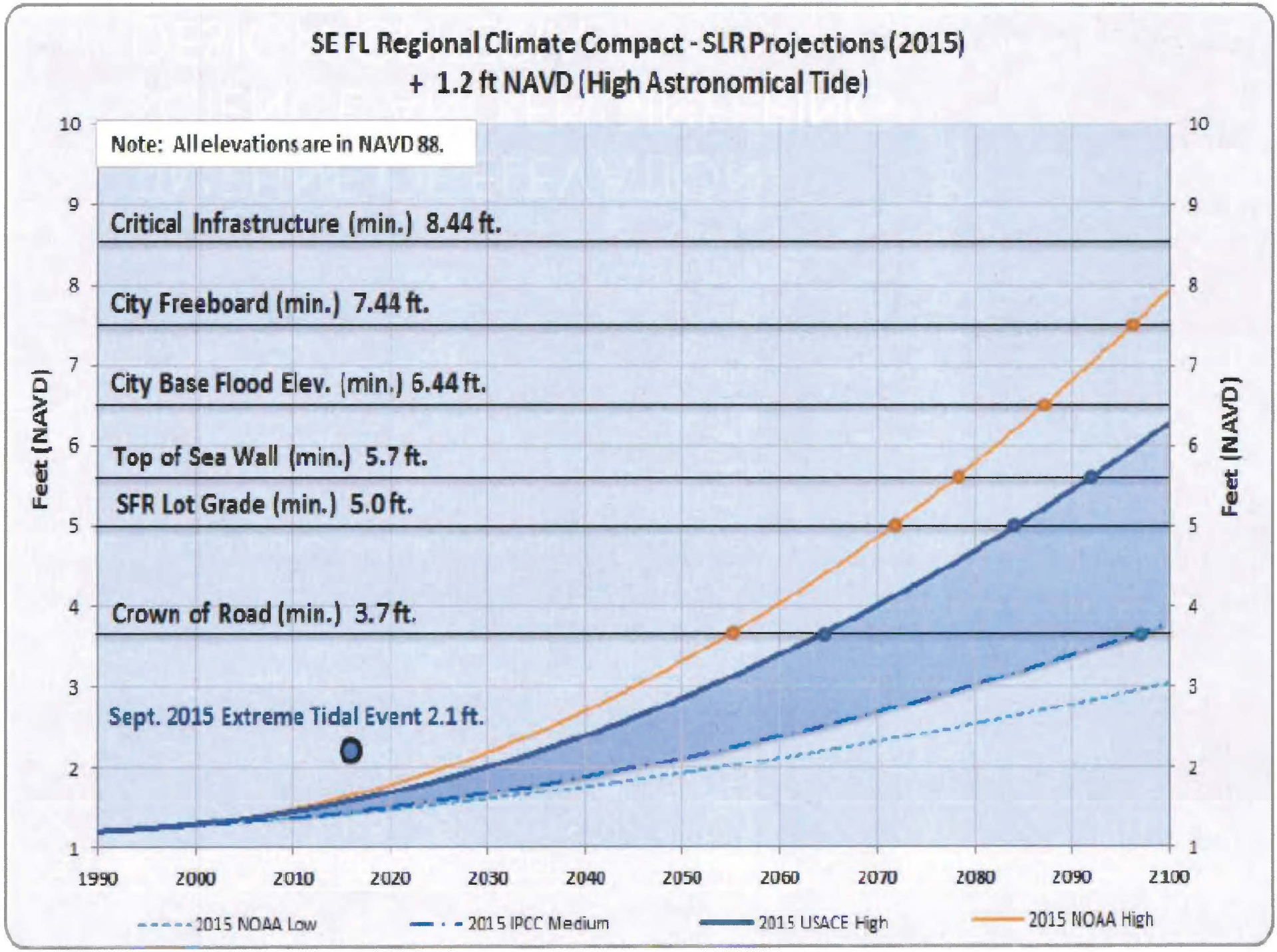

SE FL Regional Climate Compact - SLR Projections (2015)
+ 1.2 ft NAVD (High Astronomical Tide)
Note: All elevations are in NAVD 88.
Critical Infrastructure (min.) 8.44 ft.
City Freeboard (min.) 7.44 ft.
City Base Flood Elev. (min.) 6.44 ft.
Top of Sea Wall (min.) 5.7 ft.
SFR Lot Grade (min.) 5.0 ft.
Crown of Road (min.) 3.7 ft.
Sept. 2015 Extreme Tidal Event 2.1 ft.
Feet (NAVD)
10
9
8
7
6
5
4
3
2
1
1990
2000
2010
2020
2030
2040
2050
2060
2070
2080
2090
2100
2015 NOAA Low
2015 IPCC Medium
2015 USACE High
2015 NOAA High

ALL 4 COUNTIES
MORE THAN 1/3 CITIES

Have adopted the Southeast Florida Climate Change Compact Unified Sea Level Rise Projection for Planning

RESILIENCE PROJECTS BENEFITS

New Water Lines

- Reduced chances of water pipe breaks and lapses in water service
- Improved water pressure in your home
- Increased water flow for the Fire Department in case of an emergency

New Wastewater Infrastructure

- Increased protection of near-shore water quality with reduced likelihood of sewage overflows
- Energy savings from reduced inflows
- Lower maintenance costs
- Safeguarding homes and businesses from sewage backups

New Stormwater System

- Improved drainage in rain and high tide events
- Increased protection from hurricane storm surge and sea level rise
- Reduced risk of flood damage to property

New Roads and Sidewalks

- New and improved lighting
- Increased accessibility for emergency vehicles
- Enhanced neighborhood aesthetics with new roadways, sidewalks, and landscaping
- Improved safety for pedestrians

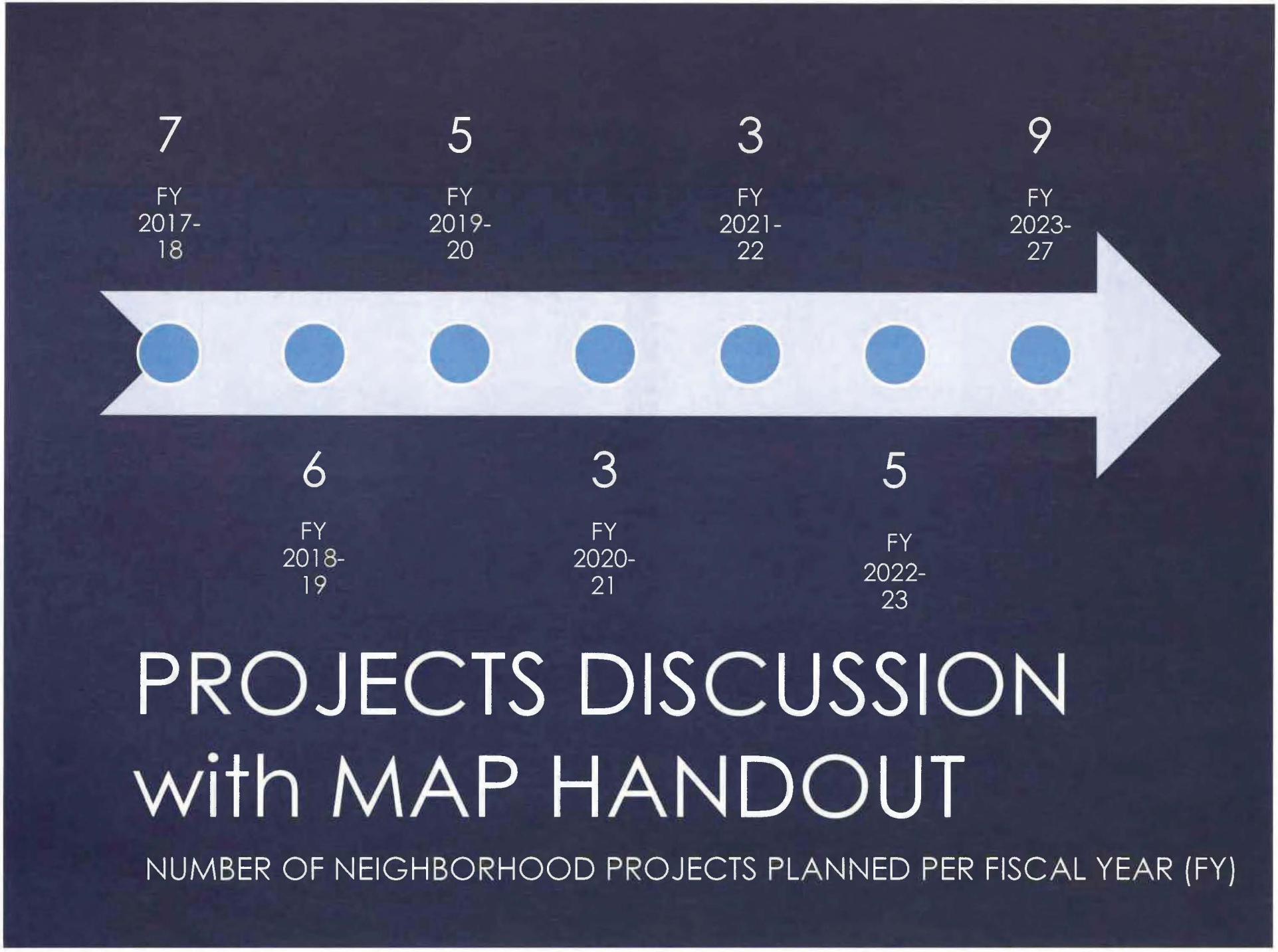
POLICY DECISIONS MADE

- TO INVEST IN AND REPLACE AGING INFRASTRUCTURE
  STORMWATER, WATER, WASTEWATER, ROAD
- TO USE CLIMATE CHANGE COMPACT SCIENCE
- TO ADAPT TO SEA LEVEL RISE

PENDING DECISIONS FEEDBACK NEEDED

- TIMING OF PROJECTS
- PRIVATE PROPERTY HARMONIZATION
- LOCALIZED AND INDIVIDUAL DESIGN

DISCUSSION & DECISIONS


7
FY 2017-18
5
FY 2019-20
3
FY 2021-22
9
FY 2023-27
6
FY 2018-19
3
FY 2020-21
5
FY 2022-23
PROJECTS DISCUSSION with MAP HANDOUT
NUMBER OF NEIGHBORHOOD PROJECTS PLANNED PER FISCAL YEAR (FY)

MIAMIBEACH
RISING
ABOVE

THANK YOU!

Exhibit 3

CITY OF MIAMI BEACH, FLORIDA

Engineer's Report for the Stormwater Revenue and Revenue Refunding Bonds, Series 2017

RISING ABOVE

MIAMIBEACH

November 29, 2017

FINAL

Prepared by

AECOM

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Coral Gables, Florida 33134
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November 29, 2017

Mr. John Woodruff
Chief Financial Officer
City of Miami Beach, Florida
1700 Convention Center Drive
Miami Beach, Florida 33139

Subject: Engineer's Report for the City of Miami Beach, Florida
Stormwater Revenue and Revenue Refunding Bonds, Series 2017

Dear Mr. Woodruff,

AECOM has prepared this letter report to present pertinent engineering information for the Official Statement relating to the issuance by the City of Miami Beach, Florida (City) of its Stormwater Revenue and Revenue Refunding Bonds, Series 2017 (Series 2017 Bonds). The Series 2017 Bonds are being issued to finance continued construction of improvements to the stormwater systems throughout the City as begun with proceeds from the City's Stormwater Revenue Bonds, Series 2000 (Series 2000 Bonds), Stormwater Revenue Bonds, Series 2011A (Series 2011 Bonds), and Stormwater Revenue Bonds, Series 2015 (Series 2015 Bonds).

This Engineer's Report contains information prepared by AECOM relative to the City's stormwater system as developed and proposed in part by the 2011 City of Miami Beach Citywide Comprehensive Stormwater Master Plan prepared by CDM Smith Inc. (2011 SWMP) and makes reference to both the 2011 SWMP and the 1997 Comprehensive Stormwater Management Program Master Plan prepared by CH2M Hill (1997 SWMP) in combination with various Basis of Design Reports developed by other engineering consultants and current basin studies being prepared by AECOM. Since 2014 AECOM has evaluated over 30 individual neighborhoods to determine the number and size of required pumping systems, and drainage improvements, and is in process of preparing an updated SWMP.

Subsequent to adoption of the 2011 SWMP, the City implemented policy changes related to flood mitigation, drainage and roadway Level of Service (LOS) to maintain flood protection while taking into account sea level rise, king tide events, and increased rainfall depth, intensity and distribution. AECOM evaluated the prior reports and studies and has updated the citywide master stormwater model to evaluate areas deficient in LOS. Based on this analysis, it was determined that the drainage designs contained within the 2011 SWMP were inadequate to serve the City's needs.

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In addition, as a result of the predicted increase in groundwater levels resulting from sea level rise, the City has implemented a working policy to (over time) reduce and/or eliminate the use of exfiltration trenches, gravity drainage wells and stormwater injection wells due to concerns over reliability and decreasing capacity, which further modified the 2011 SWMP drainage designs.

Various aspects of the City's stormwater system are included in this Engineer's Report in the following format:

- Introduction
- Public Works Department and Stormwater System Development
- Stormwater System, and
- Capital Improvements

It is the intent of this Engineer's Report to identify proposed projects that will provide comprehensive solutions for improving the City's stormwater management system performance for the next 50 years. Appropriate consideration has been given to water quality of the Biscayne Bay and Operation and Maintenance (O&M) of an expanded system. The presented capital improvements allow the City's stormwater systems to meet the increasing performance, permitting and regulatory demands while modernizing the existing system to meet the drainage and roadway LOS desired by the City of Miami Beach.

Respectfully submitted;

AECOM

Thomas F. McGowan, PE
Project Manager

Florida License #44742
FPBE & BPR #8115

SEAL

AECOM

1. Introduction

1.1 Background

The City of Miami Beach (the "City") has experienced tidal flooding for many years. The tidal flooding has been severe during higher than average tides experienced in the spring and the fall of each year. The fall high tides are the highest tides of the year, and are also known as the King Tides. Tidal flooding occurs when the Biscayne Bay water surface elevation rises sufficiently to backflow into the City's stormwater management system and up through the stormwater inlet grates, flooding the roadway curb and gutter. During some high tide events, the tidal flooding can overtop the roadway curb and gutter and sidewalks, filling the streets of the City with salt water. Tidal flooding poses a threat to public health and safety and inconveniences the public. The flooding has caused major damage to structures and killed lawns and landscaping. In addition, tidal flooding saturates the base structure of roadways, causing deterioration and failure of roadways prior to their expected useful design life.

AECOM has prepared this letter report to present pertinent engineering information for the Official Statement relating to the issuance by the City of its Stormwater Revenue and Revenue Refunding Bonds, Series 2017 (the "Series 2017 Bonds"). Proceeds of the Series 2017 Bonds will provide funds, together with other available funds, to (i) pay the costs of certain capital improvements to the Stormwater Utility as described in the Bond Resolution (the "Series 2017 Project"), (ii) refund a portion of the City's outstanding Stormwater Revenue Bonds, Series 2011A (the "Series 2011A Bonds") and the Stormwater Revenue Refunding Bonds, Series 2011B (the "Series 2011B Bonds" and together with the Series 2011A Bonds, the "Refunded Bonds"), and (iii) pay costs of issuance of the Series 2017 Bonds, and refunding of the Refunded Bonds.

The Series 2017 Bonds are being issued to finance continued construction of the improvements to the stormwater utility system owned and operated by the City together with any improvements and any Separate Systems (as defined in the hereinafter defined Resolution) consolidated with the Stormwater Utility pursuant to the Resolution (the "Stormwater Utility"), as begun with proceeds from the City's Stormwater Revenue Bonds, Series 2000 (the "Series 2000 Bonds"), Stormwater Revenue Bonds, Series 2011A (the "Series 2011 Bonds"), and Stormwater Revenue Bonds, Series 2015 (the "Series 2015 Bonds"). The City authorized AECOM to prepare an Engineer's Report in support of the City's planned issuance of approximately $300 million of Stormwater Revenue Bonds in order to complete the upgrades to the City's Stormwater Utility (the Stormwater Program). The Series 2017 Bonds will be issued to provide $100 million of proceeds for such a purpose to finance current fiscal year projects and those anticipated to be constructed over the next two (2) years.

In July 2008, CDM Smith Inc. (CDM Smith) was retained by the City to perform a Stormwater Rate Study projecting annual revenue requirements for Fiscal Years 2009 through 2014, including operating expenses, existing and prospective debt service, administrative fees, depreciation/renewal and replacement requirements, and capital expenditures.

In 2015, AECOM and City Staff reviewed and updated the Stormwater Rate Study and made recommendations to increase stormwater utility rates in support of the Series 2015 Bonds. The City's current stormwater utility rates are in effect based on recommendations from the 2015 updated Rate Study. The City recently retained Public Resource Management Group, Inc. (PRMG) to further update the Stormwater Rate Study. On October 1, 2016, the City raised the stormwater utility rates in anticipation of the issuance of the Series 2017 Bonds. No additional increase in rates is required, or anticipated to support the issuance of the Series 2017 Bonds. In addition, on October 18, 2017 the City passed Ordinance No. 2017-4145 indexing the stormwater utility rates to the Consumer Price Index, (CPI), effective for all billings after October 1, 2017 and adjusted at the beginning of each Fiscal Year.

This Engineer's Report presents the results of an updated analysis, and describes the organization and management of the City's Public Works Department and the specific responsibilities of the Stormwater Utility (as defined in City Resolution No. 2000-24127 adopted by the City on October 18, 2000, as amended and supplemented (the "Bond Resolution") authorizing issuance of stormwater revenue bonds). This report outlines the City's stormwater service areas, facilities, operations and Capital Improvement Program ("CIP").

In July 2014, the City retained AECOM to evaluate the Citywide Comprehensive Stormwater Management Master Plan prepared by CDM Smith (2011 SWMP) to analyze and update its stormwater management practices, infrastructure, funding, and regulatory policies. In this capacity, AECOM has analyzed, reviewed and assessed various aspects of the Stormwater Utility infrastructure, management, operations and finances.

This Engineer's Report contains information prepared by AECOM relative to the City's Stormwater Utility, as developed and proposed in part by the 2011 SWMP. This Engineer's Report makes reference to both the 2011 SWMP and the 1997 Comprehensive Stormwater Management Program Master Plan prepared by CH2M Hill, (1997 SWMP), in combination with various Basis of Design Reports developed by other engineering consultants and basin studies prepared by AECOM. In addition to AECOM's analysis and update, these previously developed reports and studies provide AECOM the means of assessing the technical merit for the issuance of the Series 2017 Bonds.

1.2 Study Assumptions

Information utilized in preparation of this report relies upon information provided by the City and other parties as well as basin studies prepared by AECOM. AECOM has not independently verified all of the supplied information. However, the information follows general trends of the City related to the management of its stormwater infrastructure. AECOM has no reason to believe the supplied information is not valid for this report, yet no assurances are made with respect thereto. Specific assumptions used in this report are presented throughout the course of this report and are provided to clarify the basis of analysis.

2. Public Works Department and Stormwater System Development

2.1 Description of the Existing Stormwater System

The City is a highly urbanized coastal community located in southeast Florida and is a major economic resource to the region. The Stormwater Utility covers approximately 4,200 acres, as shown in **Figure 1,** and is bounded by the Atlantic Ocean and the environmentally sensitive Biscayne Bay Aquatic Preserve, which is also an Outstanding Florida Water ("OFW"),. The area has relatively low-lying topography that is bisected by intracoastal waterways, a subtropical climate with high intensity rainfall, significant tidal influence, limited soil storage for infiltration, high amounts of impervious area, and limited available surface storage. These factors have all contributed to historical, and have the potential to contribute to future, severe rainfall and tidal flooding.

Tidal events can cause both flooding and erosion. The City is comprised of a series of islands and has a perimeter of seawalls around the island system. Topographic elevations range from approximately 10 feet referenced to North American Vertical Datum of 1988 (feet-NAVD) to 0.0 feet-NAVD, and much of the City's stormwater infrastructure and roads lie at or below 6 feet-NAVD. Low street gutter elevations range as low as 0.5 feet-NAVD.

The City's Stormwater Utility is tidally influenced and consists of approximately 341 City maintained outfalls served by swales, inlets, storm drains, culverts, bridges, gravity and pumped recharge wells, exfiltration systems, channels, canals, pump stations, and retention/detention storage systems.

The City is one of 33 municipalities that entered into an Interlocal Agreement ("ILA") with Miami-Dade County in 1993, authorizing Miami-Dade County to be the lead permittee in submitting a National Pollutant Discharge Elimination System ("NPDES") Stormwater Permit Application. One condition of the ILA requires the City to develop a stormwater master plan that is consistent with Miami-Dade County's Master Plan.

The City's stormwater system currently operates under Florida Department of Environmental Protection ("FDEP") Municipal Separate Storm Sewer System (MS4) Permit No. FLS000003-003, which adheres to the federal NPDES requirements of the Clean Water Act. The MS4 Permit for the Stormwater Utility was scheduled to expire on June 20, 2016. An application to renew the permit was timely filed and the current permit remains in effect until the new permit is issued. A draft of the new permit has been issued, and is currently being advertised for public comment. It is expected that the new permit will be issued before the end of December 2017. As recorded in the City's stormwater Geographic Information System (GIS) database, the stormwater infrastructure in place includes approximately 4,852 stormwater inlets, 8,398 conduits (gravity pipes and force mains), 2,675 manholes, 35 pumping stations, and 341 stormwater outfalls.


SR 934
Collins Avenue
BISCAYNE BAY
Alton Road
I-195
Collins Avenue
Alton Road
ATLANTIC OCEAN
I-395
Legend
Miami Beach Boundary
Major Roads
Data Source: City of Miami Beach
City of Miami Beach Study Area Map
Figure 1
0 1,750 3,500 7,000 10,500
Feet
AECOM

In addition, the City has 11 pump stations under construction which are anticipated to be placed into operation in early 2018 and an additional 3 in final design or currently under contract to construct. Of the 35 pumping stations, 4 pump stations were constructed by the Florida Department of Transportation ("FDOT"), but are operated and maintained by the City. This does not include the several private, County, and State owned pump stations and outfalls within the City limits.

2.2 Administration and Staffing

The City is organized under the Commission-Manager form of government. The governing body of the City is the City Commission, which establishes policies for proper administration of the City. The City Commission is composed of seven members, including the Mayor. The Mayor and Commissioners are elected to their offices by an at-large vote of the citizens, and the Vice-Mayor is chosen by majority vote of all members of the City Commission. Six Commissioners serve staggered four year terms, and the Mayor serves a two year term. The City Commission appoints a City Manager to act as administrative head of the City. The City Manager serves at the pleasure of the City Commission, carries out its policies, directs the operations of the City and has the power to appoint or remove heads of all departments.

Figure 2 presents the organizational chart for the City's Public Works Department. The Public Works Department is responsible for the operation and maintenance of the facilities of the stormwater system. Eric T. Carpenter, PE is the Public Works Director/Assistant City Manager, and is assisted by two (2) Assistant Public Works Directors.

The Assistant Public Works Director and Director of the City's Infrastructure Division of the Public Works Department, Roy Coley, is responsible for the daily operations of the stormwater system. The Infrastructure Director oversees Operation and Maintenance ("O&M") and minor construction of the following:

- Sewer collection system
- Water distribution system
- Stormwater collection and disposal system
- Pump stations
- Water metering

The Infrastructure Director also oversees warehouse operations.

Other Public Works Department Divisions are overseen by the Assistant Public Works Director, Jay Fink, PE who reports to the Public Works Director. The City Engineer, Bruce Mowry, Ph.D., PE, is responsible for the daily operations of these divisions. These Department Divisions provide the following services:

- Planning and Engineering of the following:
    - Sewer collection system
    - Water distribution system
    - Water Metering
    - Stormwater collection and disposal system

  - Pump stations
- Right-of-Way permitting and enforcement
- Elevator Inspection
- Geographic Information Systems (GIS)

There are two (2) more divisions that fall under the Public Works Department and they are the Sanitation Division and the Greenspace Management Division. The Sanitation Division is managed by Al Zamora, and the Greenspace Management Division is managed by Rodney Knowles.

The Public Works Department is supported by other departments within the City. The City Manager's office provides managerial and administrative guidance. The Finance Department performs the utility billing function. The Procurement Department performs several functions including, among others: handling requests for payment of invoices received by the Public Works Department; advertising and awarding of all construction contracts; handling all requests for proposals for engineering consultants and contracts; and facilitating purchases of required equipment. The Office of Budget and Performance Improvements (OBPI) approves all spending requests and allocates funding for all water, wastewater and stormwater operations. The Fleet Maintenance and Property Management Department performs vehicle fleet maintenance and building maintenance, respectively. The Human Resources Department handles all personnel functions. The Capital Improvement Project Office provides planning, design review, fiscal and construction management services of major City capital projects.

The City bills monthly for water, wastewater, stormwater, and sanitation services on the same bill. There are four billing cycles each month. The prioritization of applying payments is first to stormwater, second to sanitation, third to wastewater, and last to water.

Payments are due within twenty one (21) days from the date of the bill. A one and one-half percent (1.5%) penalty is added to all charges on the bills if not paid within the twenty one (21) days.

Customers for whom a check has been returned by the bank are notified to replace their check with cash, cashier's check or money order within five days. For returned checks, the customer's account will be charged a minimum of $25.00 or five percent of the amount of the check, whichever is greater.

The charges for utility services constitute a lien against the premises and become effective and binding as such lien from the date upon which the account becomes due, unpaid and in arrears. Liens accrued as set out in the City Code are of the same dignity as liens acquired by virtue of the City Charter, whereby an interest rate of ten percent accrues to such delinquent accounts.

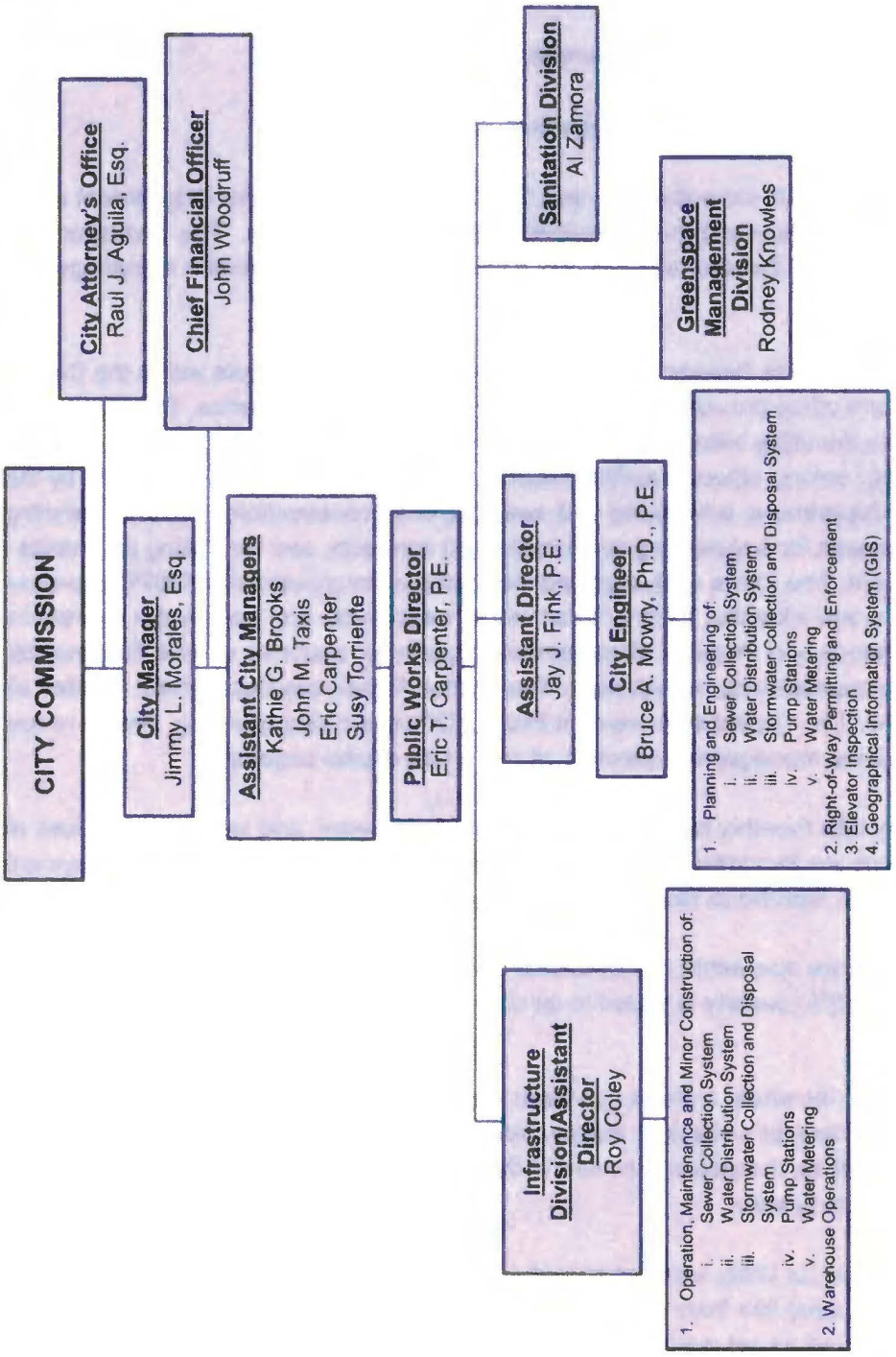

Figure 2

City of Miami Beach, Florida
Organizational Chart for City's Stormwater System

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3. Stormwater System

3.1 System Description

In 1903, the United States Army Corps of Engineers ("USACE") dredged the first opening to the Atlantic Ocean, cutting through mangrove swamps at the shipping channel known as Government Cut. The dredging project allowed for a safer, more direct access to the Port of Miami.

Through the 1900s, Miami Beach was dredged and built; the beach, on the east side, is the highest part of the City. The west side, along West Avenue, is the lowest. The majority of the storm drainage was constructed between the 1930s and 1960s during the City's initial population booms. Generally, the drainage system flows by gravity from east to west, where water drains into Biscayne Bay or one of its tributary waterways.

As development has expanded within the City and green areas have transitioned into developed land, some of the natural phenomena that occur in a tidally influenced community have been exacerbated. Under present day conditions, when the Bay is at high tide or groundwater conditions, the City experiences flooding. During storm events, flooding occurs due to excess runoff as well as the inundation of the stormwater network by tidal backflow, elevated groundwater and rainfall. **Figure 3** shows the general layout of the City's Primary Storm Water Management System ("PSMS") which was evaluated as part of the 2011 SWMP.

The existing Stormwater Utility facilities are inadequate in many areas of the City. In most areas, the existing Stormwater Utility is based on development patterns and groundwater and coastal conditions of the 1930s and 1960s, and has localized improvements to address flooding issues. Those systems constructed between the 1930s through 1960s have served their design life. Due to age, development, and updated regulatory requirements, the overall system requires upgrades to improve both stormwater quality and conveyance.


Legend
Existing Stormwater Pump Stations
Existing Stormwater Network
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
1 inch = 2,000 feet
0
0.25
0.5
Miles
City of Miami Beach
Northern Portion of Existing Primary Stormwater Management System
Figure 3A
AECOM
Monday, November 13, 2017
X:\City_of_Miami_Beach\Miami_Beach_Ccsl_Map\Existing_Storm_Map.mxd


Legend
Existing Stormwater Pump Stations
Existing Stormwater Network
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
1 inch = 2,000 feet
0 0.25 0.5 Miles
City of Miami Beach
Southern Portion of Existing Primary Stormwater Management System
Figure 3B
AECOM
Monday, November 13, 2017
X:\City_of_Miami_Beach\Miami_Beach_Cost_Map\Existing_Storm_Map.mxd

The City's stormwater master plan is reviewed and evaluated approximately every five years, with portions of the plan updated as determined to be necessary during such review and evaluation. The City conducts a comprehensive analysis and update of its stormwater master plan approximately every ten to fifteen years to address any remaining deficiencies within the Stormwater Utility and any changes that have occurred, or are expected to occur, in permitting and regulatory requirements.

Capital improvement projects identified as part of the 1997 SWMP were funded from the proceeds of the Series 2000 Bonds and revenues from the Stormwater Enterprise Fund for the highest priority flooding areas. The completion of the capital improvements from the 1997 SWMP has improved the performance and operation of the Stormwater Utility in several areas. The 1997 SWMP identified 34 drainage basins as high priority basins. The Capital Improvement Program ("CIP") originally presented in the 1997 SWMP identified proposed projects by stormwater basin number. In the 2011 SWMP, these improvements were grouped together and reclassified as neighborhood projects or by general community. The purpose of these improvements is to provide a higher Level of Service (LOS) as defined by improved flood protection and control of pollutant loading in the Stormwater Utility.

Subsequent to the adoption of the 2011 SWMP, the City has implemented policy changes related to flood mitigation and drainage and roadway LOS to maintain flood protection while taking into account sea level rise, king tide events, and increased rainfall depth, intensity and distribution. On June 8, 2016 the City passed Resolution number 2016-59454 to amend the 2011 SWMP based on recommendations made by AECOM. As such, the existing drainage designs contained within the 2011 SWMP were determined to be inadequate to serve the City's needs. In addition, as a result of the predicted increase in groundwater levels resulting from sea level rise, the City has implemented a working policy to, over the next ten to fifteen years, reduce and/or eliminate the use of exfiltration trenches, gravity drainage wells and stormwater injection wells due to concerns over reliability and decreasing capacity. This condition warranted further modifications to the 2011 SWMP drainage designs. The City has undertaken an intensive review of its building and zoning codes to evaluate and develop solutions to these issues, and over the next year will continue its plan for phased implementation of the revised code.

As such, the drainage components of the neighborhood improvements contemplated in the 2011 SWMP have been re-evaluated based on Sea Level Rise and higher groundwater conditions. **Figures 4A** and **4B** depicts the areas of the City lying below an elevation of 2.2 feet-NAVD. These areas will be inundated during normal high tide with the adopted 50-Year Sea Level Rise of 1.50 feet. With a projected Mean High Water at 1.50 feet, NAVD and a normal high tide cycle of 0.70 feet, the water level in the Biscayne Bay would be at 2.20 feet, NAVD. At these elevated Bay and groundwater levels, gravity drainage systems and conventional best management practices will not function, thereby necessitating the changes to the 2011 SWMP drainage designs currently being developed by the City. Since 2014 AECOM has evaluated over 30 individual neighborhoods to determine the number and size of required pumping systems, and drainage improvements, and is in process of preparing an updated SWMP.


Biscayne Bay
Cleveland Rd
Daytona Rd
Byron Ave
Abbott Ave
N Shore Dr
E Shore Dr
Normandy Island
Biarritz Dr
East Dr
North Bay Village
934
North Bay Island
Treasure Island
La Gorce Island
Indian Creek Dr
Pine Tree Dr
Miami Beach
Golf Course
La Gorce Cir
Collins Ave
Michigan Ave
Meridian Ave
Pine Tree Park
Polo Park
W 41st St
Mount Sinai
112
Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Legend
Ground elevations bellow 2.2 Ft. NAVD 88
0 - 2.2 Ft.
City of Miami Beach
Ground Elevations
N
0
0.4
0.8
1.6 Miles
GIS
MIAMI BEACH

Figure 4A


Miami Beach
Lincoln Rd
Terminal Island
Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Legend
Ground elevations bellow 2.2 Ft. NAVD 88
0 - 2.2 Ft.
City of Miami Beach
Ground Elevations
N
0
0.3
0.6
1.2 Miles
GIS
MIAMIBEACH

Figure 4B

3.2 Permitting Requirements

The City's Stormwater Utility is regulated by federal, state, and local agencies. Therefore, any modifications or improvements to the City's stormwater system need to be developed within the following regulatory and permitting framework.

3.2.1 Federal

The following is a summary of the federal agencies with which coordination either has been conducted, or will require coordination to implement the Stormwater Program.

3.2.1.1 United States Environmental Protection Agency (US EPA)

The US EPA was mandated by Congress through Section 405 of the Water Quality Act of 1987 to promulgate a National Pollutant Discharge Elimination System ("NPDES") permitting program for municipal stormwater discharge. The City is a co-permittee with Miami-Dade County and coordinates on this program for compliance.

The US EPA has delegated the NPDES permitting authority to the FDEP. During the development of the 2011 SWMP, the US EPA was in the process of updating the MS4 permit program, which is the permit program applicable to the Stormwater Utility. The new rule contained additional requirements for the Best Management Practices ("BMPs") and documentation on their performance. The 2011 SWMP included the potential future needs of those requirements and the pending numeric nutrient criteria ("NNC") for all discharges. Since then, FDEP has updated its rules for the MS4 permit program and has implemented the new rules to be followed and requirements to be met as each MS4 permit is updated. The MS4 Permit for the Stormwater Utility was scheduled to expire on June 20, 2016, but it has been extended until such time as a new permit is issued. A draft of the new permit has been issued, and is currently being advertised for public comment. It is expected that the new permit will be issued before the end of December 2017. The City is in the process of updating its permit compliance procedures and will have all requirements in place prior to the issuance of the MS4 permit.

3.2.1.2 Federal Emergency Management Agency (FEMA)

FEMA's mission is to support citizens and first responders to natural disasters to ensure that as a nation we work together to build, sustain, and improve our capability to prepare for, protect against, respond to, recover from, and mitigate all hazards. The Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-707, signed into law November 23, 1988, amended the Disaster Relief Act of 1974, PL 93-288. This Act constitutes the statutory authority for most Federal disaster response activities. FEMA regulates riverine (stormwater) and coastal (tidal) floodplains and floodways under the National Flood Insurance Program. CDM Smith used tools developed by FEMA to identify and quantify flood risks, including Flood Insurance Studies, Flood Insurance Rate Maps, and the HAZUS Program (a nationally applicable standardized methodology that contains models for estimating potential losses from earthquakes, floods and hurricanes) coupled with the models of the City's PSMS to estimate structural and economic damage costs from the 2- through 100-year design storm events. This information is contained within the 2011 SWMP.

Coordination with FEMA allows for the support of flood map revisions and communication of economic impacts in a manner recognized by the Federal government for cost-benefit comparisons. The improvements identified in the City's Stormwater Program and timing for their implementation are in accordance with (or are more comprehensive or aggressive than) what is currently required, or expected to be required under FEMA regulations.

3.2.1.3 United States Army Corps of Engineers (USACE)

The United States Army Corps of Engineers ("USACE") is the primary federal agency that develops guidance parameters for civil infrastructure design consideration for projects impacting environmentally sensitive water and OFW, like the Biscayne Bay.

A nationwide permit ("NWP") from the USACE is required when up to one-half acre of waters of the United States (e.g. Biscayne Bay or its tributary canals) are impacted, and the USACE requires that original grades are restored to the site after completion of construction. Under the NWP program a pre-construction notification ("PCN") submittal is required. The Regional Conditions and General Condition for NWP require that the PCN include the following information:

- A map of the entire corridor including a delineation of all wetlands and waters of the United States within the corridor.
- An alternative analysis which addresses the selection of an alternative which avoids and minimizes wetland impacts to the maximum extent practicable.
- For all submerged utility lines across navigable waters of the United States, a location map and cross-sectional view showing the utility line crossing from bank to bank is required. In addition, the location and depth of the Federal Project Channel shall be shown in relation to the proposed utility line. In general, all utility lines shall be buried at least 6 feet below the authorized bottom depth of the Federal project channel and at least 3 feet below the bottom depth in all subaqueous areas.
- A delineation of affected special aquatic sites, including wetlands, vegetated shallows (e.g., submerged aquatic vegetation, seagrass beds). This work must be conducted between April 1 and September 30 due to the growth season of aquatic vegetation.

In general, permitting coordination with USACE is required when modifications to stormwater outfalls or seawalls result in impacts to OFW, as previously discussed. However, many of the projects to be funded under the Capital Improvement Program are exempt from Federal permitting. More localized impacts are permitted at the State and local level. These permits are typically obtained during the detailed design process for each project.

3.2.2 State

The following is a summary of the state agencies with which coordination was conducted in preparation of the 2011 SWMP.

3.2.2.1 South Florida Water Management District (SFWMD)

The SFWMD has responsibilities for stormwater management under F.A.C. Chapters 40E-4, 40E-40 and 40E-400 through issuance of an Environmental Resource Permit (ERP).

In 2013, the Statewide ERP Rule (Chapter 62-330, F.A.C.) was adopted, unifying the ERP rules for the State. The SFWMD regulates surface water management under F.A.C. Chapters 40E-40 and 40E-41. In addition, its responsibilities include regulation of dredge and fill activities. Since the SFWMD has jurisdiction, their criteria and standards will be used as guidelines for conceptual planning of both water quality and quantity improvements. These guidelines are provided in the South Florida Water Management District ERP Information Manual 2014.

3.2.2.2 Florida Department of Environmental Protection (FDEP).

The FDEP regulates environmental programs in the State of Florida and has been delegated NPDES MS4 permit authority; therefore, it is responsible for implementing the stormwater element of the Federal Municipal NPDES Program as part of the FDEP's Wastewater Facility and Activities Permitting program. The stormwater element of the NPDES program is mandated by the Clean Water Act (CWA) Section 402(p). Authorized by Section 403.0885, Florida Statutes (F.S.), the FDEP's federally approved NPDES stormwater program is set out in various provisions within Chapters 62-4, 62-620, 62-621 and 62-624 of the Florida Administrative Code (F.A.C.). Chapter 62-624, F.A.C. specifically addresses MS4 permit requirements.

The City is one of the 33 entities authorized for stormwater discharge under the comprehensive Miami-Dade County NPDES MS4 permit (Permit Number FLS000003-003), was scheduled to expire on June 20, 2016, but it has been extended until such time as a new permit is issued. A draft of the new permit has been issued, and is currently being advertised for public comment. It is expected that the new permit will be issued before the end of December 2017. The City is authorized to discharge to waters of the state per the approved Stormwater Management Program effluent limitations, monitoring requirements, and other provisions as set forth in this permit. The City has actively been fulfilling the requirements of the permit related to its existing outfalls. These efforts are documented in annual reports submitted by the City to the FDEP. The City is currently in compliance with these requirements.

The FDEP also regulates underground injection control permits for wells (gravity recharge wells and pumped injection wells).

3.2.3 Local – Miami Dade County Department of Regulatory and Economic Resources (DRER).

DRER regulates various environmental permitting for the construction or modification of stormwater-related infrastructure in Miami-Dade County such as coastal construction, dewatering, wetlands, wells, and stormwater. Specifically for stormwater management, DRER requires a Class II permit for related stormwater improvement projects and outfalls. The City has obtained the required permits for improvements to the Stormwater Utility that are under construction, or are already completed and expects the timely acquisition of additional permits required for the Series 2017 Project.

3.2.4 Pending Federal and State Regulations

Over the last few years, three significant related water quality and stormwater regulation issues have emerged that will likely impact the City in the near future. They are:

- The ongoing Total Maximum Daily Load (TMDL) program by FDEP.
- The Numeric Nutrient Criteria (NNC) Rule approved by FDEP.
- US EPA NPDES MS4 Rule revisions

3.2.4.1 FDEP TMDL Program

The TMDL program is required by the Clean Water Act to identify the maximum allowable loads for all sources to impaired waters and also identify the load reductions to achieve the designated use(s). The FDEP leads this effort working with local stakeholders, including water management districts, cities, counties, and private interests.

The TMDL program works to develop a scientifically sound database of information and calibrated and validated hydrology, hydraulic and water quality models to identify the TMDL, build on pollutant load reduction goals, support the load allocation and reduction process, and establish the foundation for evaluations of management practices to improve water quality. Based on these efforts, it is the most watershed-specific information for informed decisions for water quality and water environmental health. Enforcement would be through NPDES permitting for domestic wastewater, industrial wastewater and MS4 stormwater outfalls.

The draft of the TMDL program for the Biscayne Bay was originally planned for July 2010, but is currently on hold with no scheduled completion date. This program could ultimately lead to a Basin Management Action Plan (BMAP) that would require the City to complete retrofits to reduce nutrient loads to Biscayne Bay. These pending requirements for enhanced Best Management Practices (BMPs) to reduce flooding and protect and improve water quality are discussed in the 2011 SWMP.

The improvements comprising the Series 2017 Project are currently being designed to include BMPs to reduce flooding and improve water quality consistent with those that are likely to be required in the BMAP for the Biscayne Bay.

3.2.4.2 US EPA Numeric Nutrient Rule

In 1998, the US EPA produced the National Strategy for the Development of Regional Nutrient Criteria, requiring the US EPA to produce nutrient criteria guidance documents by 2000. It also required states that have narrative nutrient criteria to develop NNC.

The State of Florida Numeric Nutrient Criteria Development Plan (FDEP, March 2009), prepared by the FDEP describes Florida's plan for development of regional NNC via the use of a technical advisory committee ("TAC"). The TAC first met in January of 2001 and has met more than 25 times since its formation. Its membership consists of scientists and practitioners who have experience related to lake, river and/or estuarine water quality, members from local government, engineering and scientific consultants, university representatives and environmental interests. With the FDEP staff providing facilitation and technical resources, the TAC addressed lake and riverine nutrients initially and later turned to estuarine NNC in June of 2008.

Environmental interests in Florida filed a complaint in the U.S. District Court in July 2008 (amended in January 2009), alleging that the US EPA had failed to perform its "non-discretionary duty" to set NNC for Florida according to section 304(a) of the Clean Water Act.

In January 2009, the US EPA issued a statement that, for the State of Florida (and only Florida), new or revised nutrient criteria are necessary to meet the requirements of the Clean Water Act. In December 2009, the US EPA entered into a consent decree with the environmental plaintiffs, requiring the US EPA to issue draft NNC for flowing streams and lakes in Florida in January 2010 and for estuaries in January 2011.

On January 14, 2010, the US EPA proposed a rule entitled "Water Quality Standards for the State of Florida's Lakes and Flowing Waters." With this rule, the US EPA proposed water quality standards in the State of Florida that would set a series of numeric limits on the amount of phosphorus and nitrogen, also known as "nutrients," that would be allowed in Florida's lakes, rivers, streams, springs and canals.

After several public hearings, on April 22, 2011, the FDEP submitted a petition to the US EPA requesting the US EPA to withdraw its January 2009 determination that NNC are necessary in Florida, repeal Federal rulemaking completed in November 2010 to establish such criteria for inland lakes and streams, and refrain from proposing or promulgating any further NNC. The petition outlined the FDEP's plans to undertake its own rulemaking for nutrient criteria for state waters. The projected rulemaking schedule called for a Notice of Rule Development in June 2011, a rule development and public outreach process through the summer and early fall of 2011, and adoption of a final rule in January 2012, followed by a legislative ratification process under Florida law. The US EPA supported the FDEP's commitment to recommence its rulemaking efforts for both inland and estuarine waters. The US EPA recognized that states have the primary role in establishing and implementing water quality standards for their waters.

On September 29, 2011, the FDEP published a draft of the proposed rule in the Florida Administrative Code (F.A.C.), titled Chapter 62-302 regarding nutrient standards. The rule was then presented to the Florida Environmental Regulation Commission (ERC), the Florida Legislature, and the Governor, who signed House Bill (HB) 7051, ratifying the proposed rule. There was a challenge to the rule that was filed by the public interests environmental law organization, Earthjustice. However an administrative law judge upheld the state's proposed new water quality rules on June 7, 2012.

On November 30, 2012, the US EPA announced its approval of the FDEP's NNC. However, the US EPA also proposed additional regulations that would apply the US EPA's criteria to those waters not covered by the FDEP's NNC, such as urban storm water conveyances, open ocean waters, and many estuaries where the FDEP Total Maximum Daily Loads (TMDLs) have already been adopted. Since the US EPA developed NNC on waters not covered by the FDEP's NNC, the US EPA and the FDEP entered into an agreement on March 15, 2013, known as "Path Forward", to develop a plan for the FDEP to develop NNC for the remaining waterbodies before the US EPA's deadline of September 30, 2013.

Since the agreement, the FDEP adopted a NNC Implementation Document on April 23, 2013; adopted criteria for additional estuaries on June 20, 2013; and produced a report titled, "Status of Efforts to Establish Numeric Interpretations of the Narrative Nutrient Criterion for Florida Estuaries and Current Nutrient Conditions of Unimpaired Waters". This report was submitted to the Governor as required by the "Path Forward" agreement and Chapter 2013-71, Laws of Florida, on August 1, 2013.

On September 24, 2013, a hearing was held on the US EPA's motion to approve the Florida regulations. On January 7, 2014, the US District Court granted the US EPA's motion to modify the consent decree between the US EPA and various environmental organizations. The action allows the US EPA's approval of the FDEP's plan for NNC regulations in Florida to move ahead, and denies the environmental parties' motion to enforce the original consent decree. Earthjustice filed a motion on March 6, 2014 to appeal Judge Hinkles' order allowing the US EPA to modify the consent decree to conform it to the "Path Forward" agreement between the FDEP and the US EPA. On April 2, 2014, the US EPA filed to withdraw their proposed rule on NNC in Florida and on June 20, 2014, Earthjustice and other environmental groups filed their initial appeal of Judge Robert Hinkle's order allowing the US EPA to accept the FDEP's plan for NNC in Florida.

Neither the US EPA nor the FDEP have NNC for South Florida waterbodies, especially canals. The FDEP drafted the "South Florida Canal Aquatic Life Study" and presented the study to stakeholders on November 1, 2012. This study proposes to perform a comprehensive assessment of South Florida canals and the aquatic life associated with those canals. The objectives of the study are:

- Assess aquatic life in South Florida canals;
- Determine interrelationships between aquatic life in canals and other variables that affect aquatic life;
- Evaluate the differences in conditions for South Florida canals; and
- Collect information that can be used to guide management decisions.

Eventually, this study will be used to determine if NNC are necessary for these waterbodies. As of the Implementation of Florida's Numeric Nutrient Standards, April 2013 document, the South Florida region does not have a numeric nutrient threshold and will need to meet the narrative criterion as it applies in paragraph 62-302.530(47)(b), FAC.

There are many opinions on what the effect of the US EPA NNC will be on the State of Florida public stormwater discharges. At a minimum, additional BMPs will be needed to address nutrient removal from urban stormwater sources. The BMP treatment train concepts as presented in the 2011 SWMP are applicable to this water quality rule while also providing flood control and stormwater harvesting benefits. The improvements comprising the Series 2017 Project are currently being designed and permitted with water quality BMPs that meet or exceed existing regulatory requirements and anticipated additional requirements.

3.2.4.3 SFWMD and FDEP Unified Statewide Stormwater Treatment Rule

The SFWMD and the FDEP have been working with various groups in southwest Florida over the last ten years in the development of supplemental water quality criteria for Environmental Resource Permits ("ERPs") in order to better protect water quality. These supplemental criteria would give credit for additional non-traditional BMPs and encourage stormwater reuse while controlling the average annual volume of discharge and nutrients to historic (pre-development) levels.

The FDEP has been working to extend these criteria to a unified statewide rule that considers variations in hydrology and physical characteristics across Florida. If adopted as currently drafted, this rule would exempt retrofits for stormwater systems that provide some load reduction, such as stormwater master plan projects with water quality BMP features. The rule is currently on hold, and there is no way to determine with any reasonable degree of certainty when, or if, a unified statewide rule will be adopted, or if adopted, in what form the rule will be adopted.

3.2.4.4 US EPA NPDES MS4 Revisions

As discussed above, the US EPA has updated the MS4 permit program and the update contains additional requirements for BMPs and documentation on their performance and costs. The improvements comprising the Series 2017 Project are currently being designed and are expected to be permitted with water quality BMPs that meet or exceed existing regulatory requirements and the anticipated additional requirements.

3.3 Facility Evaluation

The 2011 SWMP identifies stormwater improvements for implementation in several high priority drainage basins, as defined by the 1997 SWMP. The design and construction of these improvements are already underway and many of them have been completed. Factors used in the prioritization of the drainage basins in the 1997 SWMP were pollutant loading, pollutant concentration, flooding potential, citizen complaints, and ranking by City staff. As part of the 2011 SWMP, surface water hydrologic and hydraulic modeling was performed using the US EPA Stormwater Management Model (SWMM) to estimate and evaluate flooding LOS and alternative solutions to meet LOS. The CDM Smith Watershed Management Model (WMM) was used to perform surface water quality and BMP evaluations. Both are public domain tools that are widely used for stormwater master planning applications.

Model parameter estimates were checked for validity during actual storm and tidal events throughout the year 2010, as practical. Investigations; including photo-archive retrievals, field visits, photography in combination with flood depth measurements and discussions with City staff were performed as part of the validation stage. Storm event rainfall data was retrieved from City rain gages and tidal data was retrieved from the National Oceanic and Atmospheric Administration.

AECOM was tasked in 2014 with revising the US EPA SWMM model to determine areas deficient in LOS under the City's current standards and to suggest modifications to the drainage designs contained within the 2011 SWMP to better achieve the current LOS standards. AECOM is responsible for confirming the necessity of the previously prosed projects as well as planned improvements and the degree by which the basin's LOS is being achieved, as defined by the current City LOS standards.

3.4 Utility Billing

A stormwater utility fee is assessed against each property in the City based on existing City utility accounts, application for service, and Miami-Dade County Tax Assessor property information or other ownership records.

Each account is assigned a number of equivalent residential units ("ERU") that are used to determine the stormwater fee. The ERU is the estimated average horizontal impervious area of residential developed property per dwelling unit. This estimated average is calculated by dividing the total estimated impervious area of four residential categories (single family, mobile home, multi-family and condominium) by the estimated total number of dwelling units. For the City, one ERU is equal to 791 square feet. For the purpose of the Stormwater Utility, the minimum number of ERUs per dwelling unit is one.

The City had maintained a steady ERU rate from 2003 to 2008 of $5.80 per month. In recent years the City has faced significant increases in expenditures for construction of projects, as well as operation and maintenance of current Stormwater Utility infrastructure. As a result, in 2008, CDM Smith provided recommendations to support proper funding to expand, operate and maintain the Stormwater Utility, make debt service payments and maintain coverage requirements. A series of Stormwater Utility rate adjustments were recommended, which resulted in an ERU rate of $9.06 per month until FY 2014. The City raised the ERU rate to $16.67 per month on October 1, 2014 to finance the issuance of the Series 2015 Bonds. On October 1, 2016, in anticipation of the issuance of the Series 2017 Bonds, the City raised the ERU rate to $22.67 per month. The fee is structured as a flat rate for all residential customers. In addition, on October 18, 2017 the City passed Ordinance No. 2017-4145 indexing the stormwater utility rates to the CPI effective for all billings after October 1, 2017. As a result, the ERU rate is expected to increase each Fiscal Year and, as of October 1, 2017, the rate increased from $22.67 to $23.30 per month.

To receive water, sewer, and stormwater services from the City, property owners fill out an application for water service at the City's Finance Department and pay a deposit according to an established schedule. The Finance Department is responsible for preparing and issuing one itemized bill for water, sewer, stormwater, and garbage disposal (except for commercial accounts) services provided by the City. Those services are billed on a monthly basis.

Stormwater Utility fees may be reduced by 50 percent for properties within the City that meet one of the following criteria:

- The property is subject to a valid NPDES permit.

- The property is served by a private disposal system meeting State, County, and City criteria.
- A portion of the property is served by a private disposal system meeting State, County, and City criteria. The fee reduction only applies to that portion of the property served by the system.

To date, no Stormwater Utility customer has requested, or has been granted such a reduction.

The fees collected by the City with respect to the Stormwater Utility, including investment earnings, are deposited in the Stormwater Enterprise Fund and used for planning, constructing, financing, and operating and maintaining the Stormwater Utility and the infrastructure of the stormwater management system. The Stormwater Enterprise Fund tracks the operations, capital expenditures, and revenues of the Stormwater Utility.

The City has streamlined and improved the system that was in place to capture ERU changes in the review and approval of construction plans. The resulting method enhances communication and coordination of the several City departments included in the Stormwater Utility billing process, such as Public Works, OBPI and Finance.

4. Capital Improvements

4.1 Planned Improvements

The 1997 SWMP identified 34 drainage basins as high priority basins. The CIP originally presented in the 1997 SWMP identified proposed projects by stormwater basin number. In the 2011 SWMP, improvements were reclassified and are now grouped together by the neighborhood or general community where the improvements will be made. The capital improvement projects listed below are a combination of active projects pre-defined by the 1997 SWMP, project-specific Basis of Design Reports, and projects identified as part of the 2011 SWMP. In addition, since 2014 AECOM has evaluated over 30 individual neighborhoods to determine the number and size of required pumping systems, and drainage improvements, and is in process of preparing an updated SWMP. At present, 57 additional pumping stations, including one additional redundant pump and power unit per pumping station are proposed.

In most instances, the stormwater improvements were coordinated with components of the City's Neighborhood Right-of-Way projects. Such projects included improvements to other neighborhood utilities, such as water, sewer, streetscape, and street lighting. Emphasis was given to avoid re-entering a neighborhood which had recently completed neighborhood improvements.

The purpose of these improvements is to provide a higher LOS defined as improved flood protection and control of pollutant loading in the stormwater system.

The amount of funding to be derived from the City's issuance of stormwater revenue bonds is calculated as the additional monies needed to construct additional water management features above and beyond those already included in the capital budget for the neighborhood projects.

The improvements consist of one or a combination of the following:

- Repair, replace, and/or install curbs and gutters,
- Reconstruct and/or raise streets and sidewalks,
- Repair, replace, and/or install collection systems, catch basins and manholes,
- Construct pumping stations and water quality treatment devices, and
- Repair or upgrade existing outfalls (inclusive of tidal backflow prevention devices).

The projects listed below will provide comprehensive solutions for improving the City's stormwater management system performance for the next 50 years. Appropriate consideration has been given to the water quality of Biscayne Bay and the operation and maintenance of an expanded stormwater management system. The presented capital improvements allow the Stormwater Utility systems to meet increasing performance, permitting and regulatory demands while modernizing the existing system to meet the LOS desired by the City.

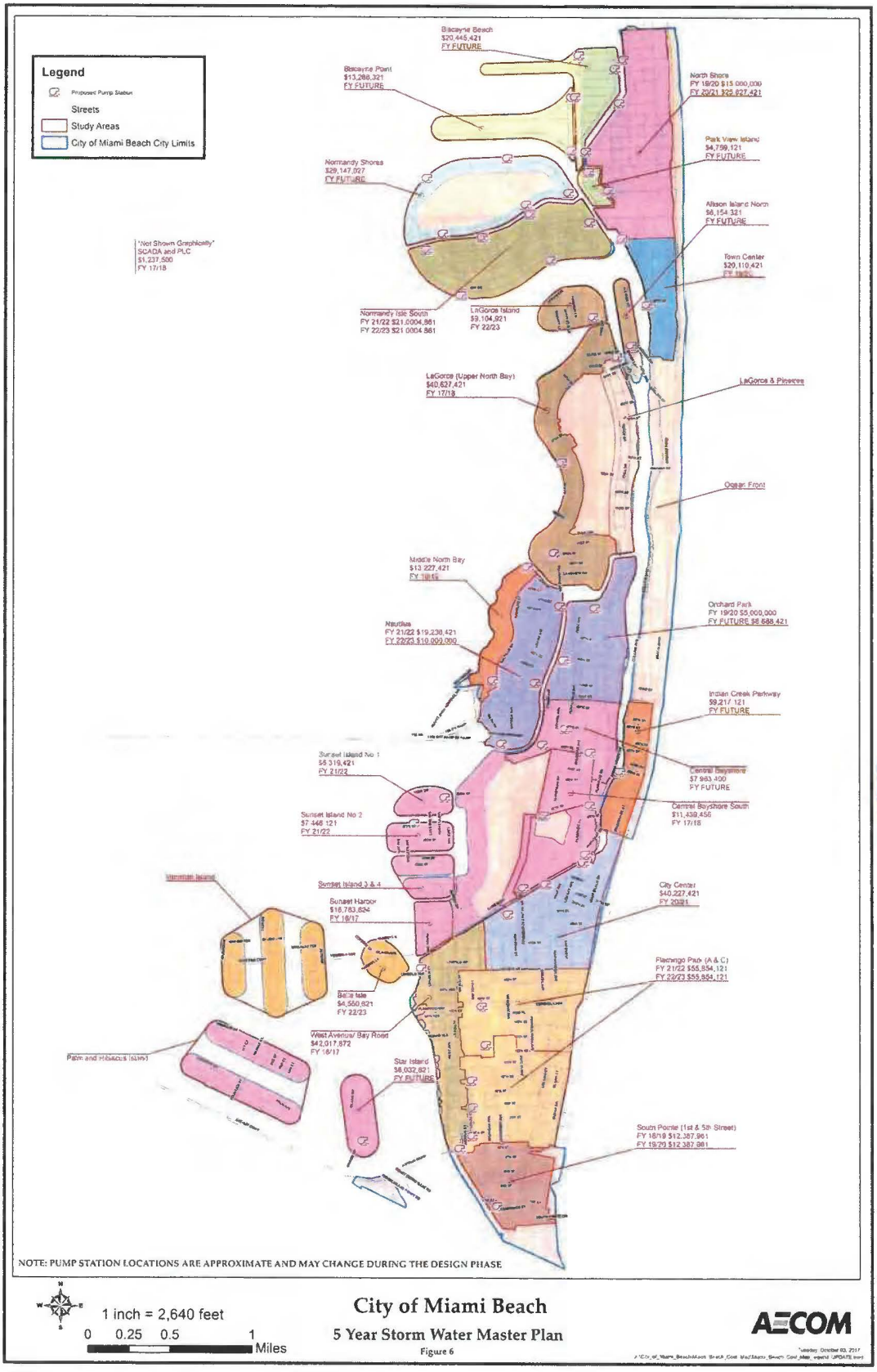
The projects listed below are identified for funding under the Stormwater Program. The total cost of the Stormwater Program is estimated to be $658,940,087. The unfunded portion of the Stormwater Program is estimated to be $500,882,768. It is expected that the proceeds from the Series 2017 Bonds will fund $100 million of these projects. Summaries of the estimated program cost by neighborhood are shown in tabular format in **Figure 5**, and graphically in **Figure 6**.

AECOM

Figure 5: Proposed Stormwater Bond Projects

Location Name	Engineer Projected Cost	Appropriated or Spent Fund	Funds Required	FY 17/18	FY 18/19	FY 19/20	FY 20/21	FY 21/22	Future	Sub-Total for Each Project
Allison Island North	$ 6,154,321	$ -	$ 6,154,321	$ -	$ -	$ -	$ -	$ -	$ 6,154,321	$ 6,154,321
Belle Isle	$ 4,550,621	$ -	$ 4,550,621	$ -	$ -	$ -	$ -	$ -	$ 4,550,621	$ 4,550,621
Biscayne Beach	$ 20,445,421	$ -	$ 20,445,421	$ -	$ -	$ -	$ -	$ -	$ 20,445,421	$ 20,445,421
Biscayne Point	$ 13,266,321	$ -	$ 13,266,321	$ -	$ -	$ -	$ -	$ -	$ 13,266,321	$ 13,266,321
Central Bayshore	$ 8,213,400	$ 250,000	$ 7,963,400	$ -	$ -	$ -	$ -	$ -	$ 7,963,400	$ 7,963,400
Central Bayshore South	$ 11,439,456	$ 11,439,456	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
City Center	$ 42,527,421	$ 2,300,000	$ 40,227,421	$ -	$ -	$ -	$ 40,227,421	$ -	$ -	$ 40,227,421
Middle North Bay	$ 13,227,421	$ -	$ 13,227,421		$ 13,227,421	$ -	$ -	$ -	$ -	$ 13,227,421
Nautilus	$ 29,236,421	$ -	$ 29,236,421	$ -	$ -	$ -	$ -	$ 19,236,421	$ 10,000,000	$ 29,236,421
Flamingo Park	$ 119,208,242	$ 7,500,000	$ 111,708,242	$ -	$ -	$ -	$ -	$ 55,854,121	$ 55,854,121	$ 111,708,242
Indian Creek Parkway	$ 14,717,121	$ 5,500,000	$ 9,217,121	$ -	$ -	$ -	$ -	$ -	$ 9,217,121	$ 9,217,121
La Gorce (Upper North Bay)	$ 40,627,421	$ -	$ 40,627,421	$ 40,627,421	$ -	$ -	$ -	$ -	$ -	$ 40,627,421
La Gorce Island	$ 9,104,921	$ -	$ 9,104,921	$ -	$ -	$ -	$ -	$ -	$ 9,104,921	$ 9,104,921
Orchard Park	$ 13,688,421	$ -	$ 13,688,421	$ -	$ -	$ 5,000,000	$ -	$ -	$ 8,688,421	$ 13,688,421
Normandy Isle South	$ 42,009,721	$ -	$ 42,009,721	$ -	$ -	$ -	$ -	$ 21,004,861	$ 21,004,861	$ 42,009,721
Normandy Shores	$ 29,147,027	$ -	$ 29,147,027	$ -	$ -	$ -	$ -	$ -	$ 29,147,027	$ 29,147,027
North Shore	$ 40,627,421	$ -	$ 40,627,421	$ -	$ -	$ 15,000,000	$ 25,627,421	$ -	$ -	$ 40,627,421
Park View Island	$ 4,759,121	$ -	$ 4,759,121	$ -	$ -	$ -	$ -	$ -	$ 4,759,121	$ 4,759,121
South Pointe (1st & 5th Street)	$ 25,249,121	$ 473,200	$ 24,775,921	$ -	$ 12,387,961	$ 12,387,961	$ -	$ -	$ -	$ 24,775,921
Star Island	$ 6,032,621	$ -	$ 6,032,621	$ -	$ -	$ -	$ -	$ -	$ 6,032,621	$ 6,032,621
Sunset Harbour	$ 16,783,824	$ 16,783,824	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sunset Island #1	$ 5,319,421	$ -	$ 5,319,421	$ -	$ -	$ -	$ -	$ 5,319,421	$ -	$ 5,319,421
Sunset Island #2	$ 7,446,121	$ -	$ 7,446,121	$ -	$ -	$ -	$ -	$ 7,446,121	$ -	$ 7,446,121
Town Center	$ 20,110,421	$ -	$ 20,110,421	$ -	$ -	$ 20,110,421	$ -	$ -	$ -	$ 20,110,421
West Avenue/ Bay Road	$ 42,017,672	$ 42,017,672	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SCADA and PLC	$ 1,237,500	$ -	$ 1,237,500	$ 1,237,500	$ -	$ -	$ -	$ -		$ 1,237,500
SUB-TOTAL	$ 587,146,920	$ 86,264,152	$ 500,882,768	$ 41,864,921	$ 25,615,382	$ 52,498,382	$ 65,854,842	$ 108,860,945	$ 206,188,298	$ 500,882,768
Under Construction / Completed										
Lower North Bay Road	$ 5,025,128	$ 5,025,128	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sunset Island 3 and 4	$ 6,520,000	$ 6,520,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Venetian Islands	$ 20,516,285	$ 20,516,285	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Palm & Hibiscus Islands	$ 32,161,390	$ 32,161,390	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Central Bayshore Bid Pak A	$ 2,815,776	$ 2,815,776	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Citywide Tidal Flooding Mitigation - Ph 1	$ 2,544,588	$ 2,544,588	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage Hot Spots	$ 2,210,000	$ 2,210,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grand Total	$ 658,940,087	$ 158,057,319	$ 500,882,768	$ 41,864,921	$ 25,615,382	$ 52,498,382	$ 65,854,842	$ 108,860,945	$ 206,188,298	$ 500,882,768

Tranche #	Funding requirements
Tranche 2	$ 41,864,921
Tranche 3	$ 25,615,382
Tranche 3	$ 78,125,803
Tranche 4	$ 149,088,386
Future Revenue Stream	$ 95,903,803
Future Revenue Stream	$ 110,224,995


Legend
Proposed Pump Station
Streets
Study Areas
City of Miami Beach City Limits
"Not Shown Graphically"
SCADA and PLC
$1,237,500
FY 17/18
Biscayne Beach
$20,445,421
FY FUTURE
Biscayne Point
$13,288,321
FY FUTURE
North Shore
FY 19/20 $15,000,000
FY 20/21 $25,627,421
Park View Island
$4,799,121
FY FUTURE
Normandy Shores
$29,147,027
FY FUTURE
Allison Island North
$6,154,321
FY FUTURE
Town Center
$20,110,421
FY 19/20
Normandy Isle South
FY 21/22 $21,0004,861
FY 22/23 $21,0004,861
LaGorce Island
$9,104,921
FY 22/23
LaGorce (Upper North Bay)
$40,627,421
FY 17/18
LaGorce & Pinetree
Ocean Front
Middle North Bay
$13,227,421
FY 19/20
Nautilus
FY 21/22 $19,238,421
FY 22/23 $10,000,000
Orchard Park
FY 19/20 $5,000,000
FY FUTURE $6,688,421
Indian Creek Parkway
$9,217,121
FY FUTURE
Sunset Island No 1
$5,319,421
FY 21/22
Central Boyshore
$7,963,400
FY FUTURE
Sunset Island No 2
$7,446,121
FY 21/22
Central Boyshore South
$11,439,456
FY 17/18
Hibiscus Island
Sunset Island 3 & 4
Sunset Harbor
$16,783,834
FY 16/17
City Center
$40,227,421
FY 20/21
Flamingo Park (A & C)
FY 21/22 $55,854,121
FY 22/23 $55,854,121
Belle Isle
$4,550,821
FY 22/23
West Avenue/ Bay Road
$42,017,872
FY 16/17
Palm and Hibiscus Island
Star Island
$6,032,821
FY FUTURE
South Pointe (1st & 5th Street)
FY 18/19 $12,387,961
FY 19/20 $12,387,961
NOTE: PUMP STATION LOCATIONS ARE APPROXIMATE AND MAY CHANGE DURING THE DESIGN PHASE
1 inch = 2,640 feet
0 0.25 0.5 1
Miles
City of Miami Beach
5 Year Storm Water Master Plan
Figure 6
AECOM

Allison Island North – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $6,154,321

Belle Isle – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $4,550,621

Biscayne Beach – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, 6) Convert existing pumping stations discharge piping from injection wells and add force mains to new outfall, and 7) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $20,445,421

Biscayne Point – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, 6) Convert existing pumping stations discharge piping from injection wells and add force mains to new outfall, and 7) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $13,266,321

Central Bayshore – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, 6) Convert existing pumping stations discharge piping from injection wells and add force mains to new outfall, and 7) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $8,213,400

Central Bayshore South – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $11,439,456

City Center – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $42,527,421

Middle North Bay – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $13,227,421

Nautilus – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, 6) Convert existing pumping stations discharge piping from injection wells and add force mains to new outfall, and 7) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $29,236,421

Flamingo Park – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $119,208,242

Indian Creek Parkway – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $14,717,121

LaGorce (Upper North Bay) – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $40,627,421

LaGorce Island – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $9,104,921

Orchard Park – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $13,688,421

Normandy Isle South – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $42,009,721

Normandy Shores – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $29,147,027

North Shore – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $40,627,421

Park View Island – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $4,759,121

South Pointe (1st & 5th Street) – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, 6) Convert existing pumping stations discharge piping from injection wells and add force mains to new outfall, and 7) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $25,249,121

Star Island – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $6,032,621

Sunset Harbour – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $16,783,824

Sunset Island #1 – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $5,319,421

Sunset Island #2 – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $7,446,121

Town Center – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $20,110,421

West Avenue/ Bay Road – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, 6) Convert existing pumping stations discharge piping from injection wells and add force mains to new outfall, and 7) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost: $42,017,672

SCADA & PLC

The purpose of the project improvements is to install an all-inclusive Supervisory Control and Data Acquisition (SCADA) package that includes engineering, design, integration and installation of a radio-based, internet accessible SCADA system. The SCADA system will be for remote monitor and control of potable water storage tanks, drinking water pumping stations, wastewater pumping stations, stormwater pumping stations, and all associated monitoring stations (flow, pressure, etc.). There are currently 33 stormwater pumping stations operated by the CMB that will be a part of the overall project. The installation will provide the ability to reduce operating costs, while improving performance and reliability. The estimated project cost reflects only the stormwater related portions of the overall project.

Estimated Project Cost: $1,237,500

4.2 Improvements under Construction

Lower North Bay Road – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost to Completion: $5,025,128

Sunset Islands 3 & 4 – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost to Completion: $6,520,000

Venetian Islands – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost to Completion: $20,516,285

Palm & Hibiscus Islands – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system. The improvements consist of one or a combination of the following: 1) Repair, replace, and/or install curbs and gutters, 2) Reconstruct and/or raise streets and sidewalks, 3) Repair, replace, and/or install collection systems, catch basins and manholes, 4) Construct water quality treatment devices, 5) Construct pump stations, controls and force mains, and 6) Repair or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost to Completion: $32,161,390

Central Bayshore Neighborhood Bid Pak A – Neighborhood Improvements

The purpose of the project improvements is to provide a higher LOS defined by flood protection and control of pollutant loading in the stormwater system, and reduce reliance on gravity or pressurized drainage (injection) wells. The improvements consist of one or a combination of the following: 1) Construct additional stormwater collection system piping to interconnect existing pipe networks, 2) Construct water quality treatment devices, 3) Convert pumping stations discharge piping from injection wells and add force mains to new outfall, and 4) Construct new outfall and/or upgrade existing outfall pipes and seawalls (inclusive of tidal backflow prevention devices).

Estimated Project Cost to Completion: $2,815,776

Citywide Tidal Flooding Mitigation Phase 1- Improvements

The purpose of the project improvements is to prevent the backflow of water from the Biscayne Bay into the City's stormwater management system and up through the stormwater inlet grates flooding the roadway curb and gutter. This tidal flooding poses a threat to public health and safety, inconveniences the public, and has caused major damage to structures, and killed lawns and landscaping. In addition, tidal flooding saturates the base structure of roadways causing failure of roadways prior to their expected useful design life. This project consists of the installation of backflow prevention valves (aka "Tideflex" valves) on a majority of the PSMS outfalls to the Biscayne Bay and in the lowest lying areas of the City.

Estimated Project Cost to Completion: $2,544,588

Drainage Hot Spots- Improvements

This project will provide localized stormwater improvements that address drainage "hot spots" within the City. The project will provide funding to allow City staff to design, contract for, and implement solutions to limited areas of the City which are within the definition of the projects approved by the City Commission in the Resolution authorizing issuance of the Series 2015 Bonds, but not incorporated into other neighborhood improvement projects identified in the Stormwater Program.

Estimated Project Cost to Completion: $2,210,000

5. Conclusions and Recommendation

AECOM has made the following conclusions with respect to the stormwater system during the course of preparing this Engineer's Report:

- The capital improvement program for the Stormwater Utility is necessary to improve the flood protection LOS and water quality of the City's stormwater management system.
- Continuation of the City's planned capital improvement program for the Stormwater Utility will entail the need for significant additional funding, as described in this Engineer's Report.
- The City's stormwater management system is well maintained, well managed and in good operating condition. Effective planning policies provide for the necessary inspection, repair, improvement and replacement of the City's stormwater management facilities and have enabled the City to comply with state and federal regulations.
- The City's stormwater management system has the physical capacity to meet existing demands. Implementation of the projects included in the capital improvement program will enable the City's stormwater management system in the areas served by those projects to meet projected demands and comply with state and federal regulations expected to be in effect during the study period of this Engineer's Report (Fiscal Years 2018 through 2022).
- The financial plan for improvements to the City's stormwater management system, as described in this Engineer's Report, includes adequate funding for improvements to be constructed and installed in the manner and time periods currently contemplated.
- In the event the City elects to issue additional Stormwater Revenue Bonds in FY 2022 in the amount currently contemplated, and as described in this Engineer's Report, a rate increase applicable to the stormwater system customers is projected to be necessary prior to the issuance of such bonds.