
CD 2.01(7)
03/2020 - 09/2021
ELECTRICAL
SUBSTATIONS
CD 2.10(1)/ 2.01(3)
12/18 - 11/23
CD 2.10/2.01(3)
12/18 - 11/23
2.10
2.17(A)
2.10
2.10
2.19(2)(A)
CD 2.10(1)/ 2.01(3)
12/18 - 11/23
O_2 TRAINS P2 UNOX - 2.06
ELECTRICAL BUILDING RAS 1 & 2
ODORIZING CHEMICAL BUILDING
RAS ELECTRICAL BUILDINGS 3, 4 & 5
RAS PUMP STATIONS CD 2.10/2.01(3)
CD 2.01(7)
2.01(7)
03/20 -
09/21
CD 2.01(7)
OXYGENATION
TANKS
(PLANT No. 2)
CD 2.06 STRUCTURAL REHAB
11/15 - 04/20
CHLORINATION DAY TANK 1
CD 2.08 (3) STRUCTURAL REHAB
11/18 - 04/22
SECONDARY CLARIFIERS PLANT 2
(PLANT No. 2)
GAS SPHERE CONDITION
ASSESSMENT
INDUSTRIAL INJECTION WELLS (CE-4)
HEADWORKS 2 ELECTRICAL BUILDING
2.04
CE-3
INDUSTRIAL WELL PUMP STATION
DIGESTER CLUSTER 1 CONTROL BUILDINGS
CD 2.15(1)
03/15 - 02/20
CD 2.27(2)
03/19 - 09/22
VPSA BUILDING
CD 2.27
CD 2.27(2)
03/19 - 09/22
DIGESTERS REHAB
DIGESTER CLUSTER CONTROL BUILDING
CD 2.15(3)
12/19 - 06/21
DIGESTER CLUSTER CONTROL BUILDING
CD 2.15(2)
07/18 - 02/20
FPL TRANSMISSION LINES
CD 2.27(2)
03/19 - 09/22
2.15
DIGESTER GAS FLARES
CD 2.15(1)/(2)
01/19 - 01/20
CD 2.15(3)
03/20 - 06/21
CD 2.17(B)
CHLORINATION
MAIN STORAGE
BUILDING
CD 2.07 (3)
STRUCTURAL REHAB
11/19 - 04/22
PLANT 1
RAS ELECTRICAL
BUILDING
CT-4
RELOCATED STORE BUILDING
PROPOSED LOCATION
FOR
CRAFT
HEADWORKS 1 ELECTRICAL BUILDING
2.03
CD 2.19/
2.01
COGEN BIOGAS FACILITY
OXYGENATION
TANKS
(PLANT No. 1)
2.11
ELECTRICAL
BUILDING
CD 2.11
03/19 – 07/20
CD 2.11
ADMIN BUILDING
CD 2.02
PMCM CONSTRUCTION TRAILER & PARKING AREA
CD 2.12/2.13/2.16/2.18(2)
08/20 - 03/23
CD 2.11/2.27/PCL
03/19 - 05/22
CD 2.15(3)
12/19 - 06/21
CD 2.10/2.01(3)
12/18 - 11/23
CD 2.01(7)
03/20 - 09/21
PARKING LOT

LEGEND

CD	CONSENT DECREE PROJECTS (REHAB)	CIP	CAPITAL IMPROVEMENT PLAN PROJECTS		COMPLETED PROJECTS
CD	CONSENT DECREE PROJECTS (NEW)	CD	CONSENT DECREE CONSTRUCTION STAGING AREAS		10" LEACHATE EFFLUENT PIPE
OOL	OCEAN OUTFALL LEGISLATION PROJECTS (NEW)	OOL	OCEAN OUTFALL LEGISLATION CONSTRUCTION STAGING AREAS		
OOL	OCEAN OUTFALL LEGISLATION PROJECTS (REHAB)	CIP	CAPITAL IMPROVEMENT PLAN CONSTRUCTION STAGING AREAS		

Title	
CDWWTP PROJECTS - DRAFT	
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MIAMI-DADE COUNTY

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CENTRAL DISTRICT WASTEWATER TREATMENT PLANT 2021 STAGING AREAS

FOR ILLUSTRATIVE PURPOSES ONLY

TEMPORARY GATE

CE-2
08/19 – 08/23

INJECTION WELLS (CE-2)

MONITORING WELLS (CE-2)

CT-3C
06/21 – 01/25

ELECTRICAL DISTRIBUTION BUILDING 2 - (CT-3C)
06/21 – 01/25

MONITORING WELLS (CE-2)

INJECTION WELLS (CE-2)

TEMPORARY GATE

Cake Silos

CD 2.16/2.12/2.13/2.18(2)
08/2020 - 03/2023
THICKENING/ DEWATERING BUILDING

Bio Filters Building

CD 2.16/2.12/2.13/2.18(2)
08/20 - 03/23
ELECTRICAL BUILDING FUEL STORAGE

(CT-3C)
06/21 – 01/25

STORMWATER DRY RETENTION AREA & DRAINAGE WELLS (CT-2B)

11/21 – 07/22

TEMPORARY GATE

SWM PS # 5 (CT-2B)

CD 2.01(7)
03/2020 - 09/2021
ELECTRICAL SUBSTATIONS

CD 2.10(1)/ 2.01(3)
12/18 - 11/23

CD 2.10/2.01(3)
12/18 - 11/23

2.10

2.17(A)

TO BE DEMOLISHED 2.10

2.10

2.10

2.19(2)(A)

COGEN SWITCHGEAR BUILDING

RAS ELECTRICAL BUILDINGS 3, 4 & 5

RAS PUMP STATIONS CD 2.10/2.01(3)

CD 2.10(1)/ 2.01(3)
12/18 - 11/23

O_2 TRAINS P2 UNOX - 2.06

ELECTRICAL BUILDING RAS 1 & 2

ODORIZING CHEMICAL BUILDING

2.01(7)
03/20 - 09/21

CD 2.01(7)

CD 2.06 STRUCTURAL REHAB

CHLORINATION DAY TANK 1

CD 2.08 (3) STRUCTURAL REHAB
11/18 - 04/22
SECONDARY CLARIFIERS PLANT 2
(PLANT No. 2)

GAS SPHERE CONDITION ASSESSMENT

CCL TRAILER AREA

INDUSTRIAL INJECTION WELLS (CE-4)

CE-3

INDUSTRIAL WELL PUMP STATION

HEADWORKS 2 ELECTRICAL BUILDING

2.04

DIGESTER CLUSTER 1 CONTROL BUILDINGS

CD 2.27(2)
03/19 - 09/22

VPSA BUILDING
CD 2.27

DIGESTERS REHAB

SWM PS # 3 (CT-2B)

DIGESTER CLUSTER CONTROL BUILDING

CD 2.15(3)
12/19 - 06/21

FPL TRANSMISSION LINES

CD 2.27(2)
03/19 - 09/22

DIGESTER CLUSTER CONTROL BUILDING

SWM PS # 2 (CT-2B)

CT-3B
01/22 – 01/25

2.15

DIGESTER GAS FLARES

CD 2.15(3)
03/20 - 06/21

CD 2.17(B)
CHLORINATION MAIN STORAGE BUILDING

SWM PS # 4 (CT-2B)

CONTRACTOR PARKING FOR CRAFT

CD 2.07 (3)
STRUCTURAL REHAB
11/19 - 04/22

PLANT 1
RAS ELECTRICAL BUILDING

CD 2.07/ 2.09
01/21 – 02/24

2.11
ELECTRICAL BUILDING

HEADWORKS 1 ELECTRICAL BUILDING

2.03

COGEN BIOGAS FACILITY

CD 2.19/
2.01

SWM PS # 1 (CT-2B)

CD 2.07/ 2.09
01/21 – 02/24

CD 2.07/ 2.09
01/21 – 02/24

ADMIN BUILDING

CD 2.02

PMCM CONSTRUCTION TRAILER & PARKING AREA

CD 2.12/2.13/2.16/2.18(2)
08/20 - 03/23

CD 2.11/2.27/PCL
03/19 - 05/22

CD 2.15(3)
12/19 - 06/21

CD 2.09
01/21 - 02/24

CD 2.10/2.01(3)
12/18 - 11/23

ELECTRICAL DISTRIBUTION BUILDING 3 - (CT-3C)
06/21 – 01/25

(CT-3C)
06/21 – 01/25

ELECTRICAL BUILDING FUEL STORAGE

CT-3C
06/21 – 01/25

CD 2.01(7)
03/20 - 09/21

PARKING LOT

LEGEND

CD	CONSENT DECREE PROJECTS (REHAB)	CIP	CAPITAL IMPROVEMENT PLAN PROJECTS	COMPLETED PROJECTS
CD	CONSENT DECREE PROJECTS (NEW)	CD	CONSENT DECREE CONSTRUCTION STAGING AREAS	
OOL	OCEAN OUTFALL LEGISLATION PROJECTS (NEW)	OOL	OCEAN OUTFALL LEGISLATION CONSTRUCTION STAGING AREAS	
OOL	OCEAN OUTFALL LEGISLATION PROJECTS (REHAB)	CIP	CAPITAL IMPROVEMENT PLAN CONSTRUCTION STAGING AREAS	

Title	
CDWWTP PROJECTS - DRAFT	
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CENTRAL DISTRICT WASTEWATER TREATMENT PLANT 2022 STAGING AREAS

FOR ILLUSTRATIVE PURPOSES ONLY

TEMPORARY GATE
CE-2
08/19 – 08/23
INJECTION WELLS (CE-2)
MONITORING WELLS (CE-2)
CT-3C
06/21 – 01/25
ELECTRICAL DISTRIBUTION BUILDING 2 - (CT-3C)
06/21 – 01/25
MONITORING WELLS (CE-2)
INJECTION WELLS (CE-2)
TEMPORARY GATE
Cake Silos
CD 2.16/2.12/2.13/2.18(2)
08/2020 - 03/2023
THICKENING/ DEWATERING BUILDING
Bio Filters Building
CD 2.16/2.12/2.13/2.18(2)
08/20 - 03/23
ELECTRICAL BUILDING FUEL STORAGE
(CT-3C)
06/21 – 01/25
STORMWATER DRY RETENTION AREA & DRAINAGE WELLS (CT-2B)
TEMPORARY GATE
SWM PS # 5 (CT-2B)
CD 2.01(7)
CD 2.10(1)/ 2.01(3)
12/18 - 11/23
CD 2.10/2.01(3)
12/18 - 11/23
2.10
2.17(A)
TO BE DEMOLISHED 2.10
2.10
2.19(2)(A)
COGEN SWITCHGEAR BUILDING
O_2 TRAINS P2 UNOX - 2.06
ELECTRICAL BUILDING RAS 1 & 2
ODORIZING CHEMICAL BUILDING
RAS ELECTRICAL BUILDINGS 3, 4 & 5
RAS PUMP STATIONS CD 2.10/2.01(3)
CD 2.10(1)/ 2.01(3)
12/18 - 11/23
2.01(7)
03/20 - 09/21
CD 2.06 STRUCTURAL REHAB
CHLORINATION DAY TANK 1
CD 2.08 (3) STRUCTURAL REHAB
11/18 - 04/22
SECONDARY CLARIFIERS PLANT 2
(PLANT No. 2)
GAS SPHERE CONDITION ASSESSMENT
CE-3
COL TRAILER AREA
INDUSTRIAL INJECTION WELLS (CE-4)
INDUSTRIAL WELL PUMP STATION
HEADWORKS 2 ELECTRICAL BUILDING
2.04
DIGESTER CLUSTER 1 CONTROL BUILDINGS
CD 2.27(2)
03/19 - 09/22
VPSA BUILDING CD 2.27
DIGESTERS REHAB
SWM PS # 3 (CT-2B)
DIGESTER CLUSTER CONTROL BUILDING
DIGESTER CLUSTER CONTROL BUILDING
FPL TRANSMISSION LINES
CD 2.27(2)
03/19 - 09/22
SWM PS # 2 (CT-2B)
RAS PUMP STATIONS
CT-3B
01/22 – 01/25
2.15
OXYGENATION TANK (CT-3B)
DIGESTER GAS FLARES
FINAL SETTLING TANKS (CT-3B)
01/22 – 01/25
CD 2.17(B) CHLORINATION MAIN STORAGE BUILDING
SWM PS # 4 (CT-2B)
CONTRACTOR PARKING FOR CRAFT
CD 2.07/ 2.09
01/21 – 02/24
CD 2.07 (3) STRUCTURAL REHAB
11/19 - 04/22
PLANT 1 RAS ELECTRICAL BUILDING
HEADWORKS 1 ELECTRICAL BUILDING
2.03
COGEN BIOGAS FACILITY
CD 2.19/ 2.01
SPLITTER BOX
CT-3B
2.11 ELECTRICAL BUILDING
CT-2A
12/22 – 11/25
EFFLUENT PUMP STATION
SWM PS # 1 (CT-2B)
CT-3B
ELECTRICAL SUBSTATIONS
ADMIN BUILDING
CD 2.02
PMCM CONSTRUCTION TRAILER & PARKING AREA
CD 2.12/2.13/2.16/2.18(2)
08/20 - 03/23
CD 2.11/2.27/PCL
03/19 - 05/22
CD 2.09
01/21 - 02/24
CD 2.10/2.01(3)
12/18 - 11/23
ELECTRICAL DISTRIBUTION BUILDING 3 - (CT-3C)
06/21 – 01/25
(CT-3C)
06/21 – 01/25
ELECTRICAL BUILDING FUEL STORAGE
CT-3C
06/21 – 01/25
PARKING LOT

LEGEND

CD	CONSENT DECREE PROJECTS (REHAB)	CIP	CAPITAL IMPROVEMENT PLAN PROJECTS		COMPLETED PROJECTS
CD	CONSENT DECREE PROJECTS (NEW)	CD	CONSENT DECREE CONSTRUCTION STAGING AREAS		
OOL	OCEAN OUTFALL LEGISLATION PROJECTS (NEW)	OOL	OCEAN OUTFALL LEGISLATION CONSTRUCTION STAGING AREAS		
OOL	OCEAN OUTFALL LEGISLATION PROJECTS (REHAB)	CIP	CAPITAL IMPROVEMENT PLAN CONSTRUCTION STAGING AREAS		

Title	
CDWWTP PROJECTS - DRAFT	
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CENTRAL DISTRICT WASTEWATER TREATMENT PLANT 2023 STAGING AREAS

FOR ILLUSTRATIVE PURPOSES ONLY

TEMPORARY GATE
FLUSHING WATER PS (CT-2A)
CE-2
08/19 – 08/23
INJECTION WELLS (CE-2)
MONITORING WELLS (CE-2)
CT-3C
06/21 – 01/25
ELECTRICAL DISTRIBUTION BUILDING 2 - (CT-3C)
06/21 – 01/25
INJECTION WELL PS (CE-1)
CE-1 - 03/23 - 11/25
CHLORINE CONTACT BASINS (CT-2A)
MONITORING WELLS (CE-2)
INJECTION WELLS (CE-2)
TEMPORARY GATE
Cake Silos
CD 2.16/2.12/2.13/ 2.18(2)
08/2020 - 03/2023
THICKENING/ DEWATERING BUILDING
Bio Filters Building
ELECTRICAL BUILDING FUEL STORAGE
HYPO STORAGE & PUMPING (CT-2A)
ELECTRICAL BUILDING CT-2A
STORMWATER DRY RETENTION AREA & DRAINAGE WELLS (CT-2B)
FILTER SYSTEM (CT-2A)
(CT-3C)
06/21 – 01/25
CT-2A
BACKWASH WASTE TREATMENT (CT-2A)
CT-2A
POLYMER BUILDING
SANITARY LIFT STATION
TEMPORARY GATE
TO BE DEMOLISHED 2.10
SWM PS # 5 (CT-2B)
CD 2.01(7)
CD 2.10(1)/ 2.01(3)
12/18 - 11/23
CD 2.10/2.01(3)
12/18 - 11/23
2.10
2.17(A)
2.10
2.10
2.19(2)(A)
COGEN SWITCHGEAR BUILDING
O_2 TRAINS P2 UNOX - 2.06
ELECTRICAL BUILDING RAS 1 & 2
ODORIZING CHEMICAL BUILDING
RAS ELECTRICAL BUILDINGS 3, 4 & 5
RAS PUMP STATIONS CD 2.10/2.01(3)
CD 2.10(1)/ 2.01(3)
12/18 - 11/23
CD 2.06 STRUCTURAL REHAB
CHLORINATION DAY TANK 1
CD 2.08
SECONDARY CLARIFIERS PLANT 2
GAS SPHERE CONDITION ASSESSMENT
OOL TRAILER AREA
INDUSTRIAL INJECTION WELLS (CE-4)
CE-3
INDUSTRIAL WELL PUMP STATION
HEADWORKS 2 ELECTRICAL BUILDING
2.04
DIGESTER CLUSTER 1 CONTROL BUILDINGS
DIGESTERS REHAB
DIGESTER CLUSTER CONTROL BUILDING
DIGESTER CLUSTER CONTROL BUILDING
FPL TRANSMISSION LINES
VPSA BUILDING CD 2.27
SWM PS # 3 (CT-2B)
SWM PS # 2 (CT-2B)
RAS PUMP STATIONS
CT-3B
01/22 – 01/25
2.15
OXYGENATION TANK (CT-3B)
DIGESTER GAS FLARES
FINAL SETTLING TANKS (CT-3B)
01/22 – 01/25
CD 2.07 (3)
PLANT 1
RAS ELECTRICAL BUILDING
CD 2.07/ 2.09
01/21 – 02/24
CD 2.17(B)
CHLORINATION MAIN STORAGE BUILDING
SWM PS # 4 (CT-2B)
CONTRACTOR PARKING FOR CRAFT
HEADWORKS 1 ELECTRICAL BUILDING
2.03
COGEN BIOGAS FACILITY
CD 2.19/ 2.01
SPLITTER BOX
SWM PS # 1 (CT-2B)
CT-3B
2.11 ELECTRICAL BUILDING
CT-2A
12/22 – 11/25
EFFLUENT PUMP STATION
CD 2.07/ 2.09
01/21 – 02/24
CT-3B
ELECTRICAL SUBSTATIONS
ADMIN BUILDING
CD 2.C2
PMCM CONSTRUCTION TRAILER & PARKING AREA
CD 2.12/2.13/2.16/2.18(2)
08/20 - 03/23
CD 2.09
01/21 - 02/24
CD 2.10/2.01(3)
12/18 - 11/23
ELECTRICAL DISTRIBUTION BUILDING 3 - (CT-3C)
06/21 – 01/25
(CT-3C)
06/21 – 01/25
ELECTRICAL BUILDING FUEL STORAGE
CT-3C
06/21 – 01/25
PARKING LOT

LEGEND

CD	CONSENT DECREE PROJECTS (REHAB)	CIP	CAPITAL IMPROVEMENT PLAN PROJECTS		COMPLETED PROJECTS
CD	CONSENT DECREE PROJECTS (NEW)	CD	CONSENT DECREE CONSTRUCTION STAGING AREAS		
OOL	OCEAN OUTFALL LEGISLATION PROJECTS (NEW)	OOL	OCEAN OUTFALL LEGISLATION CONSTRUCTION STAGING AREAS		
OOL	OCEAN OUTFALL LEGISLATION PROJECTS (REHAB)	CIP	CAPITAL IMPROVEMENT PLAN CONSTRUCTION STAGING AREAS		

Title	
CDWWTP PROJECTS - DRAFT	
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CENTRAL DISTRICT WASTEWATER TREATMENT PLANT 2024 STAGING AREAS

FOR ILLUSTRATIVE PURPOSES ONLY

GRIT & SCREENINGS STORAGE AREA
INJECTION WELLS (CE-2)
MONITORING WELLS (CE-2)
CT-3C 06/21 – 01/25
ELECTRICAL DISTRIBUTION BUILDING 2 - (CT-3C) 06/21 – 01/25
INJECTION WELL PS (CE-1)
CE-1 - 03/23 - 11/25
MONITORING WELLS (CE-2)
INJECTION WELLS (CE-2)
Cake Silos
CD 2.16/2.12/2.13/ 2.18(2) 08/2020 - 03/2023 THICKENING/ DEWATERING BUILDING
Bio Filters Building
ELECTRICAL BUILDING FUEL STORAGE
(CT-3C) 06/21 – 01/25
STORMWATER DRY RETENTION AREA & DRAINAGE WELLS (CT-2B)
SWM PS # 5 (CT-2B)
CD 2.01(7)
2.10
2.17(A)
2.10
2.10
2.19(2)(A)
COGEN SWITCHGEAR BUILDING
RAS ELECTRICAL BUILDINGS 3, 4 & 5
RAS PUMP STATIONS CD 2.10/2.01(3)
O_2 TRAINS P2 UNOX - 2.06
ELECTRICAL BUILDING RAS 1 & 2
ODORIZING CHEMICAL BUILDING
CHLORINATION DAY TANK 1
CD 2.06 STRUCTURAL REHAB
CD 2.08 SECONDARY CLARIFIERS PLANT 2
GAS SPHERE CONDITION ASSESSMENT
COL TRAILER AREA
INDUSTRIAL INJECTION WELLS (CE-4)
CE-3
INDUSTRIAL WELL PUMP STATION
HEADWORKS 2 ELECTRICAL BUILDING
2.04
DIGESTER CLUSTER 1 CONTROL BUILDINGS
DIGESTERS REHAB
DIGESTER CLUSTER CONTROL BUILDING
DIGESTER CLUSTER CONTROL BUILDING
FPL TRANSMISSION LINES
VPSA BUILDING CD 2.27
SWM PS # 3 (CT-2B)
SWM PS # 2 (CT-2B)
RAS PUMP STATIONS
CT-3B 01/22 – 01/25
2.15
OXYGENATION TANK (CT-3B)
DIGESTER GAS FLARES
FINAL SETTLING TANKS (CT-3B) 01/22 – 01/25
CD 2.17(B) CHLORINATION MAIN STORAGE BUILDING
SWM PS # 4 (CT-2B)
CT-4
RELOCATED STORE BUILDING PROPOSED LOCATION
HEADWORKS 1 ELECTRICAL BUILDING
2.03
COGEN BIOGAS FACILITY
CD 2.19/ 2.01
CD 2.07 (3) PLANT 1 RAS ELECTRICAL BUILDING
2.11 ELECTRICAL BUILDING
CT-2A 12/22 – 11/25
EFFLUENT PUMP STATION
SWM PS # 1 (CT-2B)
SPLITTER BOX
CT-3B
CD 2.07/ 2.09 01/21 – 02/24
CT-3B
ELECTRICAL SUBSTATIONS
ADMIN BUILDING
CD 2.02
PMCM CONSTRUCTION TRAILER & PARKING AREA
CD 2.09 01/21 - 02/24
ELECTRICAL DISTRIBUTION BUILDING 3 - (CT-3C) 06/21 – 01/25
(CT-3C) 06/21 – 01/25
ELECTRICAL BUILDING FUEL STORAGE
CT-3C 06/21 – 01/25

LEGEND

CD	CONSENT DECREE PROJECTS (REHAB)	CIP	CAPITAL IMPROVEMENT PLAN PROJECTS		COMPLETED PROJECTS
CD	CONSENT DECREE PROJECTS (NEW)	CD	CONSENT DECREE CONSTRUCTION STAGING AREAS		10" LEACHATE EFFLUENT PIPE
OOL	OCEAN OUTFALL LEGISLATION PROJECTS (NEW)	OOL	OCEAN OUTFALL LEGISLATION CONSTRUCTION STAGING AREAS		OOL PIPELINES >36"
OOL	OCEAN OUTFALL LEGISLATION PROJECTS (REHAB)	CIP	CAPITAL IMPROVEMENT PLAN CONSTRUCTION STAGING AREAS		

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CDWWTP PROJECTS - DRAFT	
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CENTRAL DISTRICT WASTEWATER TREATMENT PLANT 2025 STAGING AREAS

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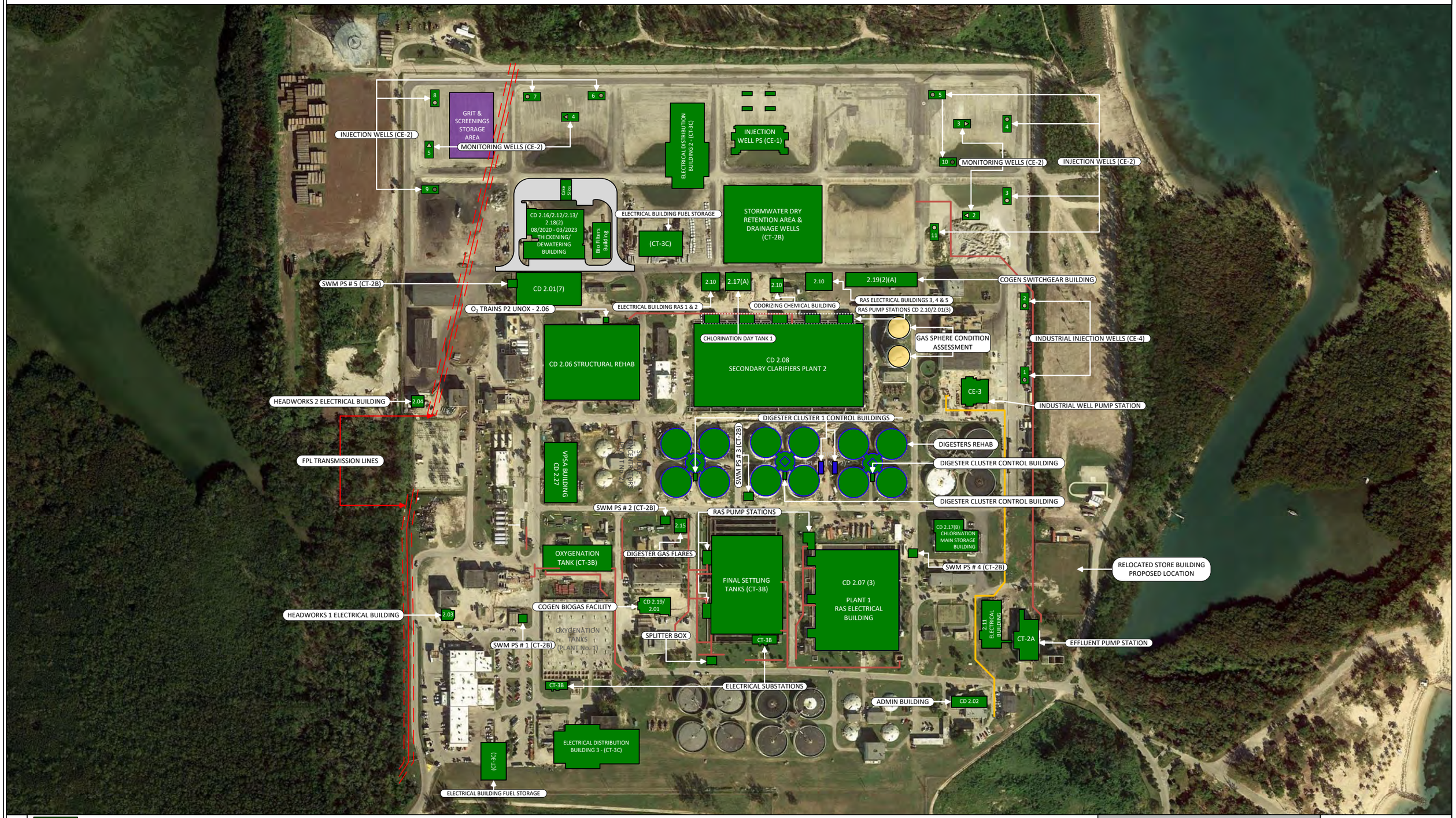

LEGEND

- COMPLETED PROJECTS
- 10" LEACHATE EFFLUENT PIPE
- OOL PIPELINES >36"

Title	
CDWWTP PROJECTS - DRAFT	
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NORTH DISTRICT WASTEWATER TREATMENT PLANT PROJECTS

FOR ILLUSTRATIVE PURPOSES ONLY

LEGEND

CD	CONSENT DECREE PROJECTS (NEW)
CD	CONSENT DECREE PROJECTS (REHAB)
OOL	OCEAN OUTFALL LEGISLATION PROJECTS
CIP	CAPITAL IMPROVEMENT PLAN PROJECTS
	COMPLETED PROJECTS

Title	
NDWWTP PROJECTS	
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NORTH DISTRICT WASTEWATER TREATMENT PLANT CONSENT DECREE PROJECTS

SECONDARY CLARIFIERS (CD 3.05)
DISINFECTION (CD 3.06)
CHLORINATION ELECTRICAL BUILDING (CD 3.06)
OXYGEN PRODUCTION (CD 3.03 | CD 3.04)
ELECTRICAL BUILDING (CD 3.03 | CD 3.04)
PRIMARY CLARIFIERS (CD 3.02)
HEADWORKS SODIUM HYPOCHLORITE FACILITY (CD 3.01)
SODIUM HYPOCHLORITE STORAGE & FEED FACILITY (CD 3.02)
OXYGENATION TRAINS (CD 3.03 | CD 3.04)
Secondary Clarifier No. 1
Secondary Clarifier No. 2
Secondary Clarifier No. 3
Secondary Clarifier No. 4
Secondary Clarifier No. 5
Secondary Clarifier No. 6
Secondary Clarifier No. 7
Secondary Clarifier No. 8
Secondary Clarifier No. 9
Secondary Clarifier No. 10
Secondary Clarifier No. 11
Secondary Clarifier No. 12
Primary Clarifier No. 1
Primary Clarifier No. 2
Primary Clarifier No. 3
Primary Clarifier No. 4
Primary Clarifier No. 5
Primary Clarifier No. 6
CD 3.03/3.04
CD 3.03/3.04 01/22 – 06/25
CD 3.03/3.04 01/22 – 06/25
CD 3.03/3.04 01/22 – 06/25
CD 3.05/3.06 SC - 09/22
CD 3.02 SC - 09/21
STAGING AREA
CD 3.02 SC - 09/21
CD PARKING

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LEGEND

CD	CONSENT DECREE PROJECTS (NEW)
CD	CONSENT DECREE PROJECTS (REHAB)
CD	CONSENT DECREE STAGING AREAS

Title	
NDWWTP PROJECTS	
Scale: Not to scale	Figure No.: 02
Date: 12/03/2019	Revision No.: 1.0
File Name:	15 - NDWWTP Proposed Improvements
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NORTH DISTRICT WASTEWATER TREATMENT PLANT CIP PROJECTS

LEGEND

CIP	CAPITAL IMPROVEMENT PLAN PROJECTS
CIP	CAPITAL IMPROVEMENT STAGING AREA

Title	
NDWWTP PROJECTS	
Scale: Not to scale	Figure No.: 03
Date: 12/03/2019	Revision No.: 1.0
File Name:	3 - NDWWTP CIP Projects
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NORTH DISTRICT WASTEWATER TREATMENT PLANT OOL PROJECTS

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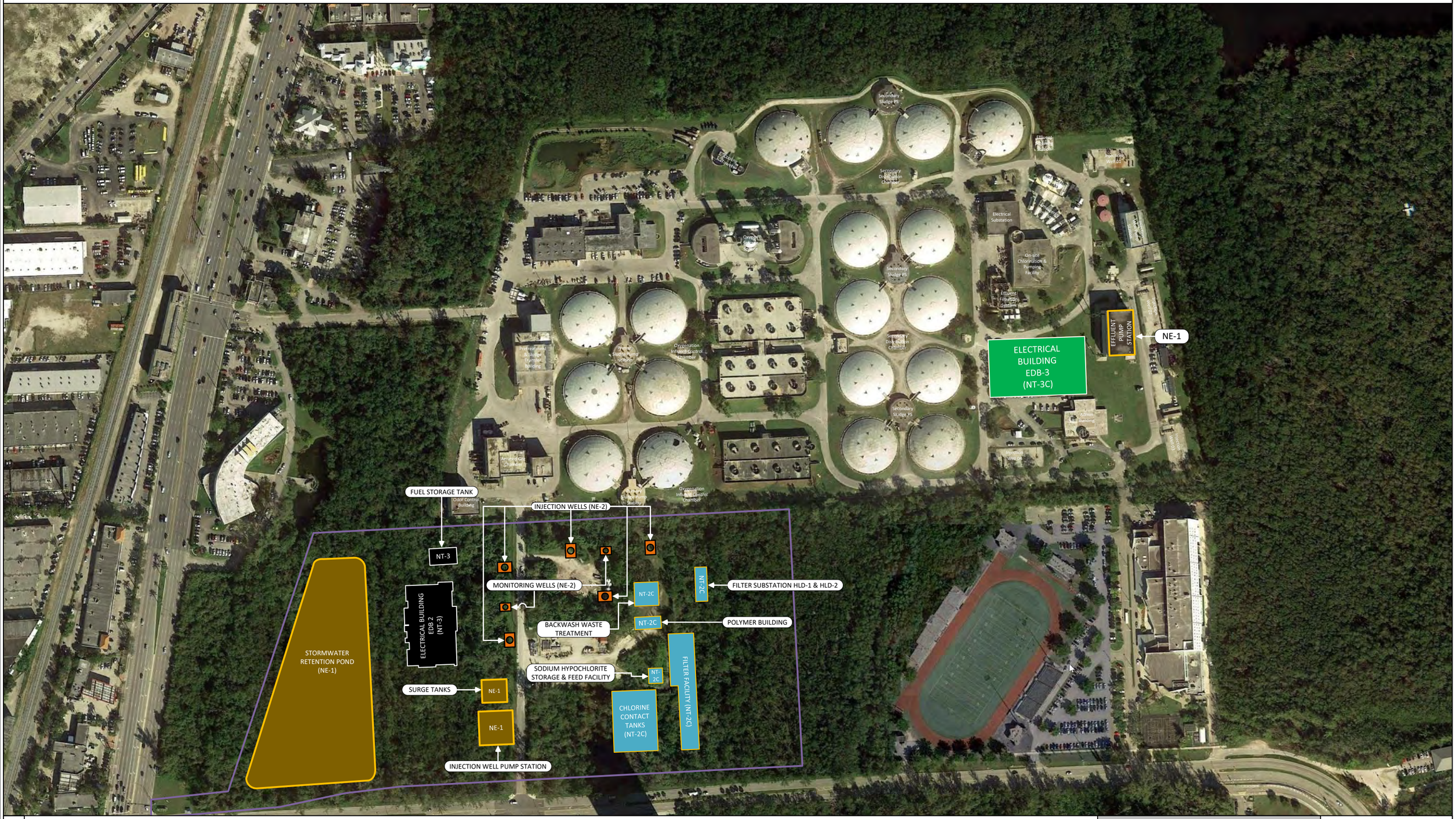

LEGEND

MUNICIPAL INJECTION WELL PS	MUNICIPAL INJECTION WELLS	SITE PREPARATION & STORMWATER	HLD FACILITIES	EDB 2 (HLD)	EDB 3 REPLACEMENT
Project: NE-1	Project: NE-2	Project: NT-2B	Project: NT-2C	Project: NT-3	Project: NT-3C
PCTS: 10730	PCTS: 10731	PCTS: 16071	PCTS: TBA	PCTS: 10726	PCTS: TBD

Title	
NDWWTP PROPOSED OOL PROJECTS	
Scale: Not to scale	Figure No.: 7-1-2
Date: 12/03/2019	Revision No.: 1.0
File Name:	4 - NDWWTP OOL Projects
Drawn: KBM	Page: 1 of 1

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NORTH DISTRICT WASTEWATER TREATMENT PLANT 2019 STAGING AREAS

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LEGEND

CD	CONSENT DECREE PROJECTS (NEW)		
CD	CONSENT DECREE PROJECTS (REHAB)		
CD	CONSENT DECREE STAGING AREAS		COMPLETED PROJECTS
CIP	CAPITAL IMPROVEMENT PLAN PROJECTS	CIP	CAPITAL IMPROVEMENT STAGING AREA

Title	
NDWWTP PROJECTS	
Scale: Not to scale	Figure No.: 05
Date: 12/03/2019	Revision No.: 1.0
File Name:	5 - NDWWTP 2019 Projects
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NORTH DISTRICT WASTEWATER TREATMENT PLANT 2020 STAGING AREAS

LEGEND

CD	CONSENT DECREE PROJECTS (NEW)	OOL	OCEAN OUTFALL LEGISLATION PROJECTS
CD	CONSENT DECREE PROJECTS (REHAB)	OOL	OCEAN OUTFALL LEGISLATION STAGING AREAS
CD	CONSENT DECREE STAGING AREAS		COMPLETED PROJECTS
CIP	CAPITAL IMPROVEMENT PLAN PROJECTS	CIP	CAPITAL IMPROVEMENT STAGING AREA

Title	
NDWWTP PROJECTS	
Scale: Not to scale	Figure No.: 06
Date: 12/03/2019	Revision No.: 1.0
File Name:	6 - NDWWTP 2020 Projects
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NORTH DISTRICT WASTEWATER TREATMENT PLANT 2021 STAGING AREAS

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STAGING AREA FOR EPS ELECTRICAL BUILDING IMPROVEMENTS

MONITORING WELL

DISINFECTION (CD 3.06)

CHLORINATION ELECTRICAL BUILDING (CD 3.06)

EFFLUENT PUMP STATION ELECTRICAL BUILDING IMPROVEMENTS

PRIMARY CLARIFIERS (CD 3.02)

HEADWORKS SODIUM HYPOCHLORITE FACILITY (CD 3.01)

SODIUM HYPOCHLORITE STORAGE & FEED FACILITY (CD 3.02)

MONITORING WELL

INJECTION WELLS (NE-2)

MONITORING WELLS (NE-2)

WETLANDS

WETLANDS

WETLANDS

CD 3.05/3.06
SC - 09/22

CD 3.02
SC - 09/21

STAGING AREA

CD PARKING

CD 3.02
SC - 09/21

LEGEND

CD	CONSENT DECREE PROJECTS (NEW)	OOL	OCEAN OUTFALL LEGISLATION PROJECTS
CD	CONSENT DECREE PROJECTS (REHAB)	OOL	OCEAN OUTFALL LEGISLATION STAGING AREAS
CD	CONSENT DECREE STAGING AREAS		**COMPLETED PROJECTS**
CIP	CAPITAL IMPROVEMENT PLAN PROJECTS		

Title	
NDWWTP PROJECTS	
Scale: Not to scale	Figure No.: 07
Date: 12/03/2019	Revision No.: 1.0
File Name:	7 - NDWWTP 2021 Projects
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NORTH DISTRICT WASTEWATER TREATMENT PLANT 2022 STAGING AREAS

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STAGING AREA FOR EPS ELECTRICAL BUILDING IMPROVEMENTS
MONITORING WELL
SECONDARY CLARIFIERS (CD 3.05)
DISINFECTION (CD 3.06)
CHLORINATION ELECTRICAL BUILDING (CD 3.06)
EFFLUENT PUMP STATION ELECTRICAL BUILDING IMPROVEMENTS
OXYGEN PRODUCTION ELECTRICAL BUILDING (CD 3.03 | CD 3.04)
OXYGEN PRODUCTION (CD 3.03 | CD 3.04)
PRIMARY CLARIFIERS (CD 3.02)
HEADWORKS SODIUM HYPOCHLORITE FACILITY (CD 3.01)
SODIUM HYPOCHLORITE STORAGE & FEED FACILITY (CD 3.02)
OXYGENATION TRAINS (CD 3.03 | CD 3.04)
INJECTION WELLS (NE-2)
MONITORING WELLS (NE-2)
INJECTION WELL STAGING AREA
STAGING AREA
CD PARKING
STORMWATER RETENTION POND ROUGH GRADING (NT-2B)
WETLANDS
CD 3.03/3.04 01/22 – 06/25
CD 3.05/3.06 SC - 09/22
Secondary Clarifier No. 1
Secondary Clarifier No. 2
Secondary Clarifier No. 3
Secondary Clarifier No. 4
Secondary Clarifier No. 5
Secondary Clarifier No. 6
Secondary Clarifier No. 7
Secondary Clarifier No. 8
Secondary Clarifier No. 9
Secondary Clarifier No. 10
Secondary Clarifier No. 11
Secondary Clarifier No. 12
Primary Clarifier No. 1
Primary Clarifier No. 2
Primary Clarifier No. 3
Primary Clarifier No. 4
Primary Clarifier No. 5
Primary Clarifier No. 6
Preliminary Treatment & Solids Transfer Building
Odor Control Building
Aeration Grit Chamber
Oxygenation Influent Control Structure
Electrical Substation
Effluent Filtration Systems
Admin Building
Maint. Building

LEGEND

CD	CONSENT DECREE PROJECTS (NEW)	OOL	OCEAN OUTFALL LEGISLATION PROJECTS		COMPLETED PROJECTS
CD	CONSENT DECREE PROJECTS (REHAB)	OOL	OCEAN OUTFALL LEGISLATION STAGING AREAS		
CD	CONSENT DECREE STAGING AREAS		CONFLICTS		
CIP	CAPITAL IMPROVEMENT PLAN PROJECTS	CIP	CAPITAL IMPROVEMENT STAGING AREA		

Title	
NDWWTP PROJECTS	
Scale: Not to scale	Figure No.: 08
Date: 12/03/2019	Revision No.: 1.0
File Name:	8 - NDWWTP 2022 Projects
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NORTH DISTRICT WASTEWATER TREATMENT PLANT 2023 STAGING AREAS

FOR ILLUSTRATIVE PURPOSES ONLY

MONITORING WELL
SECONDARY CLARIFIERS (CD 3.05)
DISINFECTION (CD 3.06)
CHLORINATION ELECTRICAL BUILDING (CD 3.06)
EFFLUENT PUMP STATION ELECTRICAL BUILDING IMPROVEMENTS
OXYGENATION ELECTRICAL BUILDING (CD 3.03 | CD 3.04)
OXYGEN PRODUCTION (CD 3.03 | CD 3.04)
PRIMARY CLARIFIERS (CD 3.02)
HEADWORKS SODIUM HYPOCHLORITE FACILITY (CD 3.01)
SODIUM HYPOCHLORITE STORAGE & FEED FACILITY (CD 3.02)
OXYGENATION TRAINS (CD 3.03 | CD 3.04)
MONITORING WELL
INJECTION WELLS (NE-2)
MONITORING WELLS (NE-2)
INJECTION WELL STAGING AREA
INJECTION WELL STAGING AREA
STORMWATER RETENTION POND ROUGH GRADING (NT-2B)
WETLANDS
ELECTRICAL BUILDING EDB-3 (NT-3C)

CD 3.03/3.04 01/22 – 06/25
CD 3.03/3.04
CD 3.03/3.04 01/22 – 06/25
CD 3.03/3.04 01/22 – 06/25
CD 3.03/3.04 01/22 – 06/25
CD 3.03/3.04 01/22 – 06/25

Secondary Clarifier No. 11
Secondary Clarifier No. 9
Secondary Clarifier No. 10
Secondary Clarifier No. 12
Secondary Clarifier No. 1
Secondary Clarifier No. 2
Secondary Clarifier No. 3
Secondary Clarifier No. 4
Secondary Clarifier No. 5
Secondary Clarifier No. 6
Secondary Clarifier No. 7
Secondary Clarifier No. 8
Primary Clarifier No. 1
Primary Clarifier No. 2
Primary Clarifier No. 3
Primary Clarifier No. 4
Primary Clarifier No. 5
Primary Clarifier No. 6

LEGEND

CD	CONSENT DECREE PROJECTS (NEW)	OOL	OCEAN OUTFALL LEGISLATION PROJECTS
CD	CONSENT DECREE PROJECTS (REHAB)	OOL	OCEAN OUTFALL LEGISLATION STAGING AREAS
CD	CONSENT DECREE STAGING AREAS		**COMPLETED PROJECTS**
CIP	CAPITAL IMPROVEMENT PLAN PROJECTS		

Title	
NDWWTP PROJECTS	
Scale: Not to scale	Figure No.: 09
Date: 12/03/2019	Revision No.: 1.0
File Name:	9 - NDWWTP 2023 Projects
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NORTH DISTRICT WASTEWATER TREATMENT PLANT 2024 STAGING AREAS

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CD 3.03/3.04 01/22 – 06/25

Secondary Clarifier No. 11

Secondary Clarifier No. 9

Secondary Clarifier No. 10

Secondary Clarifier No. 12

MONITORING WELL

SECONDARY CLARIFIERS (CD 3.05)

OXYGEN PRODUCTION ELECTRICAL BUILDING (CD 3.03 | CD 3.04)

DISINFECTION (CD 3.06)

OXYGEN PRODUCTION (CD 3.03 | CD 3.04)

Secondary Clarifier No. 1

Secondary Clarifier No. 2

CHLORINATION ELECTRICAL BUILDING (CD 3.06)

Secondary Clarifier No. 3

Secondary Clarifier No. 4

EFFLUENT PUMP STATION ELECTRICAL BUILDING IMPROVEMENTS

PRIMARY CLARIFIERS (CD 3.02)

Primary Clarifier No. 1

Primary Clarifier No. 2

NE-1

ELECTRICAL BUILDING EDB-3 (NT-3C)

HEADWORKS SODIUM HYPOCHLORITE FACILITY (CD 3.01)

Primary Clarifier No. 3

Primary Clarifier No. 4

Secondary Clarifier No. 5

Secondary Clarifier No. 6

SODIUM HYPOCHLORITE STORAGE & FEED FACILITY (CD 3.02)

Secondary Clarifier No. 7

Secondary Clarifier No. 8

MONITORING WELL

Primary Clarifier No. 5

Primary Clarifier No. 6

FUEL STORAGE TANK

INJECTION WELLS (NE-2)

OXYGENATION TRAINS (CD 3.03 | CD 3.04)

NT-3

MONITORING WELLS (NE-2)

NT-2C

NT-2C

FILTER SUBSTATION HLD-1 & HLD-2

BACKWASH WASTE TREATMENT

NT-2C

POLYMER BUILDING

STORMWATER RETENTION POND (NE-1)

ELECTRICAL BUILDING EDB 2 (NT-3)

SODIUM HYPOCHLORITE STORAGE & FEED FACILITY

NT-2C

FILTER FACILITY (NT-2C)

STAGING AREA

WETLANDS

SURGE TANKS

NE-1

STAGING AREA

NE-1

STAGING AREA

CHLORINE CONTACT TANKS (NT-2C)

STAGING AREA

INJECTION WELL PUMP STATION

LEGEND

CD	CONSENT DECREE PROJECTS (NEW)	OOL	OCEAN OUTFALL LEGISLATION PROJECTS
CD	CONSENT DECREE PROJECTS (REHAB)	OOL	OCEAN OUTFALL LEGISLATION STAGING AREAS
CD	CONSENT DECREE STAGING AREAS		**COMPLETED PROJECTS**
CIP	CAPITAL IMPROVEMENT PLAN PROJECTS		

Title	
NDWWTP PROJECTS	
Scale: Not to scale	Figure No.: 10
Date: 12/03/2019	Revision No.: 1.0
File Name:	10 - NDWWTP 2024 Projects
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NORTH DISTRICT WASTEWATER TREATMENT PLANT 2025 STAGING AREAS

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Secondary Clarifier No. 11
Secondary Clarifier No. 9
Secondary Clarifier No. 10
Secondary Clarifier No. 12
MONITORING WELL
SECONDARY CLARIFIERS (CD 3.05)
O_2 TRAINS ELECTRICAL BUILDING (CD 3.03 | CD 3.04)
DISINFECTION (CD 3.06)
OXYGEN PRODUCTION (CD 3.03 | CD 3.04)
Secondary Clarifier No. 1
Secondary Clarifier No. 2
CHLORINATION ELECTRICAL BUILDING (CD 3.06)
CD 3.03/3.04
Secondary Clarifier No. 3
Secondary Clarifier No. 4
EFFLUENT PUMP STATION ELECTRICAL BUILDING IMPROVEMENTS
PRIMARY CLARIFIERS (CD 3.02)
Primary Clarifier No. 1
Primary Clarifier No. 2
NE-1
ELECTRICAL BUILDING EDB-3 (NT-3C)
HEADWORKS SODIUM HYPOCHLORITE FACILITY (CD 3.01)
Primary Clarifier No. 3
Primary Clarifier No. 4
Secondary Clarifier No. 5
Secondary Clarifier No. 6
SODIUM HYPOCHLORITE STORAGE & FEED FACILITY (CD 3.02)
Secondary Clarifier No. 7
Secondary Clarifier No. 8
MONITORING WELL
Primary Clarifier No. 5
Primary Clarifier No. 6
FUEL STORAGE TANK
INJECTION WELLS (NE-2)
OXYGENATION TRAINS (CD 3.03 | CD 3.04)
NT-3
MONITORING WELLS (NE-2)
NT-2C
NT-2C
FILTER SUBSTATION HLD-1 & HLD-2
ELECTRICAL BUILDING EDB 2 (NT-3)
BACKWASH WASTE TREATMENT
NT-2C
POLYMER BUILDING
STORMWATER RETENTION POND (NE-1)
SODIUM HYPOCHLORITE STORAGE & FEED FACILITY
NT-2C
FILTER FACILITY (NT-2C)
STAGING AREA
WETLANDS
SURGE TANKS
NE-1
STAGING AREA
NE-1
CHLORINE CONTACT TANKS (NT-2C)
STAGING AREA
STAGING AREA
INJECTION WELL PUMP STATION

LEGEND

- COMPLETED PROJECTS
- OOL OCEAN OUTFALL LEGISLATION PROJECTS

Title	
NDWWTP PROJECTS	
Scale: Not to scale	Figure No.: 11
Date: 12/03/2019	Revision No.: 1.0
File Name:	11 - NDWWTP 2025 Projects
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NORTH DISTRICT WASTEWATER TREATMENT PLANT 2026 STAGING AREAS

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Secondary Clarifier No. 11
Secondary Clarifier No. 9
Secondary Clarifier No. 10
Secondary Clarifier No. 12
MONITORING WELL
CD 3.03/3.04
SECONDARY CLARIFIERS (CD 3.05)
O_2 TRAINS ELECTRICAL BUILDING (CD 3.03 | CD 3.04)
DISINFECTION (CD 3.06)
OXYGEN PRODUCTION (CD 3.03 | CD 3.04)
Secondary Clarifier No. 1
Secondary Clarifier No. 2
CD 3.03/3.04
CHLORINATION ELECTRICAL BUILDING (CD 3.06)
Primary Clarifier No. 1
Primary Clarifier No. 2
STEP FEED UPGRADE
Secondary Clarifier No. 3
Secondary Clarifier No. 4
EFFLUENT PUMP STATION ELECTRICAL BUILDING IMPROVEMENTS
EFFLUENT PUMP STATION
NE-1
CD 3.03/3.04
STEP FEED UPGRADE
ELECTRICAL BUILDING EDB-3
HEADWORKS SODIUM HYPOCHLORITE FACILITY (CD 3.01)
Primary Clarifier No. 3
Primary Clarifier No. 4
Secondary Clarifier No. 5
Secondary Clarifier No. 6
SODIUM HYPOCHLORITE STORAGE & FEED FACILITY (CD 3.02)
CD 3.03/3.04
STEP FEED UPGRADE
Secondary Clarifier No. 7
Secondary Clarifier No. 8
MONITORING WELL
Primary Clarifier No. 5
Primary Clarifier No. 6
FUEL STORAGE TANK
INJECTION WELLS (NE-2)
OXYGENATION TRAINS (CD 3.03 | CD 3.04)
NT-3
MONITORING WELLS (NE-2)
NT-2C
NT-2C
FILTER SUBSTATION HLD-1 & HLD-2
ELECTRICAL BUILDING EDB 2 (NT-3)
BACKWASH WASTE TREATMENT
NT-2C
POLYMER BUILDING
STORMWATER RETENTION POND (NE-1)
SODIUM HYPOCHLORITE STORAGE & FEED FACILITY
NT-2C
FILTER FACILITY (NT-2C)
SURGE TANKS
NE-1
CHLORINE CONTACT TANKS (NT-2C)
WETLANDS
NE-1
INJECTION WELL PUMP STATION

LEGEND

COMPLETED PROJECTS

Title	
NDWWTP PROJECTS	
Scale: Not to scale	Figure No.:
Date: 12/03/2019	Revision No.: 1.0
File Name:	12 - NDWWTP 2026 Projects
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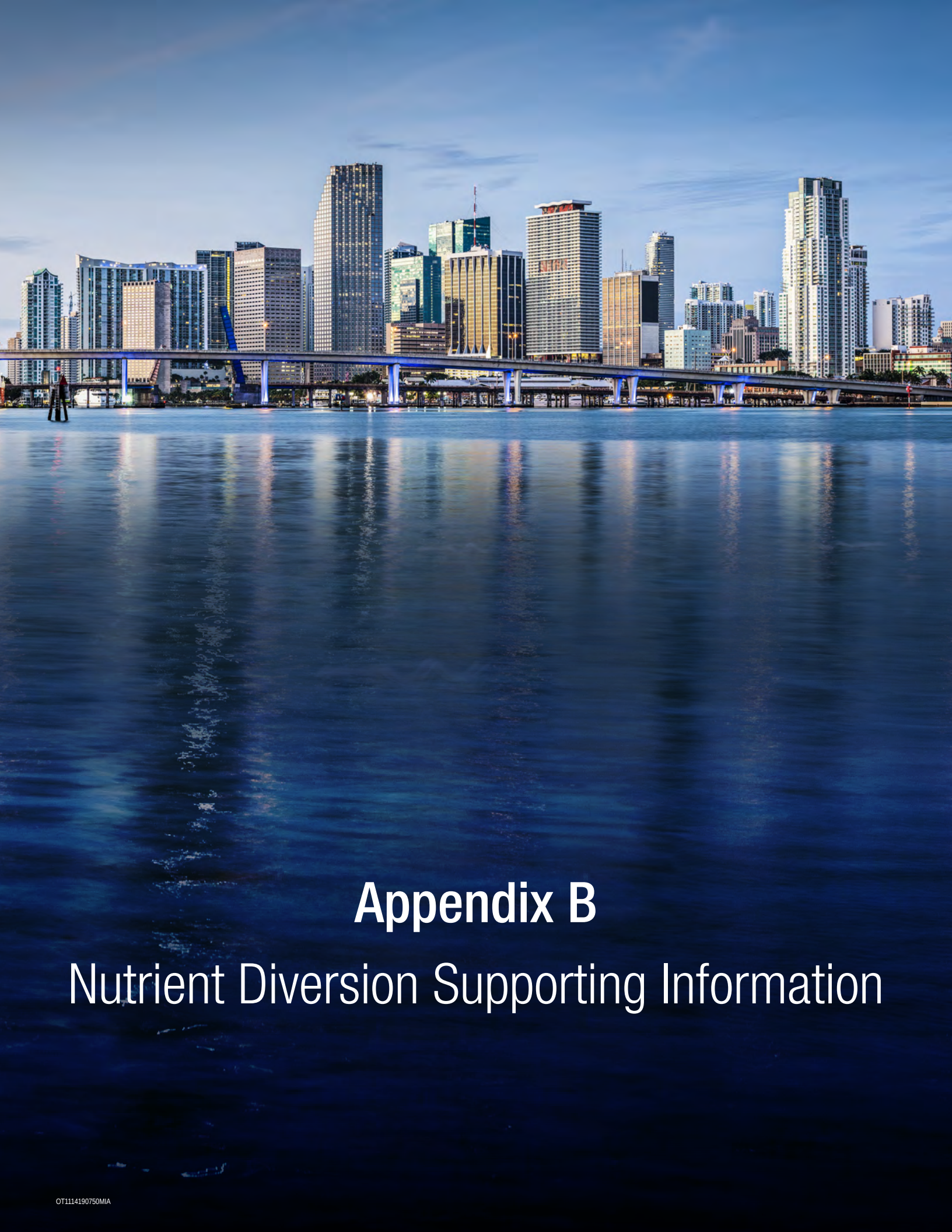


Appendix B

Nutrient Diversion Supporting Information

OT1114190750MIA

Appendix B

Diversion of Nutrients

WASD will meet the AWT and management requirements of the OOL, Section 403.086(9), F.S., by reducing cumulative nutrient loadings discharged to the outfalls between December 31, 2008 and December 31, 2025. The nutrient loading reduction will be equivalent to what would have been achieved if AWT nutrient levels (total nitrogen [TN] = 3 milligrams per liter [mg/L]; total phosphorous [TP] = 1 mg/L) were implemented from December 31, 2018 through December 31, 2025. The target reduction during this period are 59,900,000 pounds (29,950 tons) of TN and 2,900,000 pounds (1,450 tons) of TP (OOL, 2017). Because the OOL applies to WASD outfalls inclusively, the target nutrient reduction is the combined results for both the NDWWTP and CDWWTP.

Thus far, the reported load reduction from the outfalls has only been attributed to the nutrients within the treated effluent sent to the four existing injection wells at NDWWTP. This accounting for the diversion at NDWWTP will continue and beginning in November 2019, the two new industrial wells at CDWWTP will also be included.

In the Spring of 2018, operations at NDWWTP changed after new Consent Decree capital projects came online. New aeration and solids retention practices have caused the nitrogen concentrations in the effluent to noticeably decrease by 1 to 3 mg/L per month. The nitrification of ammonia and subsequent denitrification (release to the atmosphere) has consistently reduced the nitrogen load to the NDWWTP outfall during the past year. The historical tracking of TN load reduction solely by measuring flow down the wells does not account for changes in concentration that result from changes in the treatment process operations. Consequently, to capture this reduction in nutrient load to the outfall from new treatment, a new approach to quantify the load reduction, in addition to the previously utilized method, was included within the updated diversion and future projections.

At CDWWTP, WASD proposed new industrial injection wells to increase its ability to remove nutrient loading from the ocean outfalls by the end of 2025. The new system is finished and was placed in full-time operation early November 2019. Calculations to capture and account for the diversions from the CDWWTP outfall utilizing these industrial wells will be included in future annual reporting. The two industrial wells will accept the discharge of in-plant waste streams from the air scrubber wastewater and sludge dewatering centrate, plus landfill leachate from an adjacent facility (WASD, 2013). The in-plant wastes have high nutrient concentrations (higher than the effluent to the outfall) and are currently returned to the headworks. Removing these waste streams will reduce the outfall effluent nutrient concentrations. The effect of the internal waste stream removal is conceptually comparable to the operational changes at NDWWTP, and it is expected that future nutrient loadings through the CDWWTP outfall will reduce because of changes in the treatment process operations and in-plant waste stream changes. Therefore, a new method to quantify the nutrient load reduction at the outfall will be applied to the CDWWTP nutrient diversion as well.

As part of the Compliance Plan Update, an estimate of future diversions was made to demonstrate the proposed diversion effect prior to the end of 2025 (OOL, 2017). For both NDWWTP and CDWWTP, the nutrient load diversion from the outfalls will be captured and quantified by a combination of two approaches: flow to the injection wells and changes in concentrations at the outfall. However, due to plant characteristics, computations for each plant are unique and are further described in the sections

below. In addition, it should be noted that the estimated flow to the injection wells at CDWWTP was based on the limited available data from the industrial well system's basis of design report.

North District Wastewater Treatment Plant

For NDWWTP, the load diverted from the outfall will be estimated by the load diverted to the injection wells plus the load reduction at the outfall, as illustrated in Figure B-1.

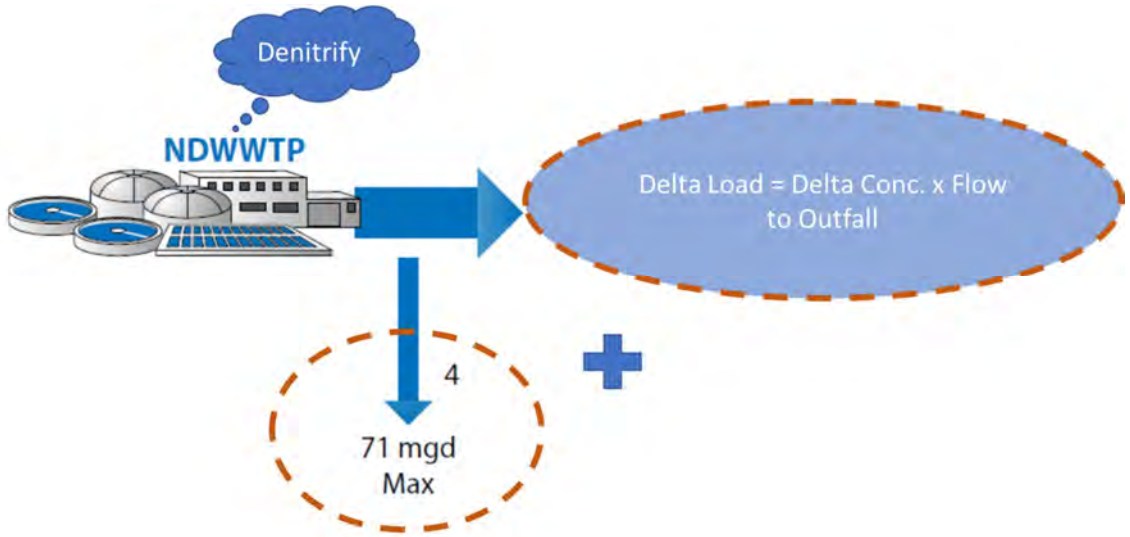


Figure B-1. Updated Approach to Estimate NDWWTP Nutrient Diversions
5-Year Progress Report: Progress from 2008 through 2019

Nutrient Diversion via Injection Wells

To date, the nutrient reduction has been accounted for by quantifying the nutrients discharged down the injection wells at NDWWTP. Since this diversion is at the end of the plant and prior to the outfall, it is a direct computation of nutrients being removed from the outfall. This calculation consists of the following steps:

- Nutrient Load to the Wells (pounds per month): Flow (mgd) x Concentration (mg/L) x 8.34 x Number of Days per Month. Monthly values are rounded to the nearest pound. Flow to the wells are obtained from the Monthly Operating Report (MOR) for the UIC permit. Concentrations are the average monthly values obtained from the Discharge Monitoring Report (DMR) for the WWTP. The nutrient concentration sampling at the WWTP is more frequent and is a better average of the daily flow being sent to the wells and outfall.
- Annual Load to Wells (pounds per year): Summation of the monthly nutrient load. There is no rounding in the Excel worksheet of the annual values.

Nutrient Diversion via Treatment Processes

The nutrient load reported to date only calculated the diversion of nutrients through flow sent to the injection wells (flow times concentration); however, this does not account for internal WWTP changes that affect the nutrient concentrations at the outfall. Beginning with this Progress Report, the second component of the nutrient reduction will be accounted for by quantifying the nutrient reduction obtained through changes within the treatment processes. This is an additional component to what was quantified and reported in previous updates.

The DMR data for both WWTPs were reviewed and the concentrations were relatively stable over the 10-year period between 2009 and 2018. Consistent with recent FDEP practice, the geometric mean was used as the representative nutrient concentration from each plant. Table B-1 presents a summary of the historical monitored effluent nutrient data from January 2009 through 2018. The proposed approach to account for in-plant changes between 2019 and through 2025 is based on the change in concentrations at the outfall from the observed historical values.

Table B-1. WWTP Monitored Effluent Nutrient Data from January 1, 2009 through December 31, 2018
5-Year Progress Report: Progress from 2008 through 2019

Summary	NDWWTP TN	CDWWTP TN	NDWWTP TP	CDWWTP TP
Count	120	120	120	120
Average (mg/L)	18.2	23.7	1.69	1.81
Median (mg/L)	17.5	23.8	1.65	1.80
Geomean (mg/L)	17.8	23.4	1.61	1.76
Std. Deviation (mg/L)	4.4	3.9	0.56	0.42
Coefficient of Variation	0.243	0.165	0.331	0.233

Based on monthly data as reported on the DMRs

The methodology used to estimate load reductions at the outfall from the treatment processes at NDWWTP is as follows:

- Delta Concentration: Utilizing the DMRs, determine the difference between the historical geometric mean and monthly monitored concentrations. This component was added to nutrient diversion calculations beginning in 2018, when the change in operations produced a noticeable difference.
- Delta Load (pounds per month): Flow to outfall (mgd) x Delta Concentration (mg/L) x 8.34 x Number of Days per Month.
- Annual Load Reduction to Outfall (pounds per year): Summation of the monthly delta load. There is no rounding in the Excel worksheet of the annual values.

Nutrient Diversion Projections

Based on recent data, the future load reduction to the outfalls was projected. It is anticipated that the future concentration of the NDWWTP effluent should average about 16 mg/L TN, so the 1.8 mg/L TN difference in the discharge to the outfall was assumed for future nutrient reduction. There will be little change to the TP concentrations in the future, so no reduction in TP is attributed to operational changes. Total flow in the future is based on the interpolation of the flow projection to the NDWWTP, and total flow to the outfall is the AADF projected flow to the plant less the average annual discharge to the injection wells (65 mgd).

Central District Wastewater Treatment Plant

Projecting the CDWWTP future effluent concentrations is uncertain because the removal of the highly concentrated centrate and other waste streams could impact the final concentration in the treated

effluent. Treated effluent will be sent to the industrial wells to help fully utilize the pump station capacity and reduce nutrients discharged from the outfall. There are permit restrictions on the blended discharge to the industrial wells (secondary effluent limits) that may prevent constant diversion of the centrate. For planning purposes, it was assumed that centrate could be discharged into the industrial wells at least 90 percent of the time; however, predicting future changes is uncertain.

The most direct alternative method to estimate the impact of the industrial wells at CDWWTP is to estimate the change in nutrient loads at the outfall instead of the injection wells. Figure B-2 illustrates the updated approach for CDWWTP.

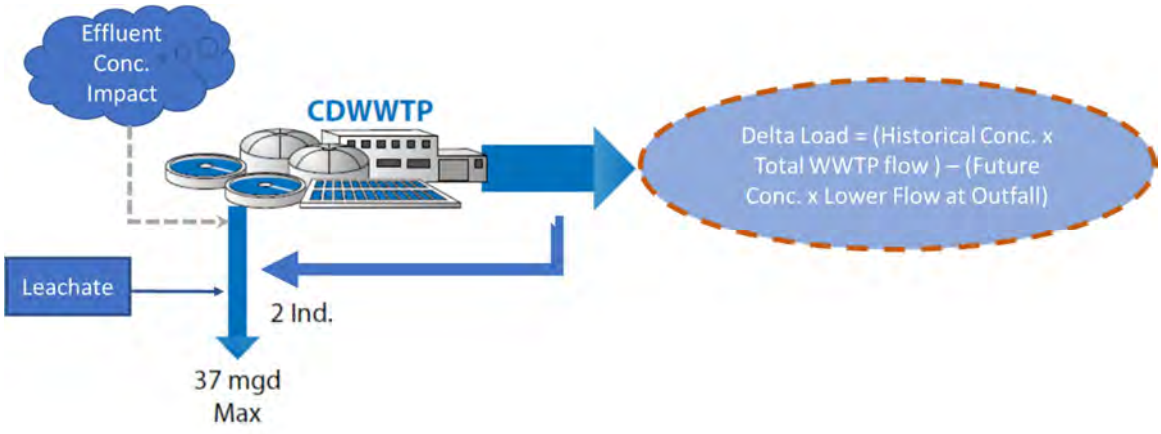


Figure B-2. Updated Approach to Estimate CDWWTP Nutrient Diversions
5-Year Progress Report: Progress from 2008 through 2019

Nutrient Diversion Methodology

Starting in November 2019, the reduction in nutrients to the CDWWTP outfall will be estimated based on observed data. However, to provide a projection on future diversions, the following process was used:

- Total Unaffected Load to Outfall (pounds per month): Total WWTP Flow (mgd) x Historical Concentration (mg/L) x 8.34 x Number of Days per Month. The historical concentrations are shown in Table B-1 (geometric means). The Total WWTP Flow is the total projected flow to the CDWWTP for the future projections. After monitoring begins, the Total WWTP Flow will be the flow sent to the outfall plus the entire flow sent to the industrial wells minus the leachate volume.
- Future Load to Outfall (pounds per month): Lower Flow at Outfall (mgd) x Observed Concentration (mg/L) x 8.34 x Number of Days per Month. For projection purposes, Future Lower Flow at Outfall is the projected flow to the CDWWTP minus what is sent to the injection well. The actual flow to the outfall is a direct monitoring requirement and will be reported as time progresses. The projected future concentration of the treated effluent was estimated to average about 17.5 mg/L TN, so the difference in future concentration is expected to be almost 6 mg/L TN. There should be a small reduction in TP concentration too, but by only about 0.08 mg/L TP. Similarly, the actual concentrations are monitored at the outfall pump station and can be used directly in the future reporting. A copy of the permit monitoring locations are provided below.
- Delta Load (pounds per month): The reduction in outfall nutrient loads is the difference between the Total Unaffected Load and Future Load to Outfall.

Annual Load Reduction to Outfall (pounds per year): Summation of the monthly delta load. There is no rounding in the Excel worksheet of the annual values.

Total WASD Nutrient Diversion

The total reduction of nutrients from the two outfalls is the sum of the Delta Load from each plant, plus an adjustment as follows:

- Annual Load Diverted from the Outfalls (pounds per year): (Annual Load Reduction– Baseline Adjustment). The Baseline Adjustment was required by FDEP to account for the use of the NDWWTP wells during their construction (for testing purposes) that occurred during the OOL baseline period (2003 through 2007). These adjustments are 230,393 pounds per year (lb/y) TN and 28,197 lb/yr TP.
- Cumulative Load Diverted from the Outfalls (pounds): Summation of the Annual Load Diverted from the Outfalls. There is no rounding in the Excel worksheet of the cumulative values. Per OOL requirements, values are reported annually to FDEP, and these are rounded to the nearest tenth of a ton (pounds / 2,000).

Estimated Total Nitrogen (TN) Reductions from Outfalls

Miami-Dade Ocean Outfall Legislation Program Calculation

M.L. Griffin 11/25/2019

Given data

Assumed data

Count through 2017	108	108		Reduction because	Assume No					
Geomean (mg/L)	17.78	23.46	Diverted from Outfall	Baseline Conc. Operations Change (2009-2017 geomean)	Change to Effluent Baseline Conc. (2009-2017 geomean)	Change to Effluent With Wells (Lower Conc. & Flow)	With Wells	NDWWTP and CDWWTP Total	After FDEP Adjustment	Result

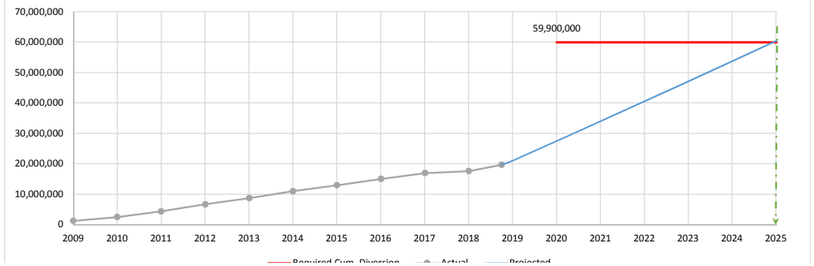
End of Period		Days per Period	AADF NDWWTP Total Flow (mgd)	AADF CDWWTP Total Flow (mgd)	AADF NDWWTP and CDWWTP Total Flow (mgd)	TOTAL AADF to Wells (mgd)	Flow Diversion to Wells: NDWWTP Existing Wells (mgd)	NDWWTP New Muni. Wells (mgd)	CDWWTP Ind. Wells (mgd)	CDWWTP Effluent to Ind.Wells (mgd)	CDWWTP New Muni. Wells (mgd)	Concentrations Avg. TN NDWWTP Effluent TN (mg/L)	Concentrations Avg. TN CDWWTP Effluent TN (mg/L)	NDWWTP TN Load to Wells (lb/period)	NDWWTP Load Diff. From 17.78 mg/L (lb/period)	CDWWTP TN Load to Outfall -No Wells- at 23.46 mg/L	CDWWTP TN Load to Outfall -With Wells- (lb/period)	CDWWTP TN Load Reduction to Outfall (lb/period)	Total TN Reductions to Outfalls (lb/period)	With 230.4K/y Discounted per FDEP (lb/period)	Cummulative TN Load Diverted (lbs)
12/31/2009	Monitored	365	81.9	126.9	208.8	20.6	20.6	0.0	0.0	0.0	0.0	19.3	21.6	1,451,299				0	1,451,299	1,220,906	1,220,906
12/31/2010	Monitored	365	82.3	104.8	187.2	28.2	28.2	0.0	0.0	0.0	0.0	17.2	23.9	1,445,083				0	1,445,083	1,214,690	2,435,596
12/31/2011	Monitored	365	82.3	112.7	195.0	36.0	36.0	0.0	0.0	0.0	0.0	18.2	25.1	2,090,387				0	2,090,387	1,859,994	4,295,590
12/31/2012	Monitored	366	95.2	119.8	215.0	39.4	39.4	0.0	0.0	0.0	0.0	20.9	25.2	2,538,247				0	2,538,247	2,307,854	6,603,445
12/31/2013	Monitored	365	90.6	124.1	214.7	35.1	35.1	0.0	0.0	0.0	0.0	21.1	21.9	2,273,106				0	2,273,106	2,042,713	8,646,158
12/31/2014	Monitored	365	90.0	116.8	206.8	47.7	47.7	0.0	0.0	0.0	0.0	17.5	21.9	2,518,451				0	2,518,451	2,288,058	10,934,216
12/31/2015	Monitored	365	86.1	120.4	206.5	43.3	43.3	0.0	0.0	0.0	0.0	16.5	21.6	2,170,189				0	2,170,189	1,939,796	12,874,011
12/31/2016	Monitored	366	80.4	119.0	199.5	43.9	43.9	0.0	0.0	0.0	0.0	17.1	25.0	2,306,747				0	2,306,747	2,076,354	14,950,365
12/31/2017	Monitored	365	87.1	110.7	197.8	37.5	37.5	0.0	0.0	0.0	0.0	18.4	23.9	2,148,815				0	2,148,815	1,918,422	16,868,787
12/31/2018	Monitored	365	97.8	104.9	202.7	22.2	22.2	0.0	0.0	0.0	0.0	15.0	22.7	898,477	630,688			0	898,477	668,084	17,536,870
9/30/2019	Monitored	273	85.5	117.2	202.7	59.4	55.3	0.0	2.1	2.1	0.0	15.7	22.8	1,975,509	145,153			109,779	2,230,441	2,058,120	19,594,990
12/31/2019	Projected	92	98	108	205	89.0	65.0	0.0	15.0	9.0	0.0	16.0	17.5	797,971	44,560	1,937,778	1,324,575	613,203	1,455,734	1,397,662	20,992,652
12/31/2020	Projected	366	97	110	208	120.0	65.0	0.0	30.0	25.0	0.0	16.0	17.5	3,174,538	175,923	7,905,720	4,561,569	3,344,151	6,694,612	6,464,219	27,456,871
12/31/2021	Projected	365	97	113	210	120.0	65.0	0.0	30.0	25.0	0.0	16.0	17.5	3,165,864	174,103	8,079,778	4,695,051	3,384,728	6,724,695	6,494,302	33,951,173
12/31/2022	Projected	365	97	116	213	120.0	65.0	0.0	30.0	25.0	0.0	16.0	17.5	3,165,864	172,764	8,275,437	4,840,996	3,434,441	6,773,069	6,542,676	40,493,850
12/31/2023	Projected	365	97	119	215	120.0	65.0	0.0	30.0	25.0	0.0	16.0	17.5	3,165,864	171,425	8,471,095	4,986,941	3,484,155	6,821,443	6,591,050	47,084,900
12/31/2024	Projected	366	96	121	218	120.0	65.0	0.0	30.0	25.0	0.0	16.0	17.5	3,174,538	170,548	8,691,036	5,147,349	3,543,686	6,888,772	6,658,379	53,743,279
12/31/2025	Projected	365	96.1	124.1	220.2	120.0	65.0	0.0	30.0	25.0	0.0	16.0	17.5	3,165,864	168,743	8,862,948	5,279,230	3,583,718	6,918,324	6,687,931	60,431,210
Notes:		see 6.	see 1.	see 1.	see 9. and 13.	sum right	see 1. and 2.	see 9.	see 3. and 4.	see 3.	see 9.	Approx. future conc. assumed	computed see 10.	see 8. x	see 14. x	see 14.	see 14.	see 14. x	Results Sum x	see 11.	see 12.

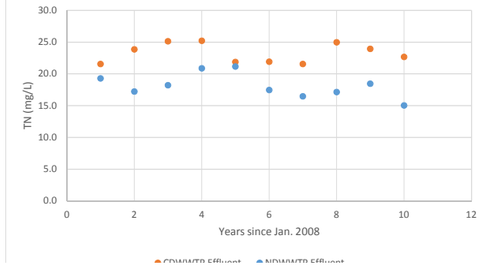
Assumptions:

1. 2009 through 2019 flow and concentrations are based on reported data. Muni. well conc. data are from WWTPs' DMR.
2. NDWWTP existing wells based on observed flows. Max. permit capacity is 71 mgd. Actual available flow may be lower.
3. CDWWTP will send leachate plus some flow currently being recycled to well. Remaining capacity filled with effluent (about 22 to 30 mgd).
4. Each muni. well is 24-inch OD with a maximum permissible capacity of 18.7 ± mgd per well. Assumed avg. capacity per new well: 15 mgd AADF
5. First year of operation for industrial well is testing, assume full use and that it will continue.
6. AADF WWTP flows from WASD projections are included here for a flow check on diversion to wells.
7. Loads based on total AADF per month, then averaged for year based on flow-weighted average concentration.
8. lb/d ==> flow (mgd) x Conc. (mg/L) x 8.34 ; lb/mn or yr is lb/d x days per month or year
9. Total AADF to muni. wells is limited by the expected AADF at the WWTFs: 96.1 mgd at NDWWTP and 124.1 mgd at CDWWTP by 2025.
10. Future concentrations are assumed or based on limited data from BODR (CDWWTP industrial wells) and NDWWTP average without sludge.
11. FDEP Req. Annual reduction in TN (lb/y): 230,393
12. Required Reduction (lbs) for Compliance: 59,900,000 TN
13. 8/15/19 Flow Proj. Used in flow computation

Year	2020	2025
mgd NDWWTP	93	96.1
mgd CDWWTP	117	124.1
mgd Total to outfall without diversions	210	220.2

14. To account for changes in concentrations at the outfall, resulting from changes in operations, use the observed data from 2009 through 2017 to establish a baseline concentration (geometric mean). NDWWTP operation impact is the difference between the 2009 to 2017 geomean and results after 2017. CDWWTP operation impact is resulting from industrial well diversions from treatment. Use the geomean concentration at CDWWTP times total effluent for baseline. Change is based on lower loads resulting from diverted flow and reduced concentrations.





Monthly data through 2017

	NDWWTP	CDWWTP	
Count	108.0	108.0	
Average	18.2	23.8	mg/L
Median	17.5	23.9	mg/L
Geomean	17.8	23.5	mg/L
Std. Deviation	4.4	4.0	mg/L
CV	0.2	0.2	
T factor (108,0.025)	2.0	2.0	
95% C.I.	0.8	0.8	mg/L
deviation	0.0	0.0	

Estimated Total Phosphorus (TP) Reductions from Outfalls

Miami-Dade Ocean Outfall Legislation Program Calculation

M.L. Griffin 11/25/2019

Given data

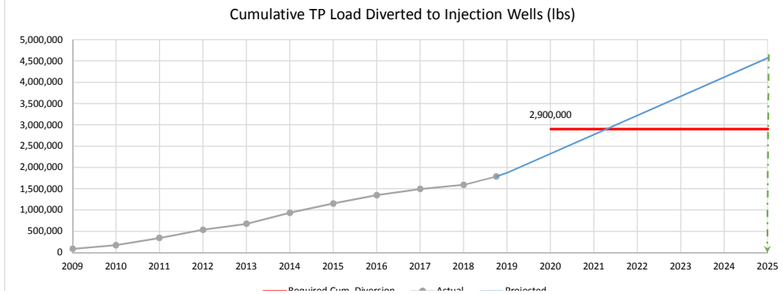
Assumed data

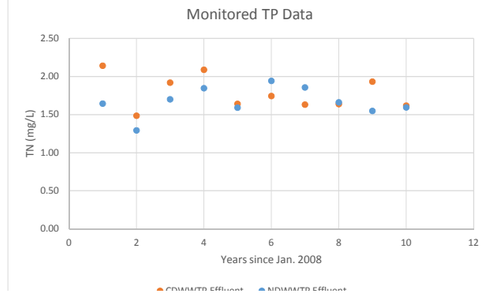
Count through 2017	108	108		Reduction because	Assume No		
Geomean (mg/L)	1.61	1.78	Diverted from Outfall	Baseline Conc. Operations Change (2009-2017 geomean)	Change to Effluent Baseline Conc. (2009-2017 geomean)	Change to Effluent With Wells (Lower Conc. & Flow)	With Wells	NDWWTP and CDWWTP Total	After FDEP Adjustment	Result

End of Period		Days per Period	AADF NDWWTP Total Flow (mgd)	AADF CDWWTP Total Flow (mgd)	AADF NDWWTP and CDWWTP Total Flow (mgd)	TOTAL AADF to Wells (mgd)	Flow Diversion to Wells: NDWWTP Existing Wells (mgd)	NDWWTP New Muni. Wells (mgd)	CDWWTP Ind. Wells (mgd)	CDWWTP Effluent to Ind.Wells (mgd)	CDWWTP New Muni. Wells (mgd)	Concentrations Avg. TP NDWWTP Effluent TN (mg/L)	Concentrations Avg. TP CDWWTP Effluent TN (mg/L)	NDWWTP TP Load to Wells (lb/period)	NDWWTP Load Diff. From 1.61 mg/L (lb/period)	CDWWTP TP Load to Outfall -No Wells- at 1.78 mg/L	CDWWTP TP Load to Outfall -With Wells- (lb/period)	CDWWTP TP Load Reduction to Outfall (lb/period)	Total TP Reductions to Outfalls (lb/period)	With 28.2K/y Discounted per FDEP (lb/period)	Cummulative TN Load Diverted (lbs)
12/31/2009	Monitored	365	81.9	126.9	208.8	20.6	20.6	0.0	0.0	0.0	0.0	1.64	2.14	112,998				0	112,998	84,801	84,801
12/31/2010	Monitored	365	82.3	104.8	187.2	28.2	28.2	0.0	0.0	0.0	0.0	1.29	1.48	114,156				0	114,156	85,959	170,760
12/31/2011	Monitored	365	82.3	112.7	195.0	36.0	36.0	0.0	0.0	0.0	0.0	1.70	1.92	195,945				0	195,945	167,748	338,508
12/31/2012	Monitored	366	95.2	119.8	215.0	39.4	39.4	0.0	0.0	0.0	0.0	1.84	2.09	220,689				0	220,689	192,492	531,000
12/31/2013	Monitored	365	90.6	124.1	214.7	35.1	35.1	0.0	0.0	0.0	0.0	1.59	1.64	170,247				0	170,247	142,050	673,049
12/31/2014	Monitored	365	90.0	116.8	206.8	47.7	47.7	0.0	0.0	0.0	0.0	1.94	1.74	285,337				0	285,337	257,140	930,190
12/31/2015	Monitored	365	86.1	120.4	206.5	43.3	43.3	0.0	0.0	0.0	0.0	1.85	1.63	247,520				0	247,520	219,323	1,149,512
12/31/2016	Monitored	366	80.4	119.0	199.5	43.9	43.9	0.0	0.0	0.0	0.0	1.66	1.64	224,181				0	224,181	195,984	1,345,496
12/31/2017	Monitored	365	87.1	110.7	197.8	37.5	37.5	0.0	0.0	0.0	0.0	1.55	1.93	173,054				0	173,054	144,857	1,490,353
12/31/2018	Monitored	365	97.8	104.9	202.7	22.2	22.2	0.0	0.0	0.0	0.0	1.59	1.62	126,351	4,827			0	126,351	98,154	1,588,508
9/30/2019	Monitored	273	85.5	117.2	202.7	59.4	55.3	0.0	2.1	2.1	0.0	1.7	1.8	207,387	0			9,562	216,949	195,859	1,784,367
12/31/2019	Projected	92	98	108	205	89.0	65.0	0.0	15.0	9.0	0.0	1.6	1.7	79,797	315	147,333	128,673	18,660	98,772	91,665	1,876,032
12/31/2020	Projected	366	97	110	208	120.0	65.0	0.0	30.0	25.0	0.0	1.6	1.7	317,454	1,244	601,088	443,124	157,965	476,662	448,465	2,324,497
12/31/2021	Projected	365	97	113	210	120.0	65.0	0.0	30.0	25.0	0.0	1.6	1.7	316,586	1,231	614,322	456,091	158,232	476,049	447,852	2,772,349
12/31/2022	Projected	365	97	116	213	120.0	65.0	0.0	30.0	25.0	0.0	1.6	1.7	316,586	1,221	629,199	470,268	158,931	476,738	448,541	3,220,890
12/31/2023	Projected	365	97	119	215	120.0	65.0	0.0	30.0	25.0	0.0	1.6	1.7	316,586	1,212	644,075	484,446	159,629	477,428	449,231	3,670,121
12/31/2024	Projected	366	96	121	218	120.0	65.0	0.0	30.0	25.0	0.0	1.6	1.7	317,454	1,206	660,798	500,028	160,769	479,429	451,232	4,121,353
12/31/2025	Projected	365	96.1	124.1	220.2	120.0	65.0	0.0	30.0	25.0	0.0	1.6	1.7	316,586	1,193	673,868	512,840	161,029	478,808	450,611	4,571,964
Notes:		see 6.	see 1.	see 1.	see 9.	sum right	see 1. and 2.	see 9.	see 3. and 4.	see 3.	see 9.	Approx. future conc. assumed	computed see 10.	see 8. x	see 14. x	see 14.	see 14.	see 14. x	Results Sum x	see 11.	see 12.

Assumptions:

1. 2009 through 2019 flow and concentrations are based on reported data. Muni. well conc. data are from WWTPs' DMR.
2. NDWWTP existing wells based on observed flows. Max. permit capacity is 71 mgd. Actual available flow may be lower.
3. CDWWTP will send leachate plus some flow currently being recycled to well. Remaining capacity filled with effluent (about 22 to 30 mgd).
4. Each muni. well is 24-inch OD with a maximum permissible capacity of 18.7 ± mgd per well. Assumed avg. capacity per new well: 15 mgd AADF
5. First year of operation for industrial well is testing, assume full use and that it will continue.
6. AADF WWTP flows from WASD projections are included here for a flow check on diversion to wells.
7. Loads based on total AADF per month, then averaged for year based on flow-weighted average concentration.
8. lb/d ==> flow (mgd) x Conc. (mg/L) x 8.34 ; lb/mn or yr is lb/d x days per month or year
9. Total AADF to muni. wells is limited by the expected AADF at the WWTFs: 96.1 mgd at NDWWTP and 124.1 mgd at CDWWTP by 2025.
10. Future concentrations are assumed or based on limited data from BODR (CDWWTP industrial wells) and NDWWTP average without sludge.





11. FDEP Req. Annual reduction in TP (lb/y): 28,197
12. Required Reduction (lbs) for Compliance: 2,900,000 TP
13. 8/15/19 Flow Proj. Used in flow computation

Year	2020	2025
mgd NDWWTP	93	96.1
mgd CDWWTP	117	124.1
mgd Total to outfall without diversions	210	220.2

14. To account for changes in concentrations at the outfall, resulting from changes in operations, use the observed data from 2009 through 2017 to establish a baseline concentration (geometric mean). NDWWTP operation impact is the difference between the 2009 to 2017 geomean and results after 2017. CDWWTP operation impact is resulting from industrial well diversions from treatment. Use the geomean concentration at CDWWTP times total effluent for baseline. Change is based on lower loads resulting from diverted flow and reduced concentrations.

Monthly data through 2017

	NDWWTP	CDWWTP	
Count	108.0	108.0	
Average	1.7	1.8	mg/L
Median	1.6	1.8	mg/L
Geomean	1.6	1.8	mg/L
Std. Deviation	0.6	0.4	mg/L
CV	0.3	0.2	
T factor (108,0.025)	2.0	2.0	
95% C.I.	0.1	0.1	mg/L
deviation	0.1	0.0	

Central District WWTP Proposed Industrial Wells

Appendix

Preliminary Estimate of Impact of Removing Centrate from CDWWTP

OOL Program Calculation
M.L. Griffin 11/22/2019

1.	**No Diversion**			Comments
	Treated Effluent	116	mgd	2010-2018 average AADF (116.4 mgd)+ 0% for growth
	Typical TN	23.97	mg/L	2010-2018 average (Ref. 1)
	Typical TP	1.79	mg/L	2010-2018 average (Ref. 1)
	Undiverted Loadings to Outfall (no wells)			= Flow (mgd) x Conc. (mg/L) x 8.3459 x 365 [typ]
	TN	**8,470,169**	**lbs/yr**	
	TP	**632,524**	**lbs/yr**	

Compute changes to concentrations given industrial wells

2.	**Two Industrial Wells**			Comments	TN (mg/L)	TP (mg/L)
	Plant 1 Scrubber Wastewater	2.20	mgd	Reference 2, T.1.1 T.3.1	11.3	2.9
	Plant 2 Scrubber Wastewater	3.80	mgd	Reference 2, T.1.1 T.3.1	19.4	3.1
	GRS Leachate	1.50	mgd	Reference 2, T.1.1 T.3.4	44.8	0.44
	Dewatering Centrate	0.50	mgd	Reference 2, T.1.1 T.3.3	869	60.35
	Treated Effluent	22.00	mgd	*Concentration from #4a below, flow is remainder of well capacity*	17.5	1.7
	Total Waste Stream Flow to Wells (mgd)	30.00	mgd	Assumed average, Ref. 2, T.4.2	32.8	2.9
	Estimated TN (mg/L)	32.84	mg/L	flow weighted average from above		
	Estimated TP (mg/L)	2.88	mg/L	flow weighted average from above		
	Diverted Loadings to Wells			= Flow (mgd) x Conc. (mg/L) x 8.3459 x 365		
	TN	**3,001,413**	**lbs/yr**	(includes leachate)		
	TP	**263,181**	**lbs/yr**	(includes leachate)		

3.	**Effect on CDWWTP Outfall Flow**			Comments
	Treated Effluent	116	mgd	assumed AADF for calculation
	Diverted effluent	-28.50	mgd	Flow to well, less leachate
	Outfall Flow	**87.5**	**mgd**	**to outfall after diversion**
		24.6%	**of the effluent flow is diverted**	

4.	**Effect on CDWWTP Effluent Concentration**			
	Centrate	0.50	mgd	from #2 above
	Ammonia + Nox	869	mg/L	from #2 above
	TP	60.35	mg/L	from #2 above

a. Portion of Loading Diverted to Well from Centrate Alone

TN	**1,323,597**	**lbs/yr**	**15.6%**	**undiverted load**
TP	**91,921**	**lbs/yr**	**14.5%**	**undiverted load**

OOL Program Calculation
M.L. Griffin 11/22/2019

Similarly:

Portion of Loading Diverted to Well from Scrubbers

TN	**300,300**	**lbs/yr**	**3.5% undiverted load**
TP	**55,320**	**lbs/yr**	**8.7% undiverted load**

Portion of Loading Diverted to Well from Leachate

TN	**204,708**	**lbs/yr**	**2.4% undiverted load**
TP	**2,011**	**lbs/yr**	**0.3% undiverted load**

Check Effluent Concentration:

[Well Load -(all other loads except diverted well load)]/(Diverted Flow from Effluent) /8.3459/365

Well Load - all other	**1,172,808**	**lbs/yr TN**	
	113,930	**lbs/yr TP**	
Net flow for above	**87.5**	**mgd**	remaining flow to outfall

Assumes negligible denitrification at CDWWTP, remaining about same. Sludge loads about same.

TN	**17.5**	mg/L
TP	**1.7**	mg/L

b. Portion of Loading Diverted to Well from Treated Effluent Alone

	22.00	mgd	Treated Effluent to Ind. Well	
TN	**1,172,808**	**lbs/yr**		**13.8% undiverted load**
TP	**113,930**	**lbs/yr**		**18.0% undiverted load**

c. Total Loading to Well from #2 above

TN	**3,001,413**	**lbs/yr**	**35.4% undiverted load**
TP	**263,181**	**lbs/yr**	**41.6% undiverted load**

d. Changed Loading to the Outfall Undiverted -(outfall flow x conc. X 8.3459 x 365)

TN	**3,805,593**	**lbs/yr**	**44.9% undiverted load**
TP	**179,394**	**lbs/yr**	**28.4% undiverted load**

5. References

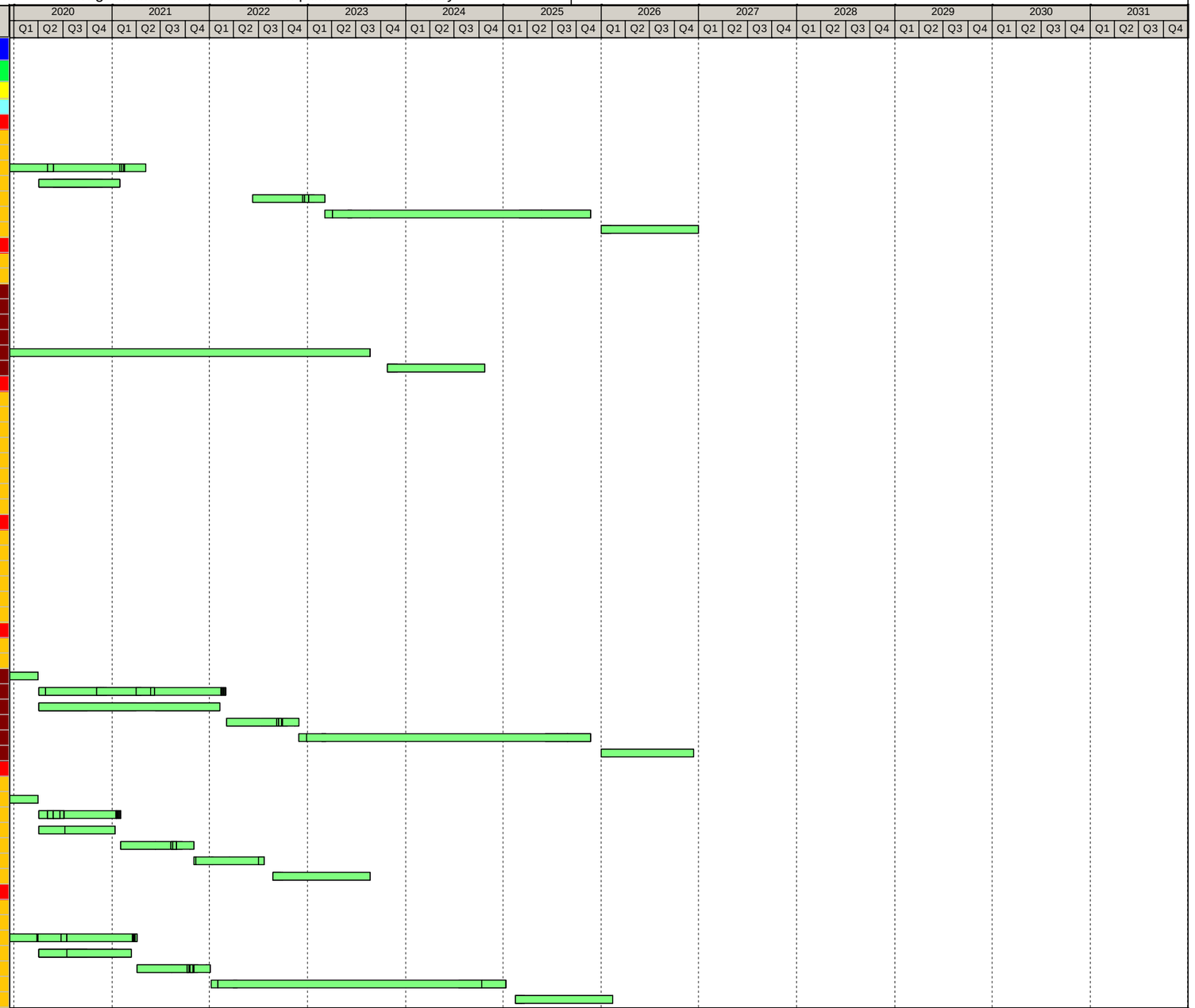
1. WASD water quality and flow data results for the injection wells.2008-2018
2. MWH. 2014. Central District Wastewater Treatment Plan Injection Well Surface Facilities Basis of Design Report. Prepared for Miami-Dade Water and Sewer Department. April.

Appendix C

OOL Schedule Gantt Chart

Miami-Dade Water and Sewer Department | Program Master Schedule - Compliance Plan Summary | 01-Nov-19 | Printed: 10-Dec-19

Activity ID	Activity Name	Duration	Start	Finish
	Miami-Dade Water and Sewer Department Programs	4858	02-Jul-12	11-Feb-31
	WASD Ocean Outfall Legislation Program	4858	02-Jul-12	11-Feb-31
	Miami-Dade Ocean Outfall Legislation Program	4732	02-Jul-12	11-Feb-31
	CDWWTP Projects	3784	02-Jul-12	31-Dec-26
	CE-1 - CDWWTP - Municipal Injection Wells PS	2759	31-Mar-16	31-Dec-26
	Project Planning	297	09-Dec-16	15-Feb-18
	A&E Selection and Award	728	31-Mar-16	12-Feb-19
	Design	513	13-Feb-19	06-May-21
	Permitting	210	01-Apr-20	28-Jan-21
	Contractor Selection	190	09-Jun-22	07-Mar-23
	Construction	691	08-Mar-23	21-Nov-25
	Close-Out	254	02-Jan-26	31-Dec-26
	CE-2 - CDWWTP - Municipal Injection Wells	2256	23-Dec-15	24-Oct-24
	Project Planning	329	23-Dec-15	07-Apr-17
	Municipal Injection Wells	2256	23-Dec-15	24-Oct-24
	A&E Selection and Award	368	23-Dec-15	05-Jun-17
	Design	250	05-Jun-17	30-May-18
	Permitting	355	01-May-17	24-Sep-18
	Contractor Selection	566	20-Jul-17	24-Sep-19
	Construction	1012	30-Aug-19	21-Aug-23
	Close-Out	254	26-Oct-23	24-Oct-24
	CE-3 - CDWWTP - Industrial Injection Well Surface Facilities	1723	06-Jan-14	01-Nov-19
	Project Planning	83	06-Jan-14	02-May-14
	A&E Selection and Award	156	05-May-14	15-Dec-14
	Land Acquisition	189	06-Jan-14	30-Sep-14
	Design	454	20-Oct-14	02-Aug-16
	Permitting	485	27-Aug-15	26-Jul-17
	Contractor Selection	239	09-May-16	17-Apr-17
	Construction	647	01-May-17	08-May-19
	Close-Out	254	09-May-19	01-Nov-19
	CE-4 - CDWWTP - Industrial Waste Deep Injection Well System	1331	02-Jul-12	28-Sep-17
	Project Planning	100	02-Jul-12	20-Nov-12
	Design	100	02-Jul-12	20-Nov-12
	Permitting	281	20-Nov-12	31-Dec-13
	Contractor Selection	504	21-Nov-12	17-Nov-14
	Construction	747	20-Oct-14	28-Sep-17
	Close-Out	0	28-Sep-17	28-Sep-17
	CT-2A - CDWWTP - HLD Improvements & Filtration Pilot Test	2759	31-Mar-16	12-Dec-26
	Project Planning	477	31-Mar-16	15-Feb-18
	HLD Improvements	2263	23-Mar-18	12-Dec-26
	A&E Selection and Award	514	23-Mar-18	31-Mar-20
	Design	489	01-Apr-20	02-Mar-22
	Permitting	479	01-Apr-20	09-Feb-22
	Contractor Selection	190	03-Mar-22	30-Nov-22
	Construction	760	01-Dec-22	21-Nov-25
	Close-Out	254	02-Jan-26	12-Dec-26
	CT-2B - CDWWTP - Preliminary Site Preparation	1883	31-Mar-16	23-Aug-23
	Project Planning	301	09-Dec-16	15-Feb-18
	A&E Selection and Award	1016	31-Mar-16	31-Mar-20
	Design	214	01-Apr-20	03-Feb-21
	Permitting	199	01-Apr-20	13-Jan-21
	Contractor Selection	190	04-Feb-21	01-Nov-21
	Construction	184	02-Nov-21	21-Jul-22
	Close-Out	254	26-Aug-22	23-Aug-23
	CT-3B - CDWWTP - Oxygenation Trains & Secondary Clarifiers	2530	31-Mar-16	13-Feb-26
	Project Planning	297	09-Dec-16	15-Feb-18
	A&E Selection and Award	703	31-Mar-16	08-Jan-19
	Design	565	09-Jan-19	05-Apr-21
	Permitting	242	01-Apr-20	15-Mar-21
	Contractor Selection	190	06-Apr-21	03-Jan-22
	Construction	768	05-Jan-22	09-Jan-25
	Close-Out	254	14-Feb-25	13-Feb-26



CP

WASD OOL Program

Compliance Plan Projects

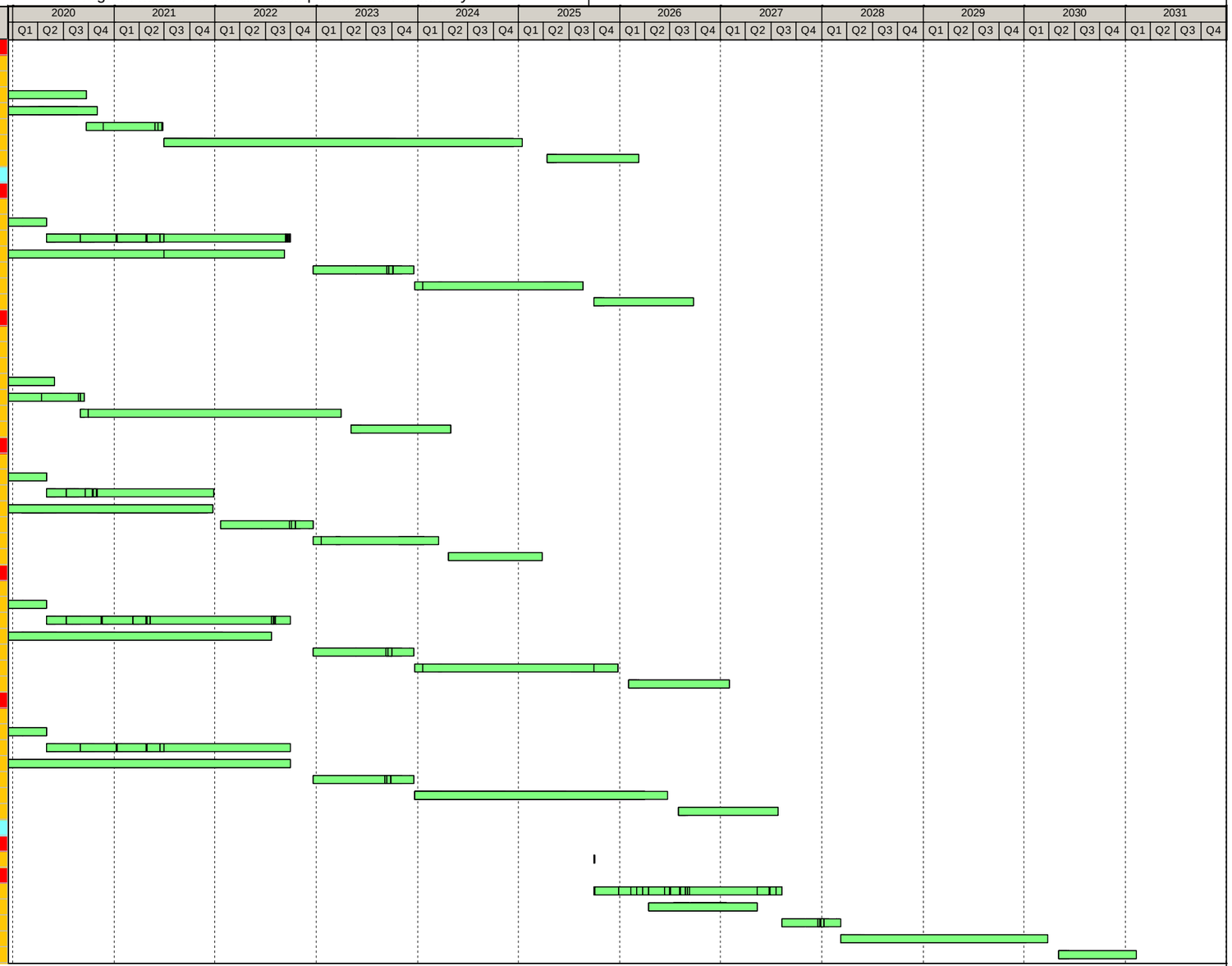
Miami-Dade Water and Sewer Department

Program Master Schedule - Compliance Plan Summary

01-Nov-19

Printed: 10-Dec-19

Activity ID	Activity Name	Duration	Start	Finish
	CT-3C - CDWWTP - EDB 2 & EDB 3	2571	31-Mar-16	11-Mar-26
	Project Planning	297	09-Dec-16	15-Feb-18
	A&E Selection and Award	703	31-Mar-16	09-Jan-19
	Design	471	09-Jan-19	23-Sep-20
	Permitting	324	26-Jul-19	30-Oct-20
	Contractor Selection	190	24-Sep-20	28-Jun-21
	Construction	902	29-Jun-21	13-Jan-25
	Close-Out	254	14-Apr-25	11-Mar-26
	NDWWTP Projects	3028	23-Dec-15	28-Jul-27
	NE-1 - NDWWTP - Municipal Injection Wells PS	2106	20-Jun-18	23-Sep-26
	Project Planning	268	20-Jun-18	10-Jul-19
	A&E Selection and Award	191	01-Aug-19	30-Apr-20
	Design	616	01-May-20	30-Sep-22
	Permitting	743	10-Oct-19	09-Sep-22
	Contractor Selection	256	21-Dec-22	20-Dec-23
	Construction	426	21-Dec-23	22-Aug-25
	Close-Out	254	30-Sep-25	23-Sep-26
	NE-2 - NDWWTP - Municipal Injection Wells	2129	23-Dec-15	30-Apr-24
	Project Planning	329	23-Dec-15	07-Apr-17
	A&E Selection and Award	781	23-Dec-15	21-Jan-19
	Design	223	21-Jan-19	04-Dec-19
	Permitting	554	20-Mar-18	29-May-20
	Contractor Selection	197	20-Jul-17	16-Sep-20
	Construction	659	01-Sep-20	31-Mar-23
	Close-Out	250	08-May-23	30-Apr-24
	NT-2B - NDWWTP - Site Prep & Stormwater	1741	20-Jun-18	28-Mar-25
	Project Planning	268	20-Jun-18	10-Jul-19
	A&E Selection and Award	191	01-Aug-19	30-Apr-20
	Design	434	01-May-20	27-Dec-21
	Permitting	610	10-Oct-19	24-Dec-21
	Contractor Selection	234	20-Jan-22	20-Dec-22
	Construction	317	21-Dec-22	17-Mar-24
	Close-Out	254	23-Apr-24	28-Mar-25
	NT-2C- NDWWTP - HLD Facilities	2192	20-Jun-18	02-Feb-27
	Project Planning	268	20-Jun-18	10-Jul-19
	A&E Selection and Award	191	01-Aug-19	30-Apr-20
	Design	581	01-May-20	30-Sep-22
	Permitting	757	10-Oct-19	21-Jul-22
	Contractor Selection	256	21-Dec-22	20-Dec-23
	Construction	512	21-Dec-23	26-Dec-25
	Close-Out	254	03-Feb-26	02-Feb-27
	NT-3 - NDWWTP -EDB 2 (HLD)	2352	20-Jun-18	28-Jul-27
	Project Planning	268	20-Jun-18	10-Jul-19
	A&E Selection and Award	191	01-Aug-19	30-Apr-20
	Design	631	01-May-20	30-Sep-22
	Permitting	812	10-Oct-19	30-Sep-22
	Contractor Selection	256	21-Dec-22	20-Dec-23
	Construction	638	21-Dec-23	22-Jun-26
	Close-Out	254	31-Jul-26	28-Jul-27
	Post 2025 - Reclaimed Water Facilities	1364	01-Oct-25	11-Feb-31
	SR-2 - SDWWTP to FPL - Reclaimed Water Pipeline	1	01-Oct-25	02-Oct-25
	Construction	1	01-Oct-25	02-Oct-25
	XR-1 - Reclaimed Water Re-use Projects	1363	01-Oct-25	11-Feb-31
	Design	470	01-Oct-25	09-Aug-27
	Permitting	275	15-Apr-26	13-May-27
	Contractor Selection	150	10-Aug-27	08-Mar-28
	Construction	523	09-Mar-28	29-Mar-30
	Close-Out	195	07-May-30	11-Feb-31



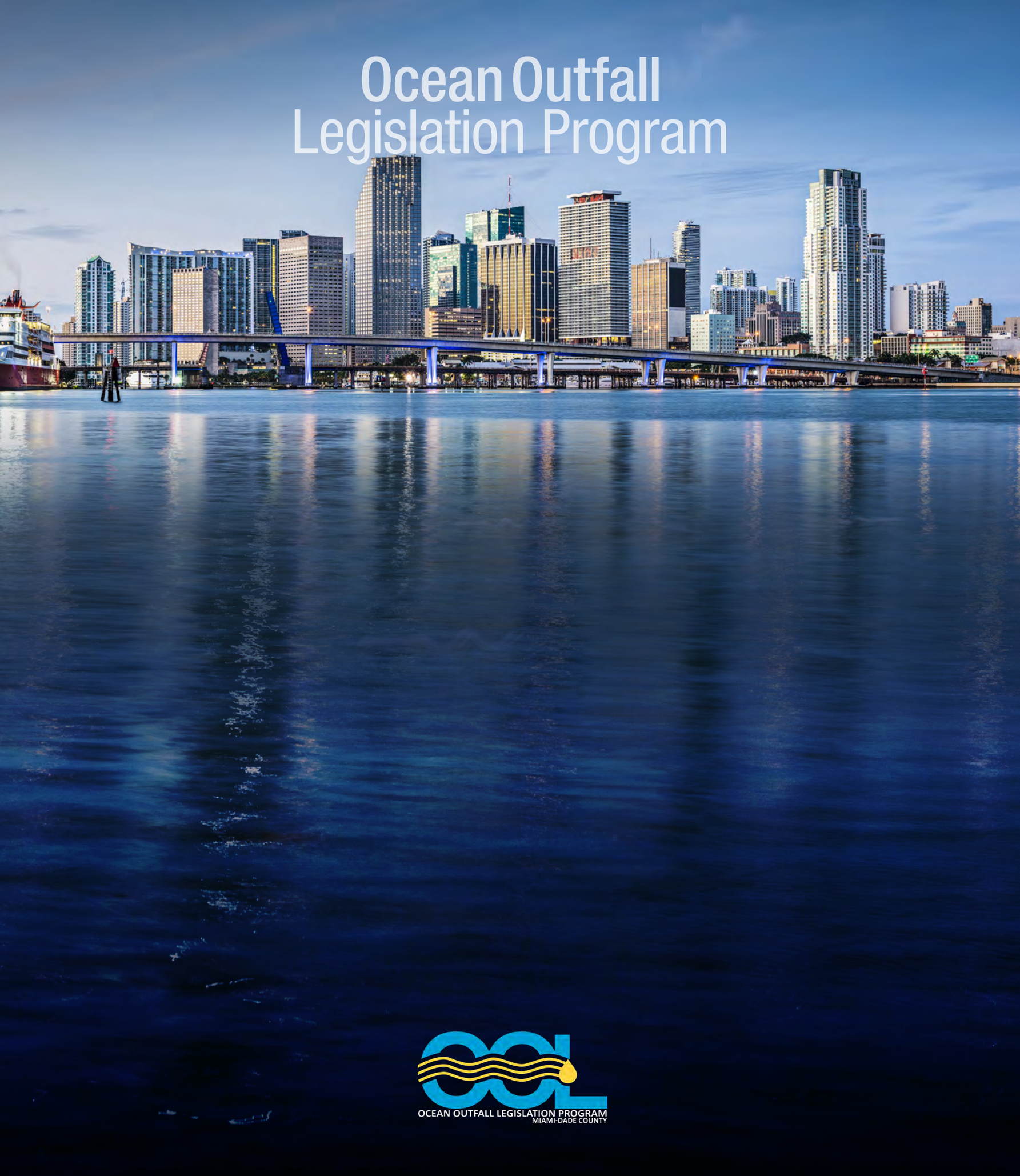
CP

WASD OOL Program

Compliance Plan Projects

OCEAN OUTFALL LEGISLATION PROGRAM

Ocean Outfall Legislation Program



OCEAN OUTFALL LEGISLATION PROGRAM
MIAMI-DADE COUNTY