



MIAMI BEACH

COMMITTEE MEMORANDUM

TO: Finance and Citywide Projects Committee

FROM: Jorge M. Gonzalez, City Manager

DATE: June 28, 2012

SUBJECT: **DISCUSSION ON THE CITYWIDE STORMWATER MASTER PLAN**

The City has recently completed the final draft of a new Stormwater Management Master Plan (SWMMP) that evaluates the existing system and recommends sustainable improvements to provide an appropriate level of service (LOS). (The SWMMP executive summary is included as Attachment A.)

The previous stormwater master plan, prepared in 1997, prioritized drainage basins and provided hydrologic and water quality calculations for the priority basins. The new SWMMP project has created a comprehensive, citywide model, using more powerful software than was available in 1997 that evaluates the existing system, simulates inter-basin flows, and identifies those basins that are experiencing reduced LOS.

This project has developed a computerized hydraulic model of the Flamingo/ Lummus and West Avenue neighborhoods. This task analyzed the existing system in the referenced neighborhoods and identified system deficiencies as well as the improvements required to meet LOS. These improvements have been identified in a schematic fashion that provides one cohesive design for the Flamingo/ Lummus and West Avenue neighborhoods.

The Stormwater Master Plan also accounts for climate change and sea level rise. The consultant made use of a variety of published resources and analyzed historic sea level data. Based on these, several sea level rise curves were prepared and design recommendations are being based upon the Army Corps of Engineers latest intermediate projection for sea level rise over the next 25 years. As a result, for all new projects, a new sea level elevation of 0.50 feet NAVD88 is now being used for stormwater design purposes and an elevation of 3.2 feet NAVD88 as a minimum for seawall elevations. The previously designed criteria were 0.04 feet NAVD 88 for sea level elevation. There was no minimum seawall elevation.

The model has also been used to provide concurrency reviews of recently bid neighborhood improvement projects. These reviews have prompted changes to the stormwater designs of the neighborhoods due to the revised sea level elevation and the inter-basin flows. As a result, the improvements will be more effective in providing the required LOS and more flexible to account for the uncertainty relative to the rate of sea level rise. The neighborhoods reviewed to date are:

- Biscayne Point
- Central Bayshore
- Lower North Bay Road
- Lake Pancoast
- Sunset Islands I & II

In addition, the new criteria are being used in the preparation of the following projects:

- Star Island
- Palm and Hibiscus Islands
- Sunset Islands III & IV
- Sunset Harbour
- Flamingo 6th Street
- 16th Street
- La Gorce

Further, the SWMMP has developed order of magnitude cost estimates for the improvements required that total almost \$200 million in needed infrastructure improvements. (Attachment B) These improvements will need to be made over an estimated span of 25 years, contingent upon the rate of sea level rise.

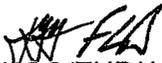
At this time, the City is negotiating with the Florida Department of Transportation to use its proposed stormwater pump stations on Alton Road to assist in alleviating flooding within the Flamingo neighborhood. The ability to use the FDOT pumping stations will reduce the number and size of the pumping stations that the City needs to construct within the Flamingo and West Avenue neighborhoods and could reduce the cost of the improvements by over \$20 million.

CONCLUSION

The above information is provided for discussion by members of the Finance and Citywide Projects Committee.

Attachments:

- A – Stormwater Master Plan Executive Summary
- B – Chart of Neighborhood Capital Needs



JMG/JGG/FHB/JJF/RWS

Executive Summary

ES.1 Introduction and Background

On June 9, 2010, the City authorized Camp Dresser & McKee (CDM) to develop a City-wide Comprehensive Stormwater Master Plan (SWMP) in order to evaluate and update its stormwater management practices, infrastructure, funding, and regulatory policies.

Miami Beach 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 of Miami Beach to develop a SWMP that is consistent with Miami-Dade County's Master Plan. This report is the update and expansion of the SWMP.

The SWMP is intended to be a guide for improving the City's stormwater management system performance for the next 50 years, with considerations to potential sea level rise over this time period. The SWMP will provide a preliminary schedule of prioritized capital improvements necessary to allow the City's stormwater systems to meet the increasing performance and regulatory demands and modernize existing systems while maintaining the high level of service expected in a modern urban environment.

The City of Miami Beach is a highly urbanized coastal community located in southeast Florida and is a major economic resource to the region. Bounded by the Atlantic Ocean and the environmentally sensitive Biscayne Bay Aquatic Preserve, which is also an Outstanding Florida Water (OFW), the study area covers approximately 4,200 acres. The area has relatively low-lying topography that is intersected by intracoastal waterways, and it has 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 all contribute to historical and potential future severe rainfall and tidal flooding. The City's stormwater management system consists of approximately 340 outfalls served by swales, inlets, storm drains, culverts, bridges, gravity and pumped injection wells, exfiltration systems, channels, canals, pump stations, and retention-detention storage systems.

ES.2 Program Goals and Objectives

The overall goals of the SWMP are to identify sustainable stormwater management solutions that:

- Protect infrastructure from flooding;
- Preserve environmental and wetland resources;
- Protect and improve water quality;
- Provide aquifer recharge where practicable to protect and enhance existing and potential future water supplies;
- Support harvesting and reuse of stormwater;
- Facilitate operation and maintenance; and
- Provide and support long term financing.

Specific objectives were defined through the initial project meetings, including:

- Quantify and improve flood control level of service (LOS);
- Quantify economic impact of flooding;
- Facilitate and prioritize O&M;
- Augment existing infrastructure for storage and treatment;
- Coordinate and guide priority early-out projects;
- Identify stormwater harvesting-reuse and recharge well opportunities;
- Refine and update ordinances and stormwater utility; and
- Seawall recommendations for anticipated sea level increases over the 50 years.

ES.3 Methodology

As part of this SWMP, surface water hydrologic and hydraulic modeling has been performed using the US EPA Stormwater Management Model (SWMM) to estimate and evaluate flooding LOS and alternative solutions to meet LOS. The process for performing surface water quality and BMP evaluations using the CDM Watershed Management Model (WMM) was used to perform surface water quality and BMP evaluations. Both are public domain tools that are widely used for SWMP applications. As a complement to the engineering evaluation, CDM utilized the FEMA Hazards United States (HAZUS) tool designed to produce loss estimates for use by federal, state, regional and local governments and private enterprises in planning for risk mitigation, emergency preparedness, response and recovery.

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 of Miami Beach rain gages and tidal data retrieved from National Oceanic and Atmospheric Administration (NOAA).

ES.4 Level of Service (LOS)

The primary purposes of LOS criteria are to protect public safety and property. Program goals are to maintain passable roads for emergency and evacuation traffic, and control flood stages below homes and buildings as practicable. The LOS criteria are first used to identify and define potential problem areas using the stormwater model developed for this study. The LOS criteria are then used to evaluate the effectiveness of improvements. LOS decisions will directly affect the size and cost of proposed improvement alternatives.

CDM evaluated refinements of the current LOS standard as part of the evaluation of the SWMP. The 5-year, 24-hour (5.9 inches) event was eventually evaluated as the critical event to evaluate stormwater system performance. As a test of system performance and for cost-benefit comparisons, CDM also evaluated LOS for the 2-year 24-hour (4.2 inches), the 10- (9.9 inches), 25- (11 inches), and 100- year 72-hour (14 inches) design storms. LOS evaluations were made for road gutter-crown and building elevations where data were available. Meeting the LOS for the SWMP is defined by maximum level of flooding up to the 6-inches above the roadway gutter elevation during the 5-year 24-hour storm event.

The City also experiences significant tidal effects, and for this SWMP, CDM evaluated the joint effects of rainfall and tides on flooding and LOS. Based on this joint rainfall and tidal evaluation, CDM proposed a modification of the LOS to the 2-year 24-hour (4.2 inches) storm event as this LOS manages the most frequent rainfall and tidal flooding occurrences in Miami Beach.

ES.5 Proposed Improvements and Project Coordination

Evaluations were performed for project areas to determine the level of infrastructure improvements necessary to meet the 2-year (4.2 inches) and 5-year (5.9 inches) LOS. A tiered BMP treatment train approach was used to identify the most effective solutions for each project area (**Figure ES-1**) and to identify multi-benefit opportunities for flood control, water quality, aquifer recharge, and stormwater harvesting and irrigation use. The tiered approaches were incrementally identified from 1 through 4 and bundled together to determine the economic feasibility of proposed infrastructure improvements. Due to the anticipated significant capital investment, and the stringent permit to discharge into the Biscayne Bay, the City requested CDM to present the alternative solutions in a tiered manner that would allow the City to proceed with specific elements of the BMP treatment train as economic conditions permit allowing for future tiered additions to ultimately meet the full 5-year LOS.

Exhibit B

Stormwater Master Plan Capital Improvement Program (in millions \$)

	0-5 Years	5-10 Years	10-15 Years	15-20 Years	Total
Biscayne Point				11	11
North Shore		11			11
North Shore (72nd Street)			10		10
Normandy Isle			20		20
Upper La Gorce*		11		1	12
Lower La Gorce*	12			2	14
La Gorce Island/Allison Island		9			9
Oceanfront			0.3		0.3
Nautilus				4	4
Sunset Islands 3 & 4*	4				4
Flamingo+	25			59	84
West Avenue	13				13
Total	54	31	30.3	77	192.3

* Under design

+ Does not include \$6M in RDA funding