City of Fort Lauderdale

Stormwater Master Plan

August 2009

Report

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Section 1 Introduction

As of the 2000 census, the City of Fort Lauderdale (City) provided stormwater service to approximately 150,000 people within the City limits. In 2009, the City updated its population projections, and by 2010 it is projected that the population within the City limits will have increased to in excess of 163,000 people. While this projection is substantially less than what was projected only three years ago, it still represents a substantial increase. As the City has experienced this increase in population within the decade and is nearing build out, the demands on the stormwater management system have likewise increased. To determine the impacts of this increased development on the City's stormwater management system, the Public Works Department undertook the development of a Stormwater Master Plan (SWMP), which was advertised as Request for Qualifications (RFQ) in 2006.

The Department's intentions for the plan as listed in the RFQ were:

- Identify, catalog and categorize existing City-wide storm water problems;

- Develop planning level improvement recommendations and cost estimates for existing stormwater problems. Address funding methods for the improvements based on existing or proposed funding resources;

- Review current status of the City's stormwater-related organization, funding mechanisms, policies and procedures. Review current ordinances, revenues, and expenditures for capital improvements (including design, project management, and construction of improvements), maintenance and operations. Make recommendations on staffing levels and changes to the existing organization, ordinances, project delivery strategies (including funding mechanisms, policies and procedures), maintenance and operations; and

- Review existing and proposed stormwater regulatory issues that may affect the City's stormwater program, particularly as they relate to the City's Municipal Separate Storm Sewer System National Pollution Discharge Elimination System (MS4 NPDES) Permit. Make recommendations, including funding resources to address the regulatory requirements.

The SWMP is intended to be a guide for improving the City's storm drainage system performance and meeting regulatory compliance through the year 2025. The Master Plan 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.

1.1 Background

The Study Area for the SWMP covers approximately 23,000 acres within the highly urbanized City of Fort Lauderdale, as shown in **Figure 1-1**. The area has relatively low-lying topography that is intersected by numerous canals and rivers, a subtropical climate with high intensity rainfall, limited soil storage, high amounts of impervious area, and limited available storage all contributing to potential severe flooding. The City's stormwater system currently operates under FDEP MS4 permit no. FLS00017, which adheres to the federal NPDES requirements of the Clean Water Act. The stormwater infrastructure in place includes 11,838 stormwater inlets, 20,482 conduits, 408 junction boxes, 2,230 manholes, 6 pumping stations, and 1,223 stormwater outfalls.

1.2 Purpose and Goals

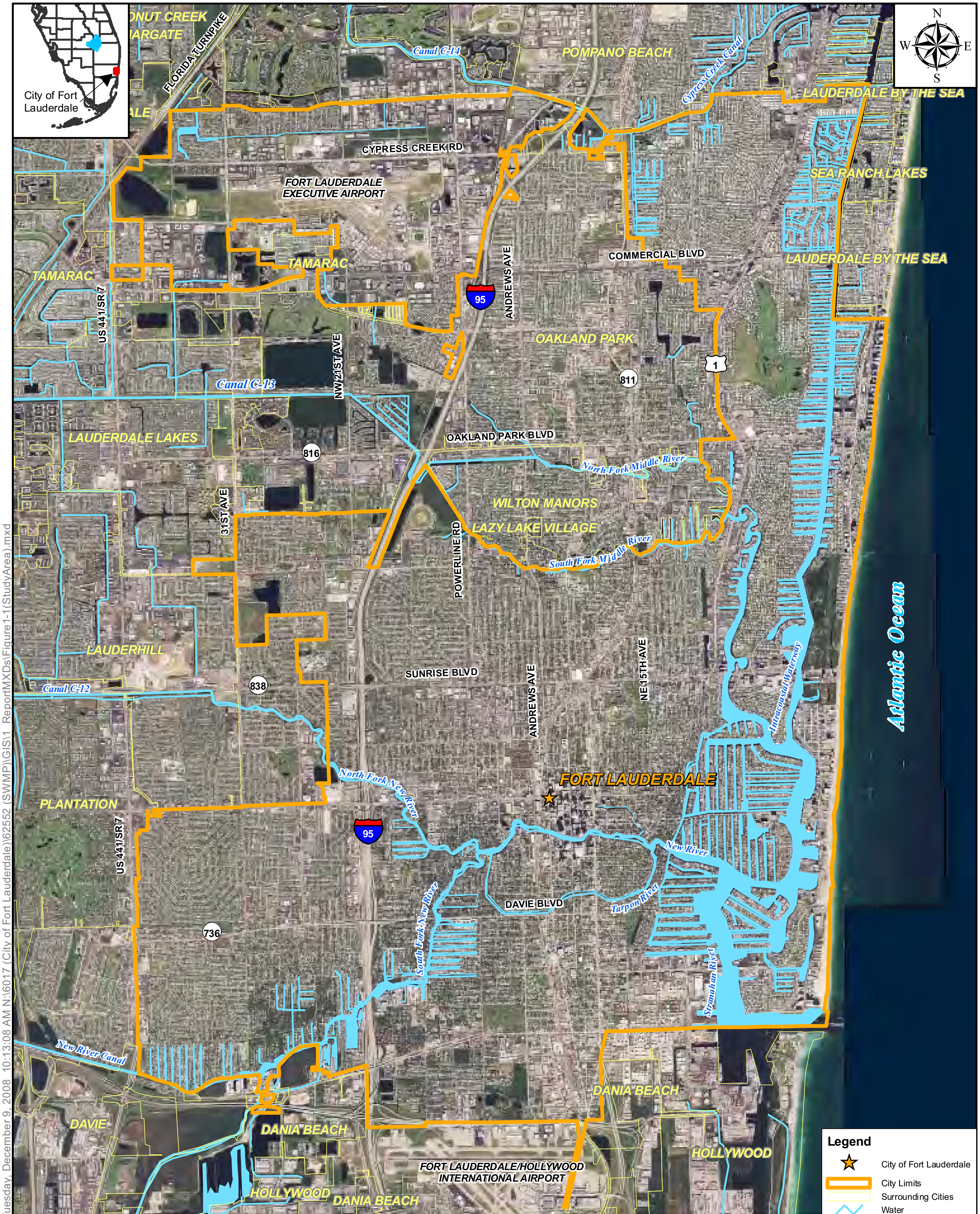
On October 16, 2007 the City authorized Camp Dresser & McKee (CDM) to develop a SWMP in order to evaluate and update its stormwater management practices, infrastructure, funding, and regulatory compliance. The goals of the evaluation are to:

- Establish program goals such as flood control, water quality protection, surface water groundwater quality improvement, protection and enhancement of water supplies, wetlands management, creation and maintenance of greenways and parks, and funding;
- Compile and evaluate data for water quantity, water quality, and funding evaluations;
- Develop a base, City-wide stormwater model to be used in more detail for evaluation of localized problem areas as needed;
- Evaluate regional and local alternatives to manage flooding;
- Evaluate water quality to support the City's NPDES MS4 permit renewal and Total Maximum Daily Load (TMDL) compliance and the Basin Management Action Plan (BMAP) with FDEP; and
- Evaluate funding options for stormwater improvements.

The master plan presented in the subsequent sections of this report includes data compilation and evaluation, water quality evaluations, wetlands inventory and management plan, alternatives evaluations and recommendations, local alternatives evaluations and recommendations, and appropriate appendices.

1.3 Organization

The primary purpose of any master plan is to take a comprehensive look at existing conditions, forecast changes, and propose improvements. The master plan process is a systemic approach to planning facilities and programs. It proceeds from data collection and evaluation of the physical, legal, and regulatory environments to conceptualization



Tuesday, December 9, 2008 10:13:08 AM N:\6017 (City of Fort Lauderdale)\62552 (SWMP)\GIS\1_ReportMXDs\Figure1-1(StudyArea).mxd

Source: City of Fort Lauderdale

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
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Figure 1-1
City-Wide Stormwater Master Plan
Study Area

UPDATED
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and modeling of the general stormwater flow and water quality characteristics of the system. These general characteristics can be further evaluated to better define problem areas and identify technical solutions to improve flood control and water quality. Following the adoption of a master plan, a capital improvement program should be established or ordinances and management programs should be implemented. That is why it is critical to include cost estimates of the proposed facilities to determine what can be accomplished within the resources available and prioritize those projects.

The SWMP is organized as follows:

- Review of Stormwater Ordinances, Operations, and Regulations – entailing a review of the Unified Land Development Regulations (ULDR), and NPDES MS4 permit in relation to stormwater quantity and quality control for the City; a review of the Stormwater Management Program ordinances in relation to recent changes to stormwater utility practices in Florida; a cost-benefit analysis of the City's existing navigable dredging plan; and review of the City's existing swale program.

- Data Acquisition and Review – entailing an overview of the data obtained for use in the SWMP and conversion and modification details for hydrologic units and topography; rainfall and design storms; stage, discharge and monitoring data; soils data; land use and impervious areas; overland flow data; stage-area-storage data; boundary conditions; cross section data; conduit and control structure data; water quality data and impaired waters; previous reports and studies; and problem areas identification.

- Regional Water Quantity Modeling – entailing the development of an Environmental Protection Agency (EPA) Stormwater Management Model (SWMM) version 5 to evaluate the Primary Stormwater Management System (PSMS) for 2-, 5-, and 10-year, 24 hour storms and 25- and 100-, 72 hour storms using flooding complaints, eyewitness accounts and/or gauge results for verification to identify up to ten serious City-wide flooding problem areas.

- Regional Water Quality Modeling – entailing the development of a CDM Watershed Management Model (WMM) using non-point source loading factors for model inputs to evaluate annual and seasonal (dry and wet) non-point source pollutant loads for the twelve EPA NPDES indicator pollutants to receiving waters for present and future land use conditions and the potential implementation of Best Management Practices (BMPs).

- Wetlands Inventory and Management Plan – entailing an inventory of wetlands in the Study Area based on the City's GIS and the National Wetlands Inventory including recommendations on buffers for healthy/pristine wetlands and hydroperiod improvements for adversely impacted wetlands along with potential utilization of the wetlands part of the alternatives improvements.

- Regional Alternatives Evaluations and Recommendations – entailing the definition of one regional alternative, including cost estimates, based on comprehensive water quality and water quantity solutions, both structural and non-structural, to provide the City a desired Level of Service (LOS) for the PSMS and serious problem areas. The regional alternative includes an improved maintenance evaluation where additional pipe, channel and/or lake maintenance can be performed to reduce velocities, reduce erosion, stabilize side slopes, and improve overall system maintainability.

- Local Alternatives Modeling, Evaluation and Recommendations – entailing the definition of four neighborhood alternatives as expansions of the earlier regional model to simulate 2-, 5- and 10-year, 24 hour storms and 25- and 100-year, 72 hour storms. A conceptual improvement plan will be developed for each of the four local areas to meet the required LOS and produce an estimated cost of implementation for each.

Section 2
Data Compilation and Evaluation

Prior to the modeling the operation of the stormwater management system and developing solutions, data collection and evaluation are required to identify the most serious water quantity and water quality problem areas that will be targeted by the models. In addition, it is necessary to review the City's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit requirements relative to the City's legal capabilities for enforcement and evaluate how the City operates and funds the operations and maintenance of the stormwater management system.

This section addresses these areas and is segregated into two general subsections. The first part of this section pertains to the evaluation of the regulatory and legal enforcement environment relative to the stormwater management system, the stormwater management program, and the dredging maintenance program. The second part of this section provides for an overview of the data obtained and its evaluation. This evaluation provided the basis for conceptualizing the model framework and for preliminarily identifying areas for further study.

2.1 Review of Stormwater Ordinances, Operations, and Regulations

The City provided the following documents for review and assessment: the Unified Land Development Regulations (ULDR) and the NPDES MS4 permit; the Swale Program information; the Stormwater Management Program ordinance; and dredging contracts, billing information, and projects list. Recommendations for alterations and additions to these ordinances, programs and policies are included in their respective sections.

2.1.1 Unified Land Development Regulations Review and Recommendations

The ULDR is found in Section 47 of the Code of Ordinances and Unified Land Development Regulations of the City of Fort Lauderdale, Florida. Stormwater regulations are specifically found in Article III (Development Requirements), Article IV (Development Permits and Procedures), and Article V (Development Review Criteria). Below is a listing of the current language by section followed by recommendations for alterations in italics.

<u>Sec. 47-19.1.G. General requirements</u>

No accessory use or structure shall be permitted to be located in a manner which may cause runoff onto adjacent properties.
Include consideration of existing onsite storage and runoff and specify and define what is to be done on additions and modifications in terms of storage and treatment onsite.

<u>Sec. 47-20.13.D. Paving and drainage, Drainage</u>

On-site stormwater retention shall be provided in accordance with the requirements of the regulatory authority with jurisdiction over stormwater retention.
Specify South Florida Water Management District (SFWMD) and Broward County Environmental Protection and Growth Management Department (BC EPGMD) as regulatory authorities. Extend to detention, swale and Exfiltration systems or wells.

<u>Sec. 47-20.13.E. Paving and drainage</u>

Whenever the total pavement area in the swale area frontage on public right-of-way is fifty percent (50%) or more of the total frontage on that public right-of-way a French drain stormwater system in the swale area in accordance with city construction standards and specifications will be required.
Consider rewording for clarity.

<u>Sec. 47-20.22.C.3.e. Temporary parking lots</u>

Surface water/drainage plans shall be in accordance with the requirements of the Broward County Department of Natural Resource Protection permitting requirements.
Update reference to Broward County Environmental Protection and Growth Management Department. Add standard erosion control verbiage.

<u>Sec. 47-24.5.E.3.d.ii. Subdivision regulations, Paving, Minimum widths</u>

On primary arterials, major thoroughfares, and secondary thoroughfares where storm drainage is required the subdivider shall have the option of providing the minimum twenty-four-foot pavement without curbs and gutters, or providing curbs and gutters with a pavement in excess of thirty (30) feet as determined by the city engineer.
Specify that storm drainage may be waived by the BOCC.

<u>Sec. 47-24.5.EW.3.e.iv. Subdivision regulations, Sidewalks</u>

The board, upon recommendation of the city engineer, may waive the requirements of sidewalks.
Specify that sidewalks may be waived if they cause a storm drainage problem.

<u>Sec. 47-25.2.C. Adequacy requirements, Drainage facilities</u>

Adequacy of stormwater management facilities shall be evaluated based upon the adopted level of service requiring the retention of the first inch of runoff from the entire site or two and one-half (2 ½) inches of runoff from the impervious surface whichever is greater.
Maintain to reinforce SFWMD's Basis of Review.

<u>Sec. 47-25.2.L. Adequacy requirements, Stormwater</u>

Adequate stormwater facilities and systems shall be provided so that the removal of stormwater will not adversely affect adjacent streets and properties or the public stormwater facilities and systems in accordance with the Florida Building Code, city engineering standards and other accepted applicable engineering standards. *Remove reference to Florida Building Code and update to reference BC EPGMD or SFWMD.*

2.1.1.1 Permit Requirements

Pursuant to Section 403.0885, Florida Statutes, the Florida Department of Environmental Protection (FDEP) has authorized the use of a NPDES MS4 permit to address the stormwater element within the City. Under permit FLS000017, the City is charged with implementing a comprehensive Stormwater Management Program that includes pollution prevention measures, treatment or removal techniques, stormwater monitoring, use of legal authority, and other appropriate means to control the quality of stormwater discharged from the MS4. The following areas are specifically regulated under the permit:

- Structural controls and stormwater collection system operation;
- Areas of new development and significant redevelopment;
- Roadways;
- Flood control projects;
- Municipal waste treatment, storage, or disposal facilities not covered by an NPDES stormwater permit;
- Pesticides, herbicides, and fertilizer application;
- Illicit discharges and improper disposal;
    - Inspection, ordinances, and enforcement measures;
    - Dry weather field screening program;
    - Investigation of suspected illicit discharges and/or improper disposal;
    - Spill prevention and response;
    - Public notification;
    - Oils, toxics, and household hazardous waste control;
    - Limitations of sanitary sewer seepage;
- Industrial and high risk runoff;
- Construction site runoff;
    - Site planning and non-structural and structural best management practices;
    - Inspection and enforcement; and
    - Site operator training.

Many of these areas are currently regulated through a combination of statutes, ordinances, permits, contracts, orders and inter-jurisdictional agreements. However, areas needing more stringent regulations or stronger inspection and enforcement measures are included in the recommendations in the following sections.

2.1.1.2 Recommendations for Additional Ordinances

Review of the City's ordinances relative to the NPDES MS4 permit indicate modification to the City code is warranted to better support enforcement remedies in controlling stormwater pollutant discharges and maintaining compliance with the permit. The following modifications are recommended:

- Structural Controls – an ordinance to compel privately owned stormwater management facilities that discharge into the City's MS4 to maintain or modify such facilities to operate in conformance with their original design operating conditions;

- Flood Control – modify ordinances and ULDF so that all flood control projects adhere to Broward County Code Section 27-200(b)(1)h. and rules of SFWMD to assure that such projects include stormwater treatment consistent with these agencies' rules and requirements;

- Illicit Discharges and Connections - modify ordinances to allow for authority to control illegal dumping/spills and illicit connections into the MS4 and to require compliance with conditions in ordinances, permits, contracts, and orders;

- Sanitary Sewer – modify ordinances to require that those properties served by septic tanks to connect to the regional sanitary sewer system within 90 days of notice of availability;

- Construction Site Runoff – adopt ordinance requiring construction site planning approval, structural and non-structural controls during construction to reduce pollutants to receiving waters, and that all new development obtain Broward County stormwater management license or SFWMD Environmental Resource Permit prior to land clearing. Require that Notice of Intent be submitted to FDEP if applicant plans to use NPDES Generic construction activities permit for construction within City's jurisdiction; and

- Inspection – an ordinance allowing the City to inspect:
  - privately owned stormwater management facilities to verify that the private MS4 is operating in conformance with its original operating design requirements;
  - facilities with suspected illicit connections to the MS4. Provide for enforcement powers to track and eliminate the illicit connections; and
  - high risk facilities, as determined by the City, that discharge into the City's MS4 to allowing for compliance monitoring if necessary.

2.1.1.3 Additional Recommendations

Based on the current City ordinances, the requirements of the NPDES MS4 permit, and recent engineering experience, the following policies and procedures should be adopted and where applicable, regulations developed so that they may be enforced.

- Use erosion and sediment control on all construction sites;
- Introduce fertilizer application, storage and training requirements;
- Assign a Stormwater Utility Director for stormwater ordinance enforcement and verbiage for violation penalties;
- Require installation of pollutant-retardant devices at proposed drainage structures and retrofit where available;
- Vacuum sweep parking lots at least once per week for new developments as part of Operation and Maintenance;
- Require infiltration of stormwater that does not represent an environmental hazard to surficial or artesian aquifers in accordance with all regulatory requirements;
- Create a Greenspace Management Fund for providing natural drainage, clean water, wildlife habitat and passive recreational opportunities;
- Prohibit application of reclaimed water applied to impervious surfaces that allow drainage to surface waters unless Broward County surface water standards are met;
- Create of a Land Development Procedures Manual;
- Make reference to FDOT specifications for construction;
- Prohibit developments from obstructing natural and man-made flow patterns and drainage courses;
- Regulate low-lying vacant land development to avoid flooding of adjacent properties;
- Include floodplain compensation; and
- Develop a typical design for stormwater features that protect the right-of-way and neighboring properties.

Excerpts from the City of Sarasota, City of Miami, and City of Jacksonville ordinances can be found in **Appendix 2A** to act as proposed verbiage for the recommended additions.

2.1.2 Swale Program

Swales are designed to collect rainwater, filter pollutants, control flooding, prevent erosion, and provide a drainage area for stormwater. The City's Save Our Swales program constructs swales at the request of its residents and has constructed over 98,000 LF of swales to date through the program. The City typically waits until 50 requests are made in a local area as indicated by the clustering of swaled properties shown in **Appendix 2B**. One of two work crews is then mobilized to construct the swales at no cost to the residents. Currently, a dedicated City program to measure stormwater quality does not exist, and thus there is no baseline to measure the swales effectiveness in reducing pollutants. To measure stormwater quality, the ambient water quality network that Broward County maintains as part of the regional monitoring program would have to be relied on, unless the City is willing to develop and maintain its own surface water monitoring network. The City is considering its options to cost effectively monitor surface water quality which is a recommended improvement to the program. In the meantime, a new controls system is being developed to better track the progress of the program in terms of existing improvements and recommended improvements.

2.1.3 Stormwater Management Program

From an organizational and operational perspective, there is no difference between a stormwater management program and a stormwater utility. The City 's Program was adopted by Ordinance No. C-92-34 in July 1992. The ordinance is codified in Chapter 28 (Water, Wastewater and Stormwater), Article IV (Stormwater Management Program), Sections 28-191 to 200.

2.1.3.1 Current Stormwater Management Program

The ordinance, provided as **Appendix 2C**, creates a stormwater management program to implement the functional requirements of the stormwater management system and imposes a stormwater fee. The fee is based on three customer categories and can be found in **Table 2-1**:

Category I	Residential Properties (e.g., developed properties including single family, mobile homes, multifamily, apartments and condominiums with less than 3 dwelling units)
Category II	Developed Properties not in Categories I or III (e.g., residential properties with greater than 3 dwelling units per parcel and all developed non-residential properties)
Category III	Undeveloped Properties (e.g., properties without impervious areas such as vacant property, parks, and golf courses)

It should be noted that although they contain significant impervious areas, airports are included in Category III. "Impervious Area" is defined (Sec. 28-193) as "any part of any parcel of land that has been modified to reduce the land's natural ability to absorb and hold rainfall."

Table 2-1. Stormwater Management Fees by Category.

Customer Category	Monthly Stormwater Management Fee*	
	Effective 8/01/2009	Effective 8/01/2010
Category I (Residential ≤ 3 DU)	$3.36 per DU	3.53 per DU
Category II (Residential > 3 DU, Non-Residential	$34.00 per acre	$35.70 per DU
Category III (Undeveloped)	$10.78 per acre	$11.32 per DU

* as defined in Sec. 28-197

These fees are projected to provide $9,165,189 in annual revenues (FY 2008/09) to the stormwater management program enterprise fund. These funds are authorized to be used for the following activities:

- Management Services – design, studies, permit review, plan preparation and development review;
- Operation & Maintenance – operation, maintenance, repair and replacement of the stormwater collection, treatment and conveyance infrastructure;
- Construction Costs – project costs related to constructing large and small infrastructure;
- Administration Costs – administration costs in support of the stormwater management program;
- Debt Service – debt service costs related to financing stormwater capital improvements; and
- Studies – funding of studies related to stormwater management planning.

According to a Stormwater Management Billing Rate structure package (August 1992), the stormwater rates are based on total property area, number of dwelling units and standard runoff coefficients. Standard runoff coefficients were used for each category (i.e., 0.525, 0.685 and 0.217 for Category I, II, and III, respectively), multiplied by the total area in the City for each category, creating weighted total areas. The weighted total areas represent the portion of the budget (based on percent of weighted area) needed to be produced by each category. For the residential properties, the budget amount to be produced divided by the number of dwelling units (divided by 12 to get a monthly value) defined the residential rate (dollars per month per dwelling unit) and for nonresidential and undeveloped properties, the budget amounts to be produced divided by the respective total areas (also divided by 12) defined the nonresidential and undeveloped rates (dollars per acre per month).

2.1.3.2 Other Stormwater Utilities in Florida

In order to assess the Fort Lauderdale stormwater management fees, the 2007 stormwater utility survey provided by the Florida Stormwater Association (FSA) was used. The survey reports elements of stormwater utilities within Florida based on survey information collected every other year since 2001. The 2007 FSA survey had 91 respondents, one of which was Fort Lauderdale, and thus, the survey provides a good comparison of the current operation of the City's Stormwater Management Program to those of other cities in Florida. Because Fort Lauderdale is a member of FSA, a copy of the 2007 FSA Survey was previously provided to the City.

While the survey provides responses to 52 questions, a number of responses have been selected to indicate stormwater utility programs from other areas of the state.

Basis for Fee (Fort Lauderdale – Intensity of Development)

Impervious Area	72.5%
Gross Area & Impervious Area	11.0%
Intensity of Development	3.3%
Other	14.3%

Billing Units (Fort Lauderdale – Not applicable)

Single Family Units	55.6%
All Residential Types	36.7%
Other	6.7%
Average Billing Unit	2,581 sq ft

Residential Rates (Fort Lauderdale – Same for ≤ 3 DU; Rate = $3.05/DU/Month)

Single Family Pays Same as Multifamily	58.6%
Average Residential Rate	$4.32/DU/Month

Credits (Fort Lauderdale – None)

Credits for Private Facilities	47.1%

Exemptions (Fort Lauderdale – None)

Streets/Roads	79.1%
Non-Agricultural Undeveloped	57.1%
Agricultural Properties	50.5%
Railroad ROW	59.3%
Public Parks	59.3%
Government	42.9%
Airports	21.1%

The most striking difference is that almost 84 percent of the utility fees in Florida are based on impervious area (either alone or in conjunction with total area) while the City, along with 2 other communities in Florida (Charlotte County and City of Titusville), use the Intensity of Development concept with the fee based on a standard runoff coefficient dependent on the type of parcel. Also, most utilities in Florida allow for exemptions and credits while the City does not.

For rates, **Table 2-2** and **Figure 2-1** provide the rates identified in the 2007 FSA survey relative to the City. Based on the populations reported, the average revenue per year per capita per residential rate is about $8.80 per capita (calculated as the total annual revenue divided by the population service and monthly residential rate). In comparison, the City's per capita revenue is $7.64.

2.1.3.3 Recent Changes in Florida Stormwater Utilities and Programs

In Florida, the first stormwater utility started in Tallahassee in October 1986. Since that time, as of November 2007, 134 cities (including the City) and 11 counties have implemented stormwater fees of some type. The nature of many of these utilities is illustrated in the 2007 FSA stormwater utility survey summarized in the previous section. For the purposes of this section, the survey identifies the recent practices in stormwater utility operations and rate structure (some of these are identified above). Also, in September 2003, the Supreme Court of Florida provided a decision related to stormwater utility fees (No. SC02-1696; City of Gainesville vs. State of Florida; attached as **Appendix 2D**. The summary of this case provided the stormwater utility community a number of important legal characteristics for a valid user fee.

It should be noted that the City of Gainesville uses an Equivalent Residential Unit (ERU) as the common unit of measure for impervious area. For Gainesville, the ERU was defined as 2,300 square feet (sq ft) based on the median single family property. Multifamily had a slightly smaller average so were assigned 0.6 ERUs. Impervious area was measured for each non-residential property and the fee was based on the impervious area divided by the ERU impervious (2,300 sq ft) times the fee rate. Properties that do not use the stormwater management system do not pay the fee, nor do undeveloped properties since they do not have impervious areas. FDOT refused to pay the bill for a developed maintenance yard (i.e., with impervious area that drained to the City's stormwater management system) since they claimed the fee was not valid and was therefore an assessment (which they do not have to pay).

In summary, the Supreme Court found that the Gainesville "stormwater fees constitute valid user fees." A summary of important conclusions of the Court case are provided below:

- Chapter 403.0893, FS, authorizes local governments to create a stormwater utility and adopt stormwater utility fees "to plan, construct, operate, and maintain stormwater management systems…"

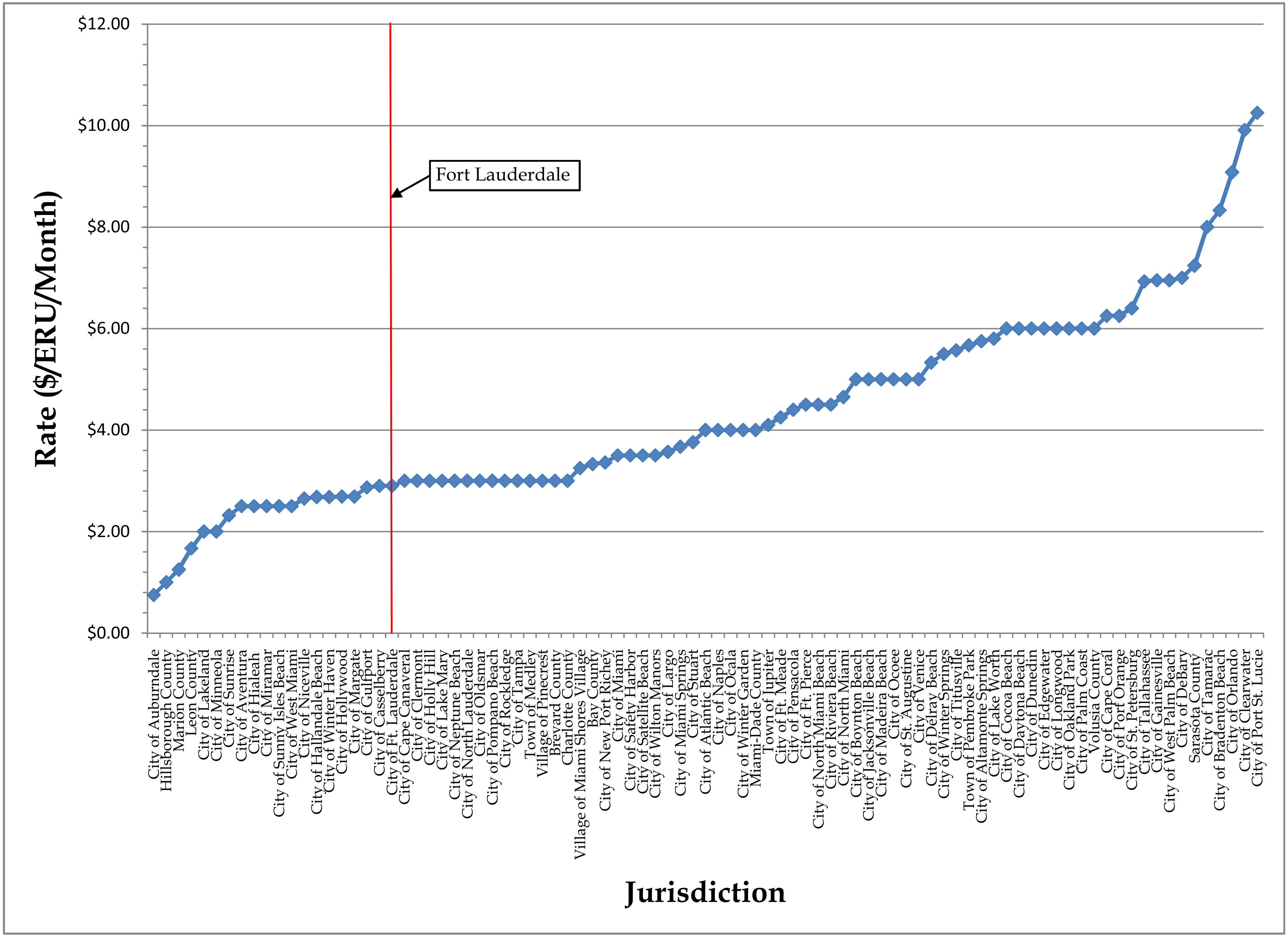
- A "stormwater utility" is defined as "the funding of a stormwater management program by assessing the cost of the program to the beneficiaries based on their relative contribution to its need. It is operated as a typical utility which bills services regularly, similar to water and wastewater service" (Chapter 403.031(17), FS).

Table 2-2
Fort Lauderdale Stormwater Management Program
Summary of Stormwater Utility Rates in Florida
(From FSA 2007 Stormwater Utility Survey)

	Jurisdiction	Area Served (acres)	Population Served	Current Utility Fee ($/mo)	Total Annual Revenue	Revenue per capita per Residential Rate ($/capita)
Cities	City of Altamonte Springs	6,157	43,054	$5.75	$1,627,000	$6.57
	City of Atlantic Beach	1,938	15,000	$4.00	$377,500	$6.29
	City of Auburndale	5,388	12,512	$0.75	$44,829	$4.78
	City of Aventura	2,049	27,500	$2.50	$963,000	$14.01
	City of Boynton Beach	10,600	95,000	$5.00	$3,200,000	$6.74
	City of Bradenton Beach		1,500	$8.33		
	City of Cape Canaveral	1,216	10,500	$3.00	$334,200	$10.61
	City of Cape Coral	73,600	163,126	$6.25	$13,525,806	$13.27
	City of Casselberry	261,360	24,000	$2.90	$500,000	$7.18
	City of Clearwater	16,000	110,169	$9.91	$9,441,000	$8.65
	City of Clermont	9,098	22,097	$3.00	$733,000	$11.06
	City of Cocoa Beach	3,840	13,000	$6.00	$585,000	$7.50
	City of Daytona Beach	42,240	65,000	$6.00	$5,026,480	$12.89
	City of DeBary	16,000	18,500	$7.00	$700,000	$5.41
	City of Delray Beach	10,535	64,757	$5.33	$2,200,000	$6.37
	City of Dunedin	7,000	37,426	$6.00	$1,350,000	$6.01
	City of Edgewater	14,238	21,572	$6.00	$892,417	$6.89
	City of Ft. Lauderdale	23,222	171,500	$2.90	$3,800,000	$7.64
	City of Ft. Meade	2,880	5,800	$4.25	$139,000	$5.64
	City of Ft. Pierce	1,089,000	41,102	$4.50	$2,298,787	$12.43
	City of Gainesville	2,352,240	120,779	$6.95	$5,946,678	$7.08
	City of Gulfport	2,449	12,899	$2.87	$318,000	$8.59
	City of Hallandale Beach	2,880	40,000	$2.68	$1,300,000	$12.13
	City of Hialeah	12,800	242,000	$2.50	$3,401,100	$5.62
	City of Holly Hill	3,750	12,500	$3.00	$390,000	$10.40
	City of Hollywood	21,290	160,000	$2.69	$2,400,000	$5.58
	City of Jacksonville Beach	5,464	23,279	$5.00	$2,107,502	$18.11
	City of Lake Mary	6,193	14,020	$3.00	$281,108	$6.68
	City of Lake Worth	3,904	29,598	$5.80	$2,717,000	$15.83
	City of Lakeland	46,199	91,623	$2.00	$1,365,936	$7.45
	City of Largo	10,900	72,000	$3.57	$1,940,600	$7.55
	City of Longwood	3,000	13,000	$6.00	$1,300,000	$16.67
	City of Madeira Beach	192	4,511	$5.00	$375,000	$16.63
	City of Margate	5,868	54,461	$2.69	$688,000	$4.70
	City of Miami	22,754	376,815	$3.50	$8,962,242	$6.80
	City of Miami Springs	2,240	13,725	$3.67	$281,000	$5.58
	City of Minneola	NR	12,000	$2.00	$91,000	$3.79
	City of Miramar	19,968	108,000	$2.50	$1,257,000	$4.66
	City of Naples	8,000	22,443	$4.00	$1,506,900	$16.79
	City of Neptune Beach	1,408	7,200	$3.00	$195,000	$9.03
	City of New Port Richey	2,880	16,334	$3.36	$542,119	$9.88
	City of Niceville	6,989	13,221	$2.65	$222,100	$6.34
	City of North Lauderdale	2,560	44,000	$3.00	$329,000	$2.49
	City of North Miami	6,400	59,990	$4.65	$2,072,818	$7.43
	City of North Miami Beach	3,400	41,000	$4.50	$1,287,000	$6.98
	City of Oakland Park	5,268	42,421	$6.00	$3,120,000	$12.26
	City of Ocala	27,750	51,853	$4.00	$4,372,793	$21.08
	City of Ocoee	12,000	27,000	$5.00	$2,275,470	$16.86
	City of Oldsmar	3,200	14,000	$3.00	$320,000	$7.62
	City of Orlando	70,992	208,900	$9.08	$20,188,000	$10.64
	City of Palm Coast	41,031	67,800	$6.00	$3,100,000	$7.62
	City of Pensacola	16,000	58,000	$4.40	$1,900,000	$7.45
	City of Pompano Beach	16,051	101,457	$3.00	$2,400,000	$7.89
	City of Port Orange	17,664	56,067	$6.25	$3,140,000	$8.96
	City of Port St. Lucie	72,960	150,000	$10.25	$14,000,000	$9.11
	City of Riviera Beach	7,000	30,000	$4.50	$1,500,000	$11.11
	City of Rockledge	7,040	24,000	$3.00	$985,000	$13.68
	City of Safety Harbor	3,400	17,000	$3.50	$510,000	$8.57

Table 2-2
Fort Lauderdale Stormwater Management Program
Summary of Stormwater Utility Rates in Florida
(From FSA 2007 Stormwater Utility Survey)

Category	Jurisdiction	Area Served (acres)	Population Served	Current Utility Fee ($/mo)	Total Annual Revenue	Revenue per capita per Residential Rate ($/capita)
Cities	City of Satellite Beach	1,563	10,938	$3.50	$165,153	$4.31
	City of St. Augustine	7,000	14,800	$5.00	$886,000	$11.97
	City of St. Petersburg	37,920	250,000	$6.40	$10,500,000	$6.56
	City of Stuart	6	15,900	$3.76	$481,320	$8.05
	City of Sunny Isles Beach	600	16,000	$2.50	$525,000	$13.13
	City of Sunrise	11,520	85,779	$2.32	$1,670,000	$8.39
	City of Tallahassee	66,041	174,781	$6.93	$9,000,000	$7.43
	City of Tamarac	8,000	57,000	$8.00	$4,155,850	$9.11
	City of Tampa	75,000	334,550	$3.00	$6,118,638	$6.10
	City of Titusville	17,280	43,000	$5.57	$1,700,000	$7.10
	City of Venice	10,560	20,800	$5.00	$1,750,000	$16.83
	City of West Miami	453	6,018	$2.50	$85,000	$5.65
	City of West Palm Beach	35,424	150,000	$6.95	$7,000,000	$6.71
	City of Wilton Manors	2,496	13,000	$3.50	$250,000	$5.49
	City of Winter Garden	9,592	28,440	$4.00	$1,468,096	$12.91
	City of Winter Haven	24,000	31,500	$2.68	$584,938	$6.93
	City of Winter Springs	9,461	33,971	$5.50	$1,048,000	$5.61
	Town of Jupiter	11,456	45,000	$4.10	$1,825,000	$9.89
	Town of Medley		150	$3.00	$1,000,000	
	Town of Pembroke Park	960	6,700	$5.67	$580,000	$15.27
	Village of Indian Creek	256	34		$175,900	
	Village of Miami Shores Village	1,792	10,500	$3.25	$132,570	$3.88
	Village of Pinecrest	5,184	19,530	$3.00	$367,450	$6.27
	No. of Respondents	78	81	80	80	78
	Average	61,372	59,079	$4.43	$2,478,691	9
Counties	Bay County	680	64,286	$3.33	$1,400,000	$6.54
	Brevard County	85,526	239,063	$3.00	$3,203,202	$4.47
	Charlotte County	150,000	150,000	$3.00	$5,000,000	$11.11
	Hillsborough County	589,504	785,120	$1.00	$5,527,000	$7.04
	Lake County				$5,000,000	
	Leon County	375,040	96,161	$1.67	$831,348	$5.18
	Marion County	600,000	239,300	$1.25	$3,150,000	$10.53
	Miami-Dade County	218,000	2,400,000	$4.00	$37,175,000	$3.87
	Sarasota County	333,000	357,417	$7.24	$15,829,625	$6.12
	Volusia County	604,889	106,956	$6.00	$4,500,000	$7.01
	Total or Number of Responses	9	9	9	10	9
	Average	328,515	493,145	$3.39	$8,161,618	7
	Total Responses	87	90	89	90	87
	Average	89,007	102,486	$4.32	$3,110,128	9



CDM

Figure 2-1
2007 FSA Stormwater Utility Survey
Summary of Rates

- In general terms, a fee is "exchanged for a service rendered or a benefit conferred, and some reasonable relationship exists between the amount of the fee and the value of the service or benefit…" Further, user fees are those charged to those persons using the service and the amount charged is related to actual services. Based on these conclusions, the Court lists a series of factors which define a user fee, none of which are definitive but must be taken together:
  - Name given to the charge;
  - The relationship between the amount of the fee and value of the service or benefit;
  - Whether the fee is charged to the users or to all residents in a given area;
  - Whether the fee is voluntary;
  - Whether the fee is monthly or a one-time charge;
  - Whether the fee is charged to recover the costs of improvements or for routine services;
  - Whether the fee is for a traditional utility service; and
  - Whether the fee is statutorily authorized.

2.1.3.4 Stormwater Management Fee Billing

Stormwater management fees are billed to customers in multiple ways: along with other utility fees (such as monthly water, sewer, garbage, or electric bills); using stand-alone bills with only the stormwater management fees (generally done at a less frequent increment such as quarterly); or using the "uniform method" as defined in Chapter 197.3632, FS. Currently, Fort Lauderdale collects developed residential and non-residential stormwater fees in association with other utility fees, while customers with undeveloped lots are billed annually ("Audit of the Stormwater Enterprise Fund", Report #6/07-3, October 10, 2007 [Audit]). Thus, except for the undeveloped properties, Fort Lauderdale bills along with other utility fees, so there are administrative costs and efforts required to maintain this monthly billing process. The Audit found that the City needs to improve the monthly billing process and the following recommendations are pertinent:

- A comprehensive Stormwater Management Master Plan should be developed and the stormwater management fees reviewed in light of the potentially new capital improvement requirements;

- The City Manager should request that Broward County should reconfigure its payment report and perform an audit to verify the completeness of remittance from the County;

- To update the billing database periodically, the City departments need to formalize the process of communication to account for new properties and utility customers;

- The City staff should have a written policy to verify the accuracy of the billing database; and
- The City staff should have a written policy to deal with uncollected and uncollectible accounts.

The audit indicates that continuation of the monthly billing of stormwater management fees needs improvement to increase the accuracy of the billing database and accounting of revenues. These are the consequences of a monthly billing structure – more frequent account updates; stronger accounting requirements related to cash flow and nonpayment; and greater intergovernmental communication. The benefits are greater cash flow, fee distribution (i.e., there are more utility accounts than properties), association with other fees, and more self-determination on the billing structure. Also, if the City references Chapter 403.0893(1), FS, then the fees should be billed monthly along with other utility fees.

However, to fully consider the options for billing, the uniform method (Ch. 197.3632, FS, attached as **Appendix 2E**) also provides a method to collect stormwater management fees. This option places the fee on the annual non-ad valorem assessment portion of the annual tax collector's bill. The tax collector provides payment administration and costs, for sending the bills and collecting the revenue, which is about 2 percent of the revenue.

Chapter 197.3632, FS, provides very specific protocols to implement the uniform method. If the City wishes to implement this method next year, then the following general activities need to occur (reference to the statute should be made for a complete understanding of the requirements):

- By December 31st of 2009 (or, if acceptable to the property appraiser and tax collector, by March 1, 2010), the City needs to adopt a resolution in a public hearing clearly stating its intent to use the uniform method and defining the need for the fees and boundaries of properties affected. This resolution does not constrain the City to using this method during 2010; rather, it keeps the option open;
- By June 1, 2010, the property appraiser will provide the City with the information needed to create the non-ad valorem assessment roll. The dataset basically has property information to which the fee can be added;
- Since this would be the first time the uniform method is used for this purpose, the City would need to adopt the non-ad valorem assessment roll at a public hearing held between June 1 and September 15, 2010. At least 20 days prior to the public meeting, the City must notice the meeting by mail providing specific information to each fee payer. By agreement with the property appraiser and tax collector, the TRIM bill can be used for this purpose; and

- At the public hearing, the City can adopt the non-ad valorem assessment roll with the fees and certify the roll to the tax collector for inclusion in the annual tax bill sent out in November 2010. Note that the public hearing is required only the first time and/or if the purpose or amount of the fee changes.

The advantages of this method include use of property appraiser information, annual updates to fee data (as opposed to monthly), and use of an existing, robust billing administration (the tax collector). The disadvantages of the method include the stringent schedule, the loss of administrative flexibility, and the reduced cash flow. Furthermore, the stormwater management program ordinance should reference a different subsection of Chapter 403.0893, namely (3) as opposed to (1) with the utility billing.

2.1.3.5 Updating the Stormwater Management Fee

At the completion of the Stormwater Management Master Plan, the City will likely reconsider the stormwater capital improvement program (CIP) as well as other stormwater management activities such as operation and maintenance, program management, etc. If the City decides that additional stormwater revenue is needed, especially via the stormwater fees, it is suggested that an evaluation of the overall stormwater management program be completed relative to the level of service (LOS) provided. As with all other utilities, the stormwater program provides a certain LOS based on the revenue provided. As suggested to the Florida Stormwater Association, a standard LOS definition has been offered as illustrated in **Figure 2-2**. This LOS is for stormwater management operations and includes the separation of the programs into four categories: Program Management (administration, engineering, code review and enforcement and project management); NPDES MS4 Compliance (annual reporting, compliance inspection, etc.); Operation and Maintenance (O&M) (routine and special maintenance of the stormwater infrastructure and minor repair and replacement); and, Capital Improvements or CIP (the construction of larger stormwater infrastructure projects).

Once the City's stormwater program has been assessed relative to the current LOS provided, estimates can be made on the budgets needed to improve the LOS to a higher level including a higher LOS for the CIP program in accordance with the master plan. Subsequently, with the higher LOS budgets, the City can determine the desired LOS and calculate a fee to generate the revenue for the LOS. In this manner, the elected officials and citizens of the City can associate the LOS benefits with the needed fees.

2.1.3.6 Suggestions

In accordance with the recommendations of the City Audit (see above), the City has embarked on a comprehensive Stormwater Master Plan, of which this section is a part. It is likely that the plan will result in the definition of additional CIP and therefore, the need for additional revenues from the stormwater management fees (as well as others). If the City seeks to increase revenues from the program, the

Figure 2-2. Level of Service for Stormwater Programs

Stormwater Program Level of Service Matrix

Level of Service	*Program Management Activities*	*NPDES Compliance Activities*	*Operation and Maintenance Program Activities*	*Capital Improvement Projects*
A	Comprehensive Planning + Full Implementation Capabilities	Exemplary Permit Compliance	Fully Preventative/ 100% Routine	10-year Plan
B	Pro-Active Planning + Systematic CIP Implementation Capabilities	Pro-Active Permit Complaince	Mixture of Routine and Inspection Based	20-year Plan
C	Priority Planning + Partial CIP Implementation Capabilities	Minimal Permit Complaince	Inspection Based Only	40-year Plan
D	Reactionary Planning + Minimal CIP Implementation Capabilities	Below Minimum Permit Complaince	Responsive Only (Complaint-based)	50-year Plan
F	No Planning + No CIP Implementation Capabilities	Non-Compliance	Less than full response to all complaints	75-year Plan

stormwater management program ordinance should be revised and updated to account for a number of issues identified in this section.

- The ordinance should reference Chapter 403.0893(1), FS, for its existing stormwater fee. The ordinance reverences Chapter 403.0893 but not the subsection (1).

- If the City chooses to use the Uniform Method according to Chapter 197.3632, FS, then subsection (3) should be referenced.

- The ordinance needs to establish a Stormwater Utility, not just a stormwater management program (Sec. 28-194).

- The City should consider how a customer can reduce their fees in light of the Gainesville case summarized above.

- The definition of impervious area (Section 28-193) should be expanded to clarify what is and what is not impervious. The definition includes any modification of land (such as use of pervious pavement) that "reduces that land's natural ability to absorb and hold rainfall."

- Also in the definition section, airports are considered undeveloped property ("not significantly altered from its natural state") under Category III. If there is a conclusion by the City that the airport has reduced impact of the City's stormwater system then this should be authorized in an exemption since, clearly, airports have significant amounts of impervious area.

- In Section 28-197, the stormwater management program rates are defined. In order to better relate the fees to impervious area (which is related to the benefits and/or services provided), the method of calculation should be included, defining the runoff coefficients. In lieu of defining the process in the ordinance, a Policy and Procedure Manual can be referenced which can include the methodology.

- The City should develop a Policy and Procedures Manual, referenced in the ordinance, to deal with billing maintenance and collection issues. The Manual can define the methods by which billing records are updated or started based on available public records provided during the building review process of the City as well as methods to collect the fees, adjustments to the fees and protocols to enforce collection.

- The City should consider the level of service assessment identified in Subsection 2.1.3.5 to define the estimated budgets needed for higher levels of service and determine appropriate stormwater management fees accordingly.

2.1.4 Dredging Operations

The City of Fort Lauderdale contains 165 miles of navigable waters including the Intracoastal Waterway, New River, and numerous canals. Such an extensive system requires frequent dredging to maintain a properly functioning stormwater management system. As there are significant costs associated with dredging operations, the purpose of this section is to identify other city's canal maintenance procedures and to provide recommendations for a more effective and affordable dredging system as it relates to stormwater management.

2.1.4.1 City Dredging Procedures

Canal dredging in the City is performed on an "as requested" basis. Upon a citizen's request, the City surveys the canal and determines the cause of the sedimentation. The City will proceed with dredging procedures if the sediment is near a stormwater outfall or is in the center third of a canal. Dredging near docks and seawalls is the responsibility of the homeowner.

The City currently utilizes annual contracts with independent contractors for permitting and dredging operations. The annual dredging contract used by the City includes five bid items: mobilization and insurance, silt material excavation and dewatering, rock material excavation and dewatering, dredged materials disposal, and landfill dumping fees; dredging contracts are paid from the City's General Fund. Based on drilling logs, approximately 1,000 cubic yards (CY) of material are dredged annually. Recent and planned dredging locations within the City are shown on **Figure 2-3**. Areas requiring frequent dredging include Davie Boulevard and Orange Isles, Broward Boulevard and 18th Avenue, Las Olas Isles, and the Bayview area. Calculated estimated costs for dredging are provided in **Table 2-3**.

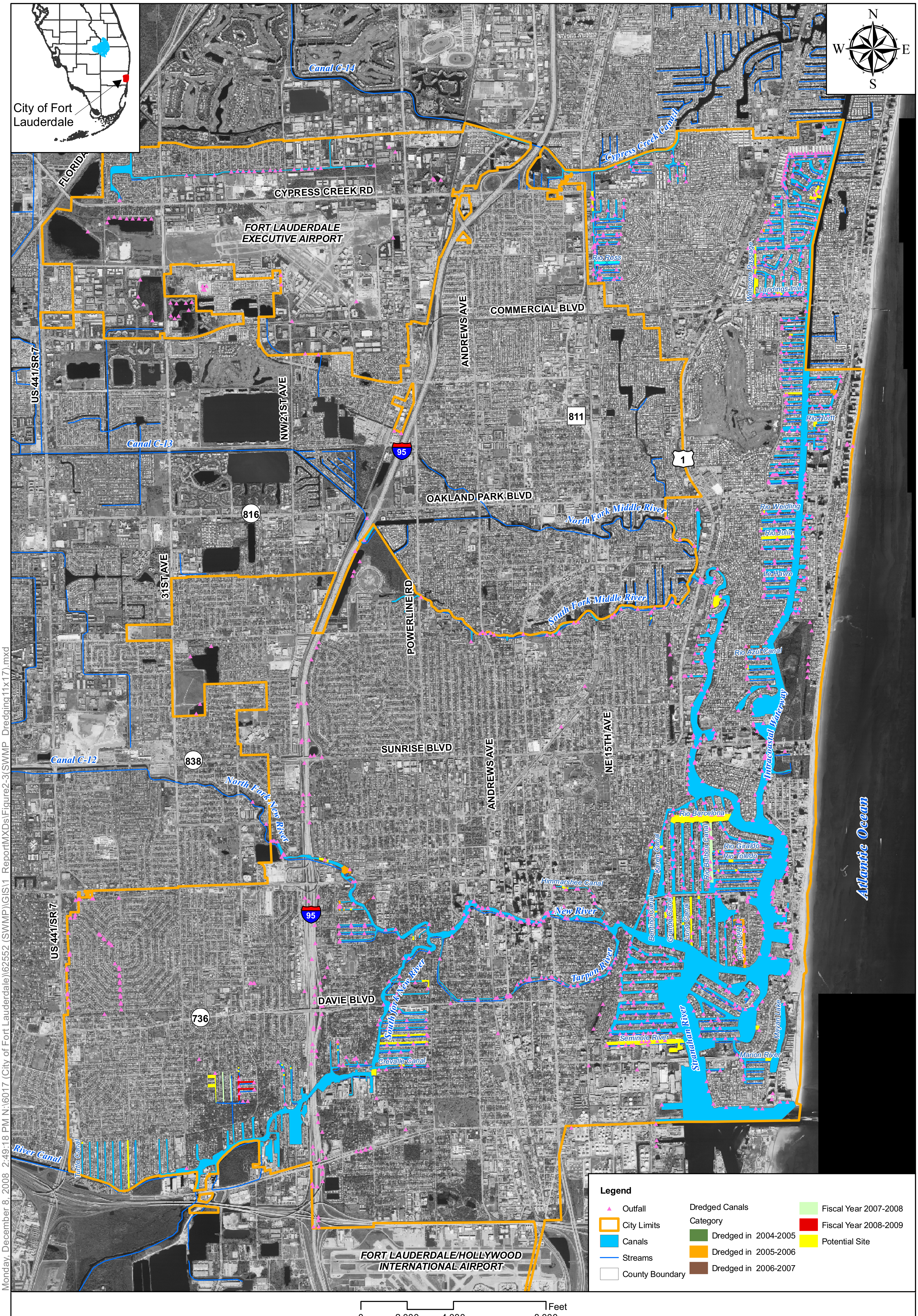
Table 2-3. Estimated Cost of Contract Dredging Operations.

Volume Dredged (CY)	Waterways Dredged	Work Days Dredged	Mobilization Cost*	Dredge Cost*	Disposal Cost*	Total Cost
100	1	10	$2,000	$5,000	$5,000	**$12,000**
200	2	20	$4,000	$10,000	$10,000	**$24,000**
300	3	30	$6,000	$15,000	$15,000	**$36,000**
400	4	40	$8,000	$20,000	$20,000	**$48,000**
500	5	50	$10,000	$25,000	$25,000	**$60,000**
600	6	60	$12,000	$30,000	$30,000	**$72,000**
700	7	70	$14,000	$35,000	$35,000	**$84,000**
800	8	80	$16,000	$40,000	$40,000	**$96,000**
900	9	90	$18,000	$45,000	$45,000	**$108,000**
1,000	10	100	$20,000	$50,000	$50,000	**$120,000**

* Cost estimates provided by Homeside Dredging, Inc.

2.1.4.2 Florida Dredging Procedures

An overview of other coastal municipality's dredging methods and payment structures is provided below. The cities were chosen to provide a variety of canal system sizes and locations on both the Atlantic and Gulf coasts. The cities were primarily contacted by phone, but a general internet search was also preformed.



Monday, December 8, 2008 2:49:18 PM N:\6017 (City of Fort Lauderdale)\62552 (SWMP)\GIS\1 Report\MXDs\Figure2-3(SWMP Dredging11x17).mxd

Source: City of Fort Lauderdale

CDM

City of Fort Lauderdale
100 North Andrews Avenue
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 2-3

City-Wide Stormwater Master Plan

Dredging Locations

UPDATED 12-08-08

City of Tampa

The City of Tampa aims to consolidate the costs of mobilization and spoils management by dredging the main channels of the entire system at once. To customize their individual needs homeowners are responsible for dredging around docks. Of note, the city permitted the dredge from seawall to seawall to cover any homeowner maintenance performed within the permitted 5-year time span. The large scale of the project allowed the city to receive grant funding (Direct Appropriation) from the water management district and EPA for spoils management. Tampa plans to fill several "dredge holes" in the bay with the spoils and use seagrass plugs or shell hash to establish a thriving marine environment. The dredge holes were originally created when fill was needed for causeway construction and other city projects.

City of Jacksonville

Jacksonville does not have a scheduled dredge maintenance program and necessary dredging is done by special assessment. Typically, homeowners file a petition with the city for canal dredges. The city evaluates the petition to determine necessity and whether or not the sedimentation is a result of the city's stormwater system. If it is found the city's stormwater system contributes to the sedimentation, the city may share a portion of the cost, typically up to 20 percent. A special assessment is levied on the benefitting homeowner for payment.

City of Naples

Naples utilizes contractors for permitting and dredging for the main channel and occasionally near seawalls. Dredging is typically not done to the seawall or in secondary channels, but property owners are given the option to have these areas dredged while the contractor is mobilized in the area. Approximately half of the city's dredging is performed in passes on a monitored basis in public channels. The other half is on a request basis in private channels. The source of dredge funding depends on the type of operation. Public canals are paid for by the city utility tax; some areas have localized taxing districts for maintenance, while private canal dredging is paid for by the property owner or homeowners association through special assessments.

City of Fort Pierce

The City of Fort Pierce Stormwater Management Department has an ongoing maintenance contract to dredge the marina and the siltation depths are monitored annually with silt surveys. The city determines which canals to dredge largely based on citizen complaints. Funding is determined based on location. If the dredged area is in the Fort Pierce Re-development Agency's district, funding is provided by the district. Marina dredging is funded through enterprise funds, and the stormwater fund is used for other dredging projects.

City of Titusville

All Titusville dredging is handled by Brevard County. Per the Brevard County Road and Maintenance Department, dredging is done by routine maintenance 90% of the time although citizen complaints will also be addressed. Typically the County evaluates all major outfalls prior to hurricane season to determine the need for maintenance.

City of Punta Gorda

The City of Punta Gorda takes a split approach to dredging. The city plans and permits canal dredging, while a contractor performs the dredge. The need for maintenance is solely initiated by citizen input and is paid for by a Municipal Service Benefit Unit (MSBU), or separate tax district, for the Punta Gorda Isles neighborhood. Dredging operations include the maintenance of docks and seawalls.

City of Sebastian

The City of Sebastian does not have a scheduled dredge maintenance program. The city dredges as needed and uses city funds for payment.

2.1.4.3 Dredging Process Analysis and Recommendations

The most efficient use for in-house dredging operations is when all labor and equipment is 100% utilized, allowing for normal maintenance and avoiding overtime costs. For contract operations, when mobilization/de-mobilization costs are negligible and only a daily or hourly rate is charged for the work, with no fixed minimum charges, the least cost approach is to perform the minimal amount of dredging allowable in a year. These two conflicting philosophies are the viewpoints considered when determining the most efficient dredging process for the City.

Currently, the City's Annual Dredging Contract allows for ten work days per 100 CY of silt and rock dredged. If the City were to dredge the waterways, the optimal work load would be 250 days of dredging activity per year or 2,500 CY of material removed annually. Any volume lower then this and the City's resources would be underutilized; conversely any larger volume would cost the City in overtime. As mentioned previously, the current rate of work is approximately 1,000 CY per year with a waitlist resulting in a 3-5 year span between citizen requests and dredging activities. However as the rate of yearly citizen requests is less than 2,500 CY, it is not considered feasible for the City to own and operate dredging equipment.

From a contractor's perspective, the optimal volume dredged per year equals the average volume requested annually to ensure the availability of long-term work. This approach is also useful for the City as it would curb the growth of the existing waitlist. Thus, it is recommended that the City continue using independent contractors to dredge this amount annually. In order to meet this goal, the City may need to streamline the pre-dredge evaluation process, as well as revise the Annual Dredging Contract, in order to expedite the additional dredging.

Other ways to decrease dredging costs include combining all projects within a two-mile radius to eliminate additional mobilization costs and eliminate rock dredging from the annual contract. Rock dredging is not considered a stormwater maintenance issue, and many contractors lack the equipment to dredge rock regardless. The City primary reason to dredge rock is if the canal was never properly excavated to accommodate the City's stormwater needs. In this case, the City can initiate individual contracts. Finally, the disposal tonnage should be reduced to account for spoil material dewatering. The silt weighs less after dewatering, and this moisture loss should be reflected in the contracts maximum tonnage.

Like many of the other municipalities in the state, it is recommended that the City either create local tax districts or assess the immediate homeowners to fund neighborhood canal dredging. Typically, dredging is a navigation issue more so than a stormwater issue, which directly benefits the homeowners with access to the canals. For larger waterways such as the New River, it is recommended that the City first seek federal and state grants for routine dredging operations as these are major navigation channels. Potential funding organizations include the EPA, United States Army Corp of Engineers (USACE) and/or the SFWMD.

2.2 Data Acquisition and Review

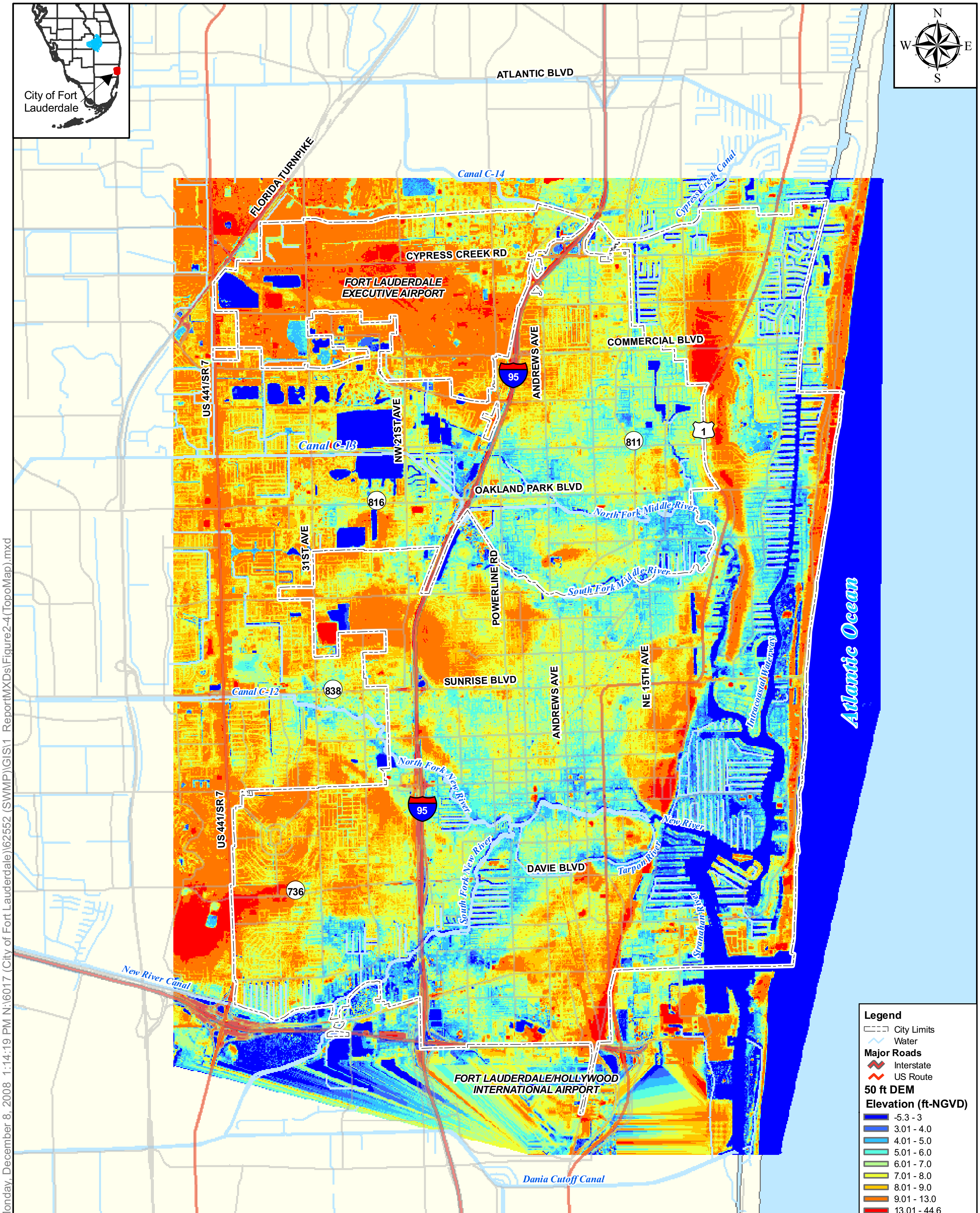
This section gives an overview of the data obtained and details any conversions or modifications to the data for use in the stormwater evaluation. It also reviews the first steps used to conceptualize the system models found in the subsequent report sections. The initial analysis was based on previous stormwater studies and entailed the synthesis of a Geographic Information System (GIS) map identifying key problem areas based on citizen complaints, capital loss and recent City engineering projects.

2.2.1 Topography

In order to account for overland flows and storage elements in the Regional and Local stormwater models, high resolution Light Detection and Ranging (LiDAR) data was collected for this project. The LiDAR data was available from the International Hurricane Research Center at the Florida International University in Miami (IHRC, 2004), and collected for the Broward County Emergency Management Division.

Airborne LiDAR systems usually obtain measurements for the horizontal coordinates (x, y) and elevation (z) of the reflective objects scanned by the laser beneath the flight path (IHRC, 2004). The laser-scanned objects include buildings, vehicles, vegetation, and "bare ground". The IHRC provides unfiltered and "bare earth" data. The data downloaded from the IHRC website was in ASCII point-data format of a 5-ft resolution digital elevation model (DEM) grouped in 5,000 by 5,000 feet tiles in bare ground format. The vertical datum used by the IHRC to deliver the data is NAVD88.

LiDAR data is typically verified against ground survey. The City provided a compilation of topographic survey data from over a hundred engineering projects where this information was available in AutoCAD format. In this way, survey elevations on centerlines of the road, curbs, edge of pavement, and finished floor elevations were made available. In **Figure 2-4**, a 50-ft resolution DEM of the City is shown, representing the LiDAR data collected for the project.



Source: International Hurricane Research Center (IHC)

0 1 2 4 Miles

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City of Fort Lauderdale
100 North Andrews Avenue
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 2-4
City-Wide Stormwater Master Plan
Topographic Map (DEM)

UPDATED
12-08-08

2.2.2 Soils

Information on soil types, lateral and vertical extents, and soil characteristics were obtained in digital format from the National Resources Conservation Services (NRCS) website. The NRCS soil data is based on the Soil Survey of Broward County, Eastern Part, published in May, 1984.

The most common soil types are in order of predominance: Immokalee, Urban Land, Duette, and Arents, which all have an urban land complex associated to them.

Figure 2-5 shows the soil distribution based on their hydrologic soil group classification. **Table 2-4** provides the area percentage of each hydrologic soil group (HSG) present in the study area.

Table 2-4. Area Percentage of Hydrologic Soil Groups in the Study Area.

Hydrologic Soil Group	Percentage
A	20%
B	16%
B/D	33%
C	6%
D	0%
Water/NA *	24%
Total	**100%**

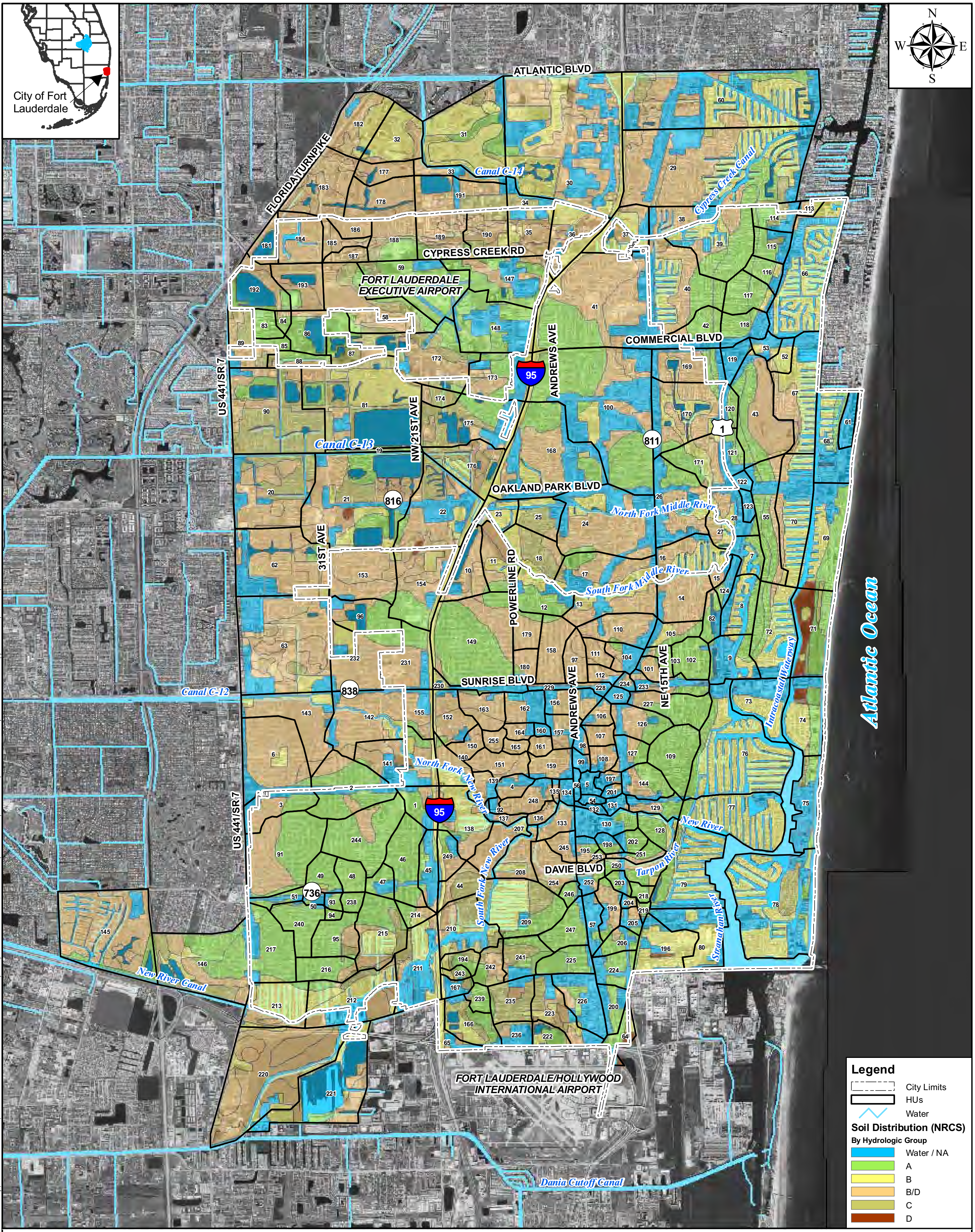
* This group includes water soil types and areas where data was not available

Results of the soil classification by HSG indicate that dual hydrologic group B/D is the predominant type of soil in the study area. The first letter applies to the drained condition of the soil, the second to the undrained. In this case, the natural condition of the soil is D; however, the soil can be adequately drained for practical purposes (i.e., low to moderate runoff potential or moderate to high infiltration capacity). The second and third soil groups with the largest predominance are A and B, at which high infiltration capacities are expected. Notably, there is not HSG type D, characteristic of low infiltration capacities

2.2.3 Land Use

The City provided CDM with the existing land use coverage, which is included as part of its parcel GIS coverage. This land use coverage extends within the City limits. However, land uses are only assigned to parcels, leaving significant components of land use areas including roads, sidewalks, and parking lots, out of all land use classification.

Since both the water quality and water quantity models used in this project require an accurate determination of land use classification to estimate runoff, the City's land use database needed to be augmented.



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Source: NRCS

0 1 2 4 Miles

CDM

City of Fort Lauderdale
100 North Andrews Avenue
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 2-5
City-Wide Stormwater Master Plan
Soil Distribution by Hydrologic Soil Group

UPDATED 12-08-08

The SFWMD land use coverage and classification was considered as an alternative source for these data. It was compared to the City's coverage for each land use category with the aid of aerial photography and found that:

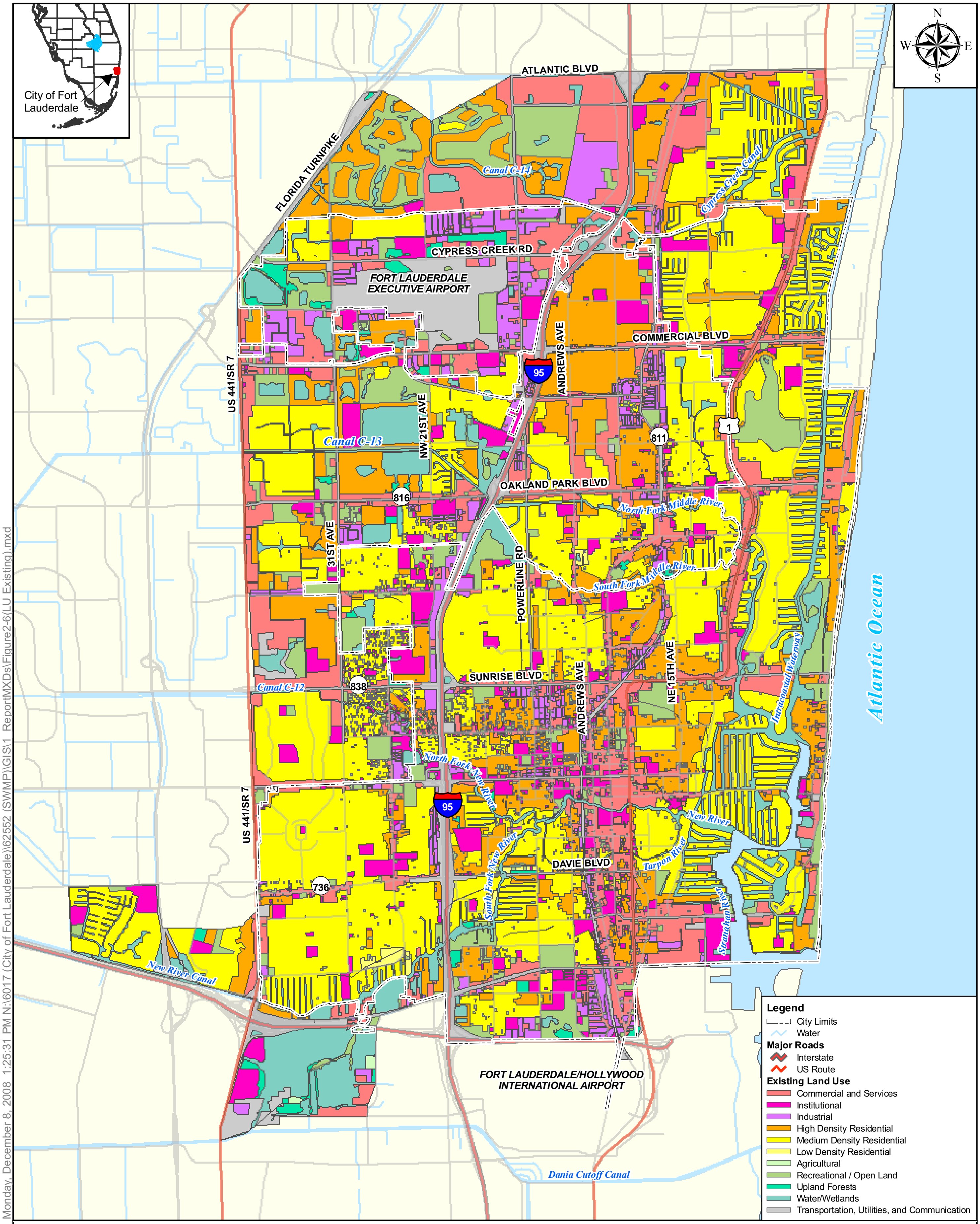
- Overall, the SFWMD's coverage closely matches the City's land use classification for residential land uses;
- In general, the City's coverage provides more detail in identifying commercial, industrial, and institutional land uses than the SFWMD coverage; and
- The City's coverage provides more detail in identifying vacant lots that are not yet developed and that may constitute the most important differentiation between existing and future land uses.

Considering the results of this comparison, it was decided that the SFWMD's coverage is to be used as the base for existing land use coverage and be improved with the City's institutional, commercial, and industrial land use categories. However, by visually inspecting these particular land uses using aerial photography, it was found that there were some assigned land uses that needed to be corrected before using them in the water quality and quantity models. This is a list of corrections made on the above set of land uses:

- Parks, open lands, cemeteries, and other non-developed areas, originally classified as institutional, commercial, and industrial land use areas, were assigned to the recreational and open land category;
- Golf courses, originally classified as commercial, were assigned to the recreational and open land category; and
- Vacant lots were assigned to the recreational and open land category.

Figure 2-6 shows the existing land use coverage for the project, which includes areas outside of the City limits that will be defined in Section 3. **Table 2-5** provides a summary of the existing land use coverage.

The future land use coverage received from the City during the data collection was not considered realistic by the City's Planning Department. Therefore, CDM and the City met to address this issue. After these meetings, it was decided that CDM would use traffic analysis zone (TAZ) household count projection data to estimate the future land use at each one of the 255 hydrologic units used in the model. The difference between projected and existing number of households would be distributed in the overlaying hydrologic units (HUs) by first filling in the vacant lots within each HU with the surrounding land use and then by reassigning a high density residential land use to areas within the HU located along major corridors, which are currently occupied by commercial developments.



Monday, December 8, 2008 1:25:31 PM N:\6017 (City of Fort Lauderdale)\62552 (SWMP)\GIS\1_ReportMXDs\Figure2-6(LU Existing).mxd

Source: City of Fort Lauderdale and SFWMD

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Figure 2-6
City-Wide Stormwater Master Plan
Existing Land Use

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Table 2-5. Existing and Future Land Uses for the City of Fort Lauderdale.

Land Use Category	Existing (acres)	Percent of Total	Future (acres)	Percent of Total
Commercial and Services	3,147.4	13.8%	3,190.2	14.0%
High Density Residential	2,733.1	12.0%	2,859.0	12.5%
Industrial	1,073.2	4.7%	1,092.5	4.8%
Institutional	1,537.3	6.7%	1,550.6	6.8%
Low Density Residential	70.5	0.3%	74.9	0.3%
Medium Density Residential	8,528.3	37.3%	8,654.6	37.9%
Recreational / Open Land	1,928.5	8.4%	1,593.2	7.0%
Transportation, Utilities, and Communication	1,685.1	7.4%	1,688.5	7.4%
Upland Forests	218.6	1.0%	218.6	1.0%
Water/Wetlands	1,928.2	8.4%	1,928.2	8.4%
Total	**22,850.2**	**100%**	**22,850.2**	**100%**

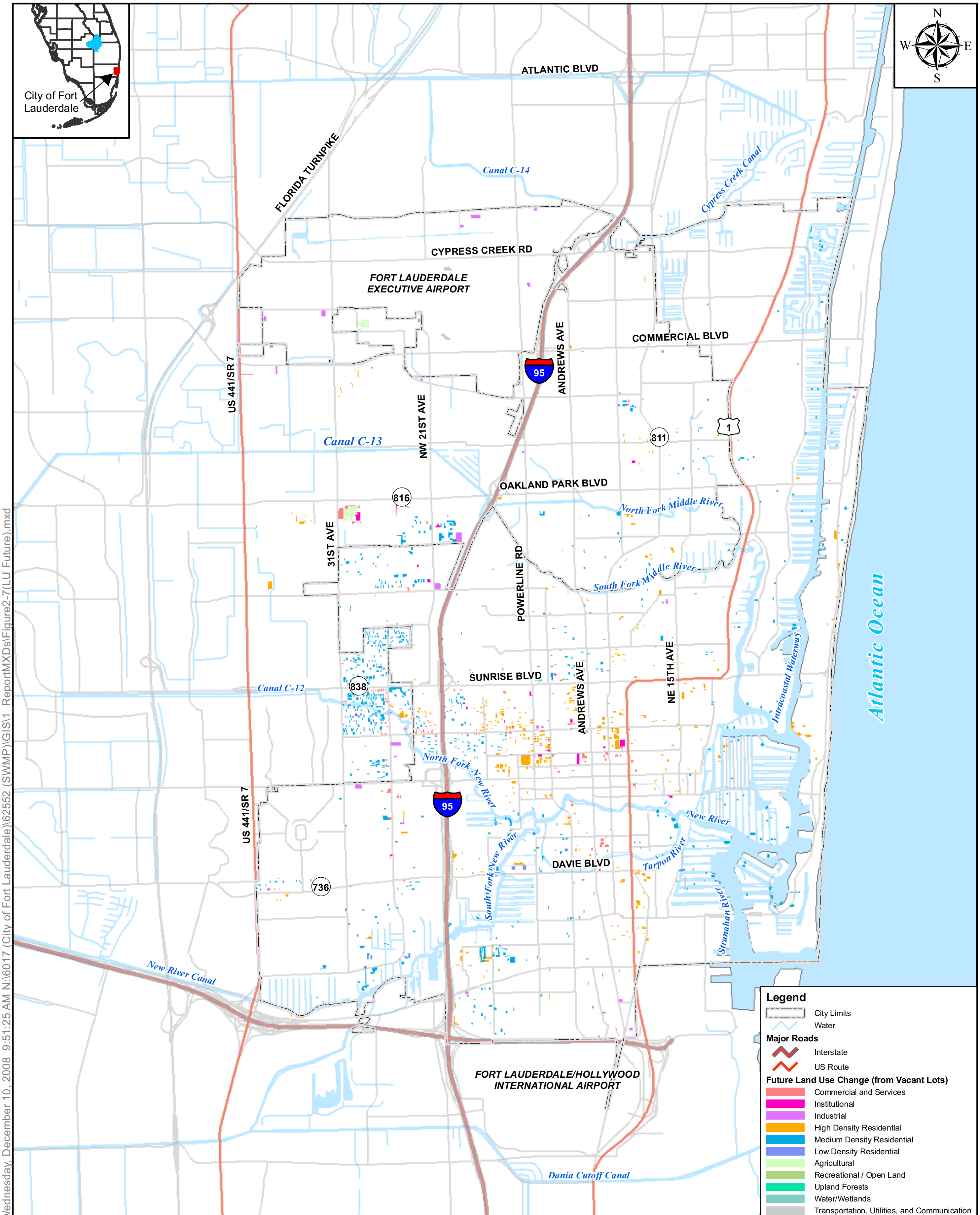
The procedure described above was first carried out for approximately 15 HUs. It was noted that the procedure was time consuming when reassigning a different land use to an existing area for two reasons. First, the area to be reassigned needed to be calculated and drawn on a GIS layer. Second, there were several HUs that did not have any major intersecting corridors, which created certain ambiguity when relocating high density residential households.

CDM decided to continue filling in the vacant lots within each HU with the surrounding land use for the remaining modeled areas only. The HUs along major corridors were not reassigned a high residential land use for the following reasons:

- The expected runoff and water quality changes from reassigning a high density residential to an existing commercial land use was not significant; and

- Reassigning land uses within TAZs intersecting two or more HUs or when no major corridors were present was ambiguous.

In addition to filling in the vacant lots with the surrounding land use, a few previously Planning Department approved redevelopment projects were included to create the future land use coverage. **Figure 2-7** shows the location of the vacant lots around the study area that were filled in and the location of the approved redevelopment projects used in the future land use coverage.



Source: City of Fort Lauderdale and SFWMD

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Figure 2-7
City-Wide Stormwater Master Plan
Future Land Use

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2.2.4 Aerial Photography

The City provided high resolution (12-inch) aerial photography within the City Limits. The 2007 aerial photography was useful for land use verification, wetland identification, basin delineation, and correlating citizen complaints with geographical locations.

2.2.5 Rainfall

Two types of rainfall data were sought for this project, namely daily and 15-minute interval rainfall. Both are useful for the water quantity modeling but long-term daily data are used chiefly in the water quality modeling effort. The SFWMD was the main source of these data. **Figure 2-8** shows the location of the rainfall gauges identified within the study area. **Table 2-6** provides information on the rainfall gauges shown in Figure 2-8 identified by their DBKEY.

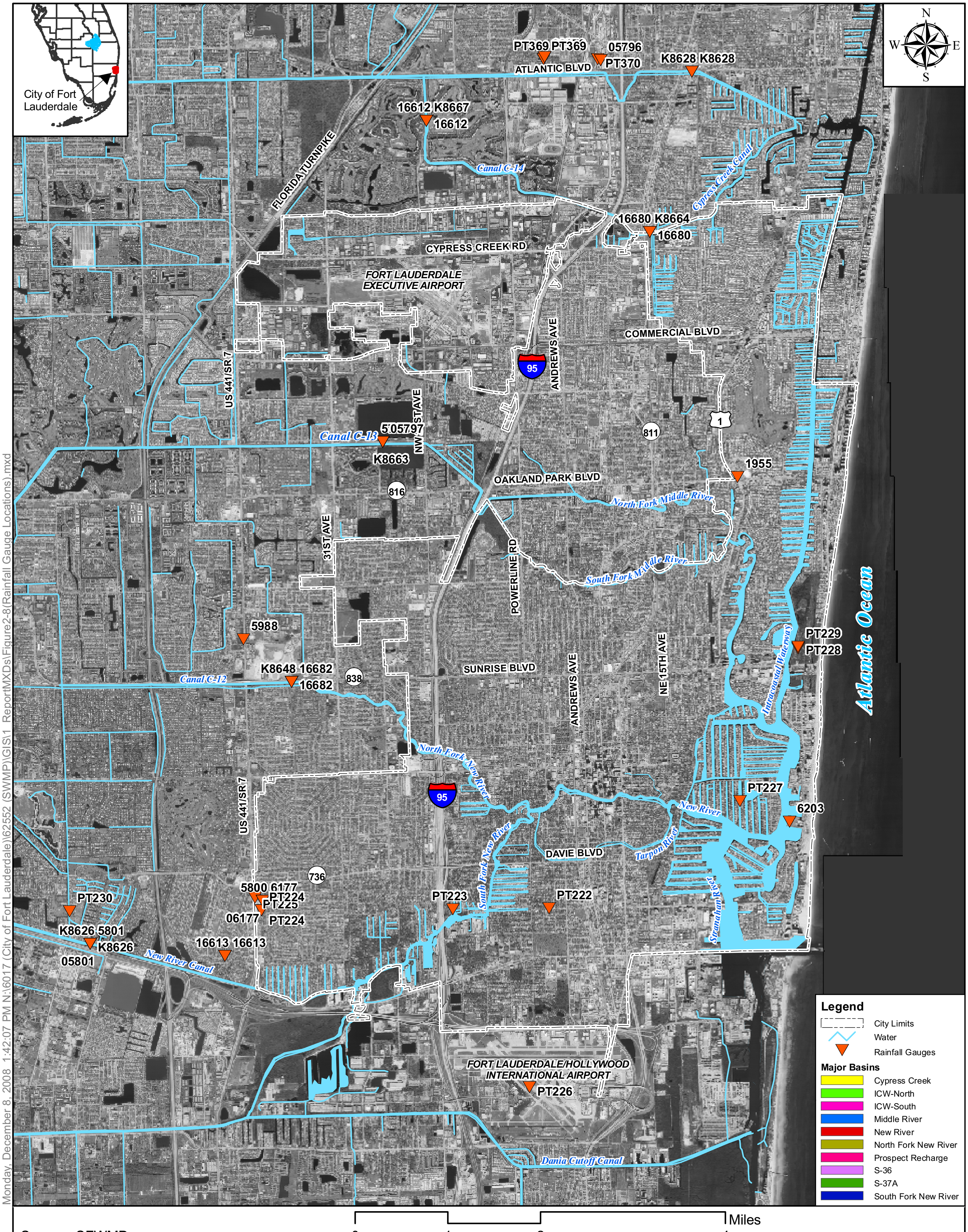
2.2.6 Stage, Discharge Monitoring Data

The main source available in the area for streamflow and stage data is the SFWMD. Upstream and downstream stage data of the salinity-control structures and estimated discharge through the structures is available on a daily and 15-minute time step from the SFWMD. The salinity-control structures located within the study area are shown in **Figure 2-9**. Streamflow measurements are not available at any other locations within the study area. Flow discharges through these salinity-control structures are computed using theoretical discharge-coefficient ratings based on manual readings of gate openings, stages by the SFWMD and the USACE.

Table 2-7 provides a summary of flow and stage gauges identified within the study area. At the stage gauges located on gate (G) and spillway (S) structures, headwater and tailwater elevations are measured to estimate discharge passing through the structure.

2.2.7 Tidal Information

The National Oceanic and Atmospheric Association's (NOAA) National Climatic Data Center (NCDC) and DBHYDRO were consulted for these data. **Table 2-8** provides a list of selected stations with tidal data. Useful tidal data has been collected in several locations within five miles of the study area for different periods of time; however, no data is available for the last 30 years. Therefore, the Virginia Key Station (ID: 8723214) located 30 miles south of the study area was selected for further analysis as it represents the most complete data set that is relatively nearby.



Source: SFWMD

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Figure 2-8
City-Wide Stormwater Master Plan
Rainfall Gauge Locations

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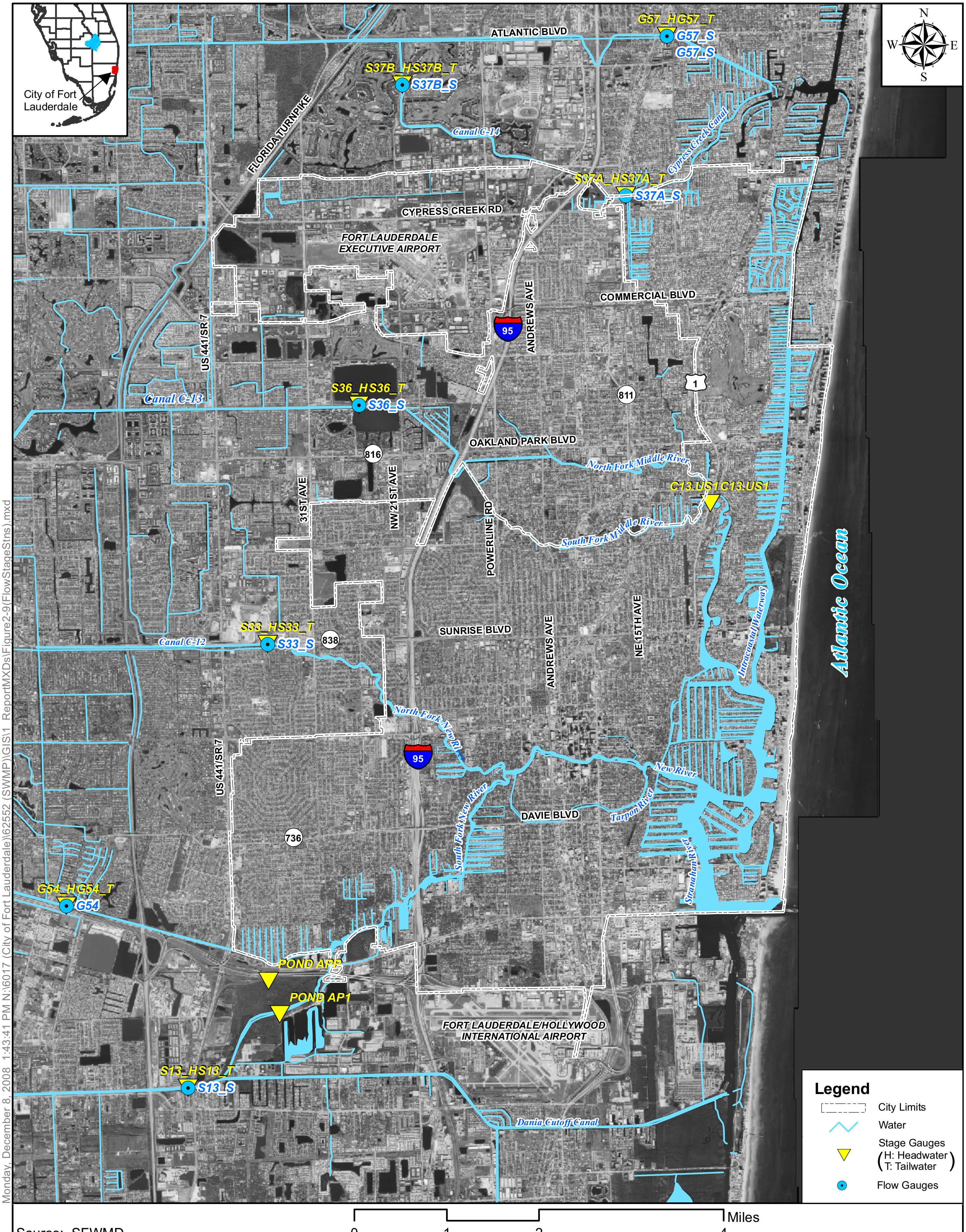
12-08-08

Table 2-6. Rainfall Gauges Located within the Study Area.

Station Name	DBKEY	Agency	Period	Easting	Northing	Frequency
083163-1	PT222	NOAA	1948-1984	935119	642947	DA,
083163-2	PT223	NOAA	1963-1969	929649	642911	DA
083163-3*	PT224	NOAA	1969-1999	918709	642843	DA
083165-1	PT226	NOAA	2001-2001	934000	632741	DA
083168-1	PT227	NOAA	1952-1966	946017	649078	DA
087254-1*	PT369	NOAA	1948-2001	934802	691412	DA
DIXIE WA_*	06177	NOAA	1914-1998	918782	643379	DA
FTL	16613	WMD	1991-2008	916613	640236	DA
G54_R*	05801	WMD	1957-2001	908926	640923	DA
G54_R	K8626	WMD	1997-2008	908926	640923	DA,15m
G57_R	K8628	WMD	1997-2008	943262	690690	DA,15m
LAUDPBAH_R	06203	NOAA	1952-1966	948837	647916	DA
POMPANOB_	06179	NOAA	1941-1998	934878	691543	DA
POMPANOF_*	05796	WMD	1957-2002	938066	691362	DA
S13_R	VB188	WMD	2007-2008	915882	630513	DA,15m
S33_R	16682	WMD	1993-2008	920436	655884	DA,15m
S36_R*	05797	WMD	1959-2002	925637	669573	DA
S36_R	16681	WMD	1991-2008	925637	669573	DA,15m
S37A_R	16680	WMD	1991-2008	940883	681556	DA,15m
S37B_R	16612	WMD	1991-2008	928114	687893	DA,15m

Notes: 1. (*) Gauges with moderate to good quality data and with longest record period.
2. ‘DA’ and ‘15m’ stands for daily and 15-minute interval data frequency.



Source: SFWMD

CDM

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Figure 2-9
City-Wide Stormwater Master Plan
Flow and Stage Stations

UPDATED
12-08-08

Table 2-7. Flow and Stage Stations Identified within the Study Area.

Station	Dbkey	Group	Data Type	Reported Statistic	Recorder	Agency	Starting Date	Ending Date	Easting	Northing
G54	00456	G54	Flow	Mean	<>	USGS	1/1/1940	4/14/1992	908926	640923
S13_S	15131	S13_S	Flow	Mean	TELE	WMD	9/8/1989	5/5/2008	915882	630513
S33_S	00424	S33	Flow	Mean	<>	USGS	4/1/1962	9/30/2004	920436	655884
S36_S	P1008	S36	Flow	Mean	MOD1	WMD	1/1/1978	12/31/2005	925637	669573
S37A_S	P1009	S37A	Flow	Mean	MOD1	WMD	1/1/1978	12/31/2005	940883	681556
S37B_S	P1010	S37B	Flow	Mean	MOD1	WMD	1/1/1978	12/31/2005	928114	687893
G57_S	15935	G57	Flow	Mean	TELE	WMD	10/11/1994	5/7/2008	943262	690690
C13.US1	00420	C13.US1	Stage	Max	<>	USGS	12/15/1962	9/30/1967	945720	663949
C13.US1	00421	C13.US1	Stage	Min	<>	USGS	12/15/1962	9/30/1967	945720	663949
G57_H	15936	G57	Stage	Mean	TELE	WMD	10/11/1994	11/29/2007	943262	690690
G57_T	15937	G57	Stage	Mean	TELE	WMD	10/11/1994	11/29/2007	943262	690690
POND AP1	12780	POND AP1	Stage	Mean	RECO	USGS	10/1/1988	10/12/1989	921115	634711
POND APP	12781	POND APP	Stage	Mean	RECO	USGS	10/1/1988	10/11/1989	920465	636625
S33_H	15678	S33	Stage	Mean	TELE	WMD	7/24/1991	11/12/2007	920436	655884
S33_T	15679	S33	Stage	Mean	TELE	WMD	7/24/1991	11/12/2007	920436	655884
S36_H	06644	S36	Stage	Mean	TELE	WMD	5/31/1985	11/26/2007	925637	669573
S36_T	06645	S36	Stage	Mean	TELE	WMD	5/31/1985	11/26/2007	925637	669573
S37A_H	06648	S37A	Stage	Mean	TELE	WMD	5/31/1985	11/29/2007	940883	681556
S37A_T	06649	S37A	Stage	Mean	TELE	WMD	5/31/1985	11/29/2007	940883	681556
S37B_H	06652	S37B	Stage	Mean	TELE	WMD	8/31/1985	11/29/2007	928114	687893
S37B_T	06653	S37B	Stage	Mean	TELE	WMD	8/31/1985	11/29/2007	928114	687893
G54_H	P0942	G54	Stage	Mean	MOD1	WMD	1/1/1978	6/30/2007	908926	640923
G54_T	15967	G54	Stage	Mean	TELE	WMD	12/10/1992	9/2/2008	908926	640923
S13_H	P0860	S13	Stage	Mean	MOD1	WMD	1/1/1978	6/30/2007	915882	630513
S13_T	13000	S13	Stage	Mean	TELE	WMD	9/8/1989	8/25/2008	915882	630513

Note: 1. These gauges report at least at a daily time-step, while some of these gauges report at finer time-steps as 15-minute intervals.
2. Provided coordinates are in the Florida East Harn reference system.

Table 2-8. Identified Stations with Tidal Data.

Station	Frequen cy	Agency	Statistic	Start Date	End Date	Easting	Northing
NNRC.FL	DA	USGS	MIN,MAX	6/1/1963	9/30/1967	937249.7	649453.9
PORT EVE	DA	USGS	TLL,THH	10/1/1973	3/27/1978	947795.8	640235.4
PORT EVE	DA	USGS	MIN,MAX	2/21/1968	9/30/1974	947795.8	640235.4
Virginia Key	DA,5m	NOAA	All	1/26/1994	Present	932146.1	509041.7

TLL: lowest low tide
THH: highest high tide

The location of the above tidal stage gauges is presented in **Figure 2-10**.

2.2.8 Cross-Section Data

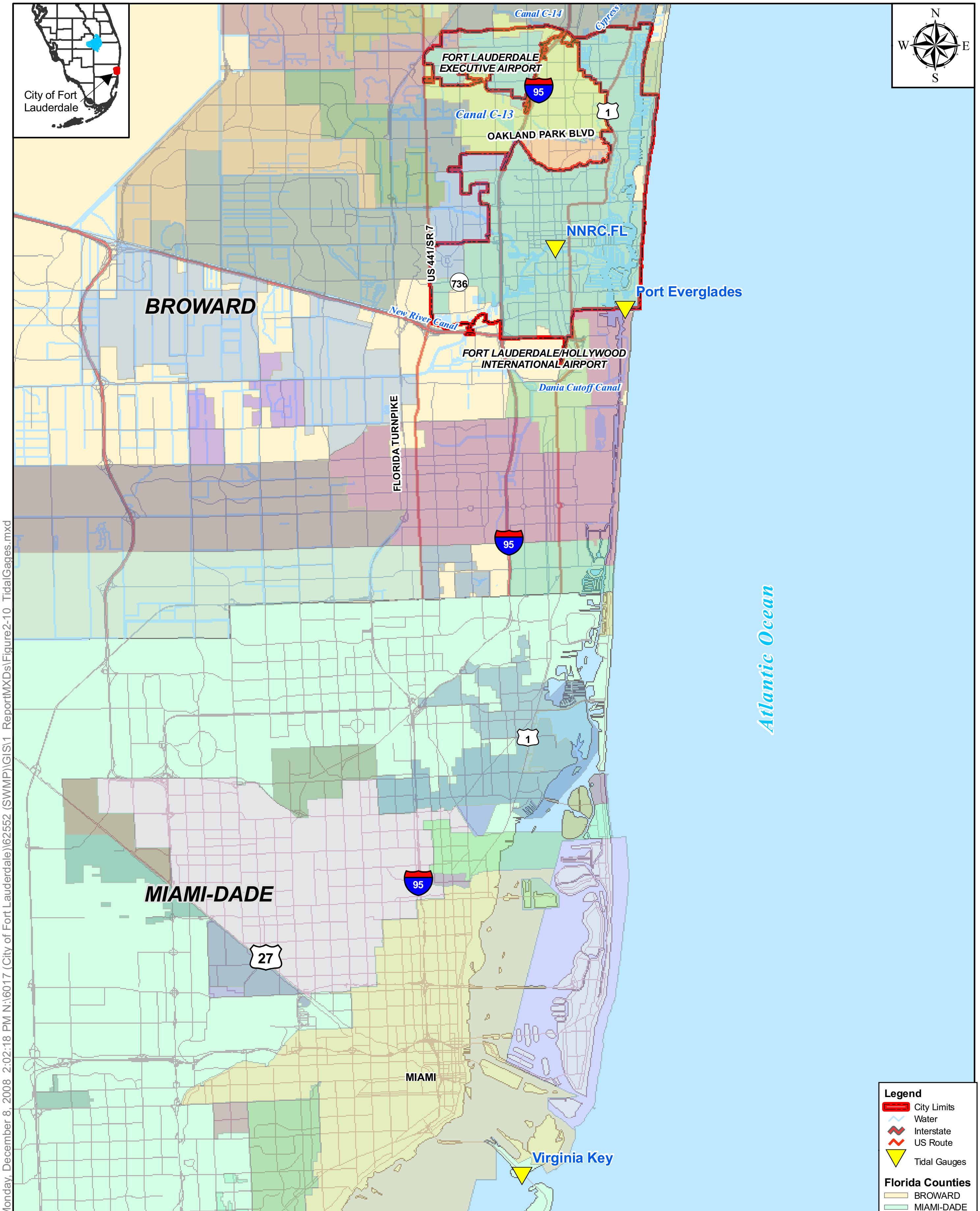
Cross section information was obtained from the Draft MIKE SHE/11 model of Broward County, recently updated for the ongoing Broward County Integrated Water Resources Management Master Plan. **Figure 2-11** shows the location of the cross sections obtained from this source. Many of the received cross section data had identical stations and elevations; therefore, the number of actual surveyed locations is much less than the number depicted in Figure 2-11.

2.2.9 Stormwater Infrastructure Data

In February of 2008, the City provided CDM with GIS files of the stormwater infrastructure. The files included spatial locations of inlets, junction boxes, manholes, conduits, outfalls, and pump stations. The following information was provided:

- 20,482 StormLine conduits, 40% with unidentified diameters and 90% with unidentified invert elevations;
- 11,838 inlet locations, including grate elevations for 67%;
- 408 junction boxes;
- 2,230 manhole locations, including rim elevations for 64%;
- 6 pumping stations; and
- 1,223 outfall locations, with ground elevations for 36%.

Figure 2-12 shows the geographic location of the stormwater infrastructure inventoried by the City. Characteristic of the distribution of this information is the lack of coverage in recently incorporated areas such as the Melrose Park east and the Rock Island Neighborhood Association.



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Source: National Climatic Data Center (NCDC)

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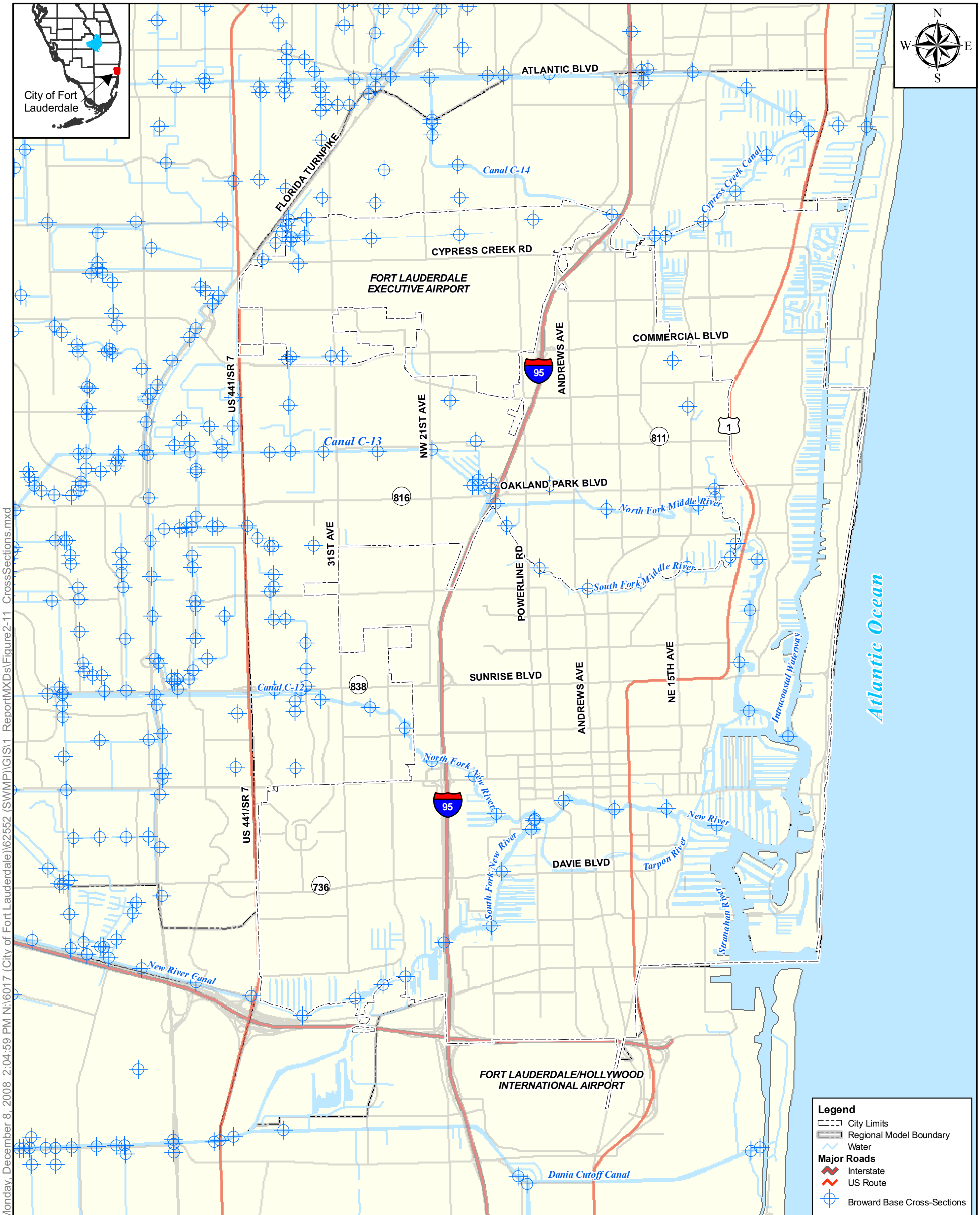
Figure 2-10
City-Wide Stormwater Master Plan
Tidal Gages

UPDATED 12-08-08



Source: Broward County Mike SHE/11 Model

CDM

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Figure 2-11
City-Wide Stormwater Master Plan
Cross Section Data

UPDATED 12-08-08

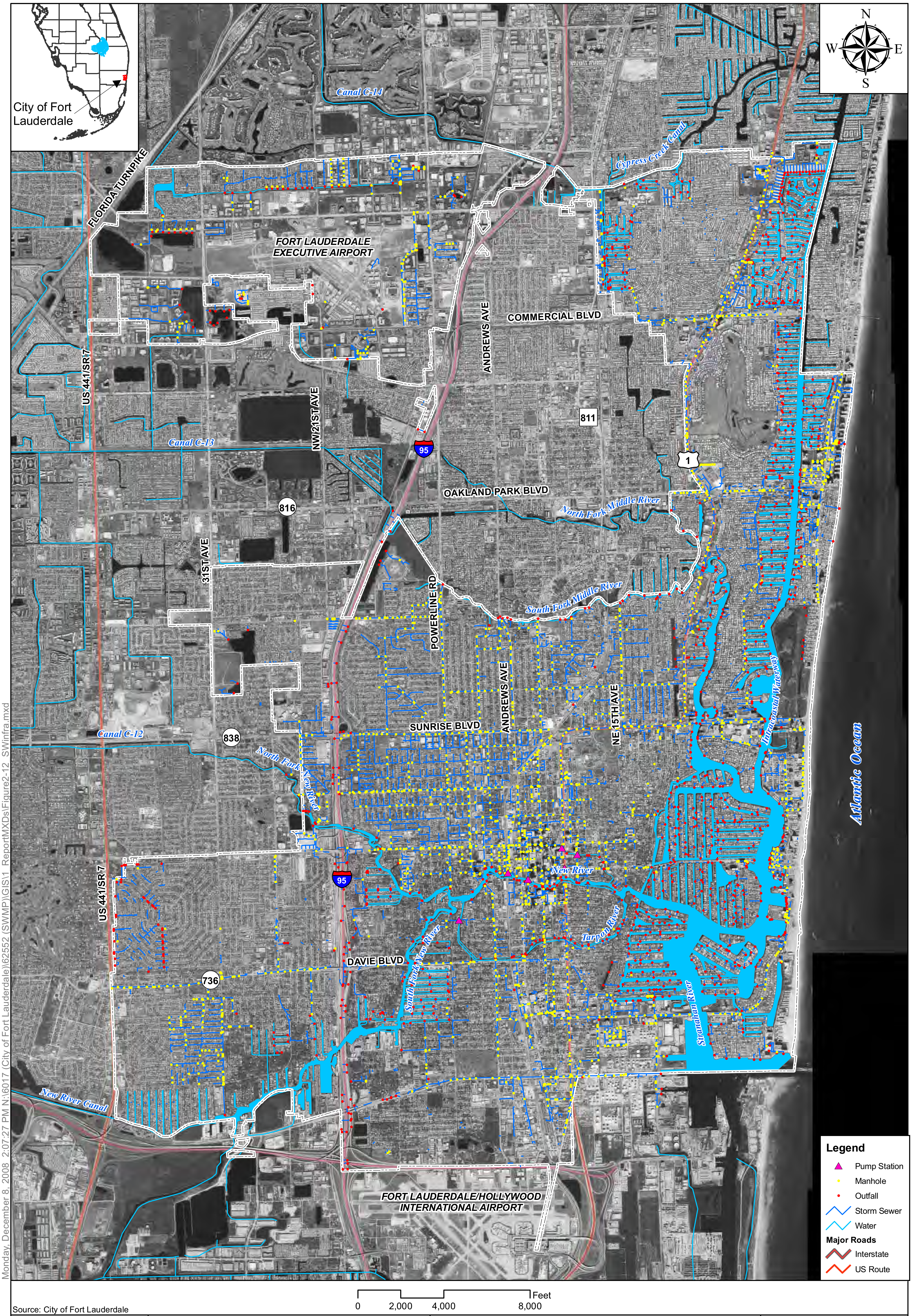

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Figure 2-12
City-Wide Stormwater Master Plan
City's Stormwater Infraestructure

UPDATED
12-08-08

2.2.10 Water Quality Data

Water quality information was obtained from STORET (EPA's storage and retrieval environmental database). Information in STORET is provided by federal, state, and private environmental monitoring programs. For this project, the major sources of this information were the Broward County's Department of Natural Resources Protection (BCDNRP) monitoring program (21FLBROW), Lakewatch (21FLKWAT), and the SFWMD (21FLSFWM). Lakewatch and SFWMD have stations primarily located in lakes and coastal areas, where flow measurements are not estimated.

From these sources, water quality data collected as part of the Broward County monitoring program offers more periodicity and spatial variability for some of the parameters of interest to this Project. Broward County has used its monitoring network to conduct chemistry and bacteriological studies of the surface water (TR:94-03, 1994; TR:01-09, 2001). For these studies, additional monitoring locations have been temporarily installed for specific data collection as appropriate.

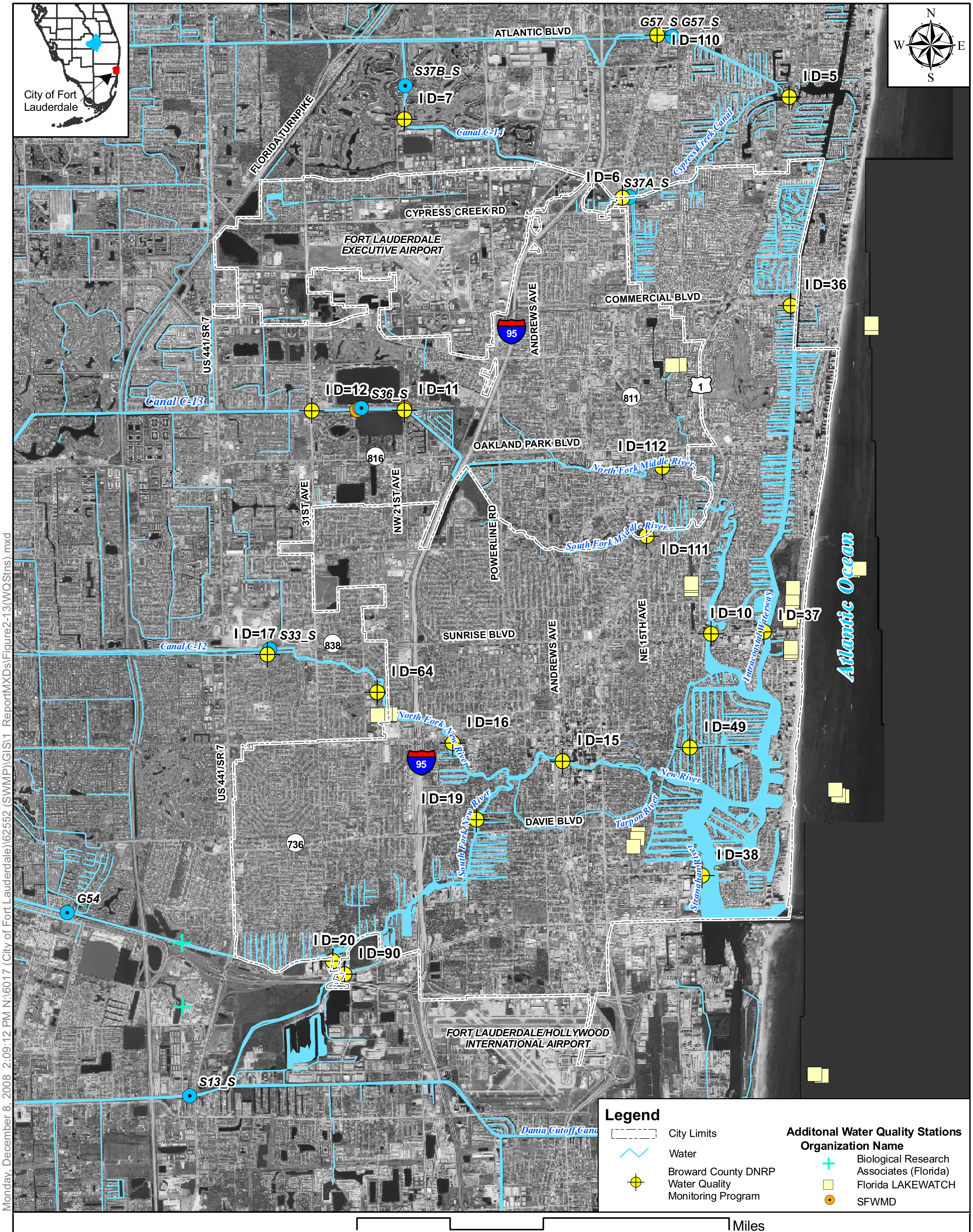
Localized studies (Solo-Gabriele et al, 2000; Desmarais et al, 2002), led by the University of Miami on the North Fork of the New River, which were oriented to identify the source of fecal contamination have generated an intense bacteriological data collection moderately disperse throughout that reach of the New River.

Figure 2-13 shows the location of identified stations with water quality data. **Table 2-9** provides a summary of the average concentrations of water quality parameters observed in the BCDNRP monitoring network located within the study area.

2.2.11 Previous Reports and Studies

Previous reports and studies were evaluated to determine if the data contained within them could be used for this report. Below is a summary of the most beneficial reports.

<u>New River Study, Broward County Department of Natural Resource Protection, 1993</u>
The initial New River Study assessed the monthly water quality of thirteen sampling stations from June 1991 through December 1992, identifying impacts from pollution and suggesting remedial measures, all of which are advantageous when analyzing the current stormwater system. Bacteria levels, nutrient concentrations and heavy metal concentrations in sediments were all noted contributors to the poor water quality in the New River. Nitrogen and phosphorus levels were shown to increase between 24 and 48 hours after rain events. Bacteria levels and precipitation were also positively linked with the highest levels occurring when rainfall was continuous for two days. Sources of bacteria in the North Fork area were attributed to septic tanks, sewer discharges, and illegal connections; the Las Olas Isles area's fecal coliform sources were linked to inhabited moored vessels (IMV's). In response to these findings, the study suggested: locating unregulated sewer and stormwater discharges; implementing the NPDES program; removing heavy metals laden sludge blankets; requiring full wastewater treatment to IMV discharges; and continuing to monitor the New River for future progress.



Source: STORET and Broward County Monitoring Program

CDM	City of Fort Lauderdale 100 North Andrews Avenue Fort Lauderdale, Florida 33301 Tel # (954) 828-5000	**Figure 2-13** City-Wide Stormwater Master Plan Water Quality Stations	UPDATED 12-08-08

Table 2-9. Summary of Average Water Quality Concentrations Observed in Broward County Monitoring Stations Located within the Study Area.

Station ID	Station Name	Chlorophyll a, corrected for pheophytin (mg/m^3)	Copper (ug/L)	Dissolved oxygen, DO (mg/L)	Fecal Coliform (#/mL)	Nitrogen, Kjeldahl (mg/L)	Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N (mg/L)	Phosphorus as P (mg/L)	Phosphorus, orthophosphate as P (mg/L)
5	Pompano Canal and C-14 at US1 bridge	4.41	<>	5.9	469	0.92	0.08	0.05	0.04
6	Cypress Creek Canal at Dixie Highway	2.58	<>	6.2	431	1.15	0.11	0.04	0.03
7	C-14 Canal Palm-Aire area South of S37B	4.57	<>	6.2	94	1.25	0.09	0.04	0.03
10	Middle River at E Sunrise Blvd	2.40	<>	5.7	351	0.77	0.13	0.05	0.04
11	Middle River at NW 21st Avenue	8.88	<>	6.0	527	1.06	0.13	0.05	0.03
12	Middle River at NW 31st Avenue	2.70	<>	6.6	173	1.06	0.22	0.02	0.01
15	New River at Andrews Avenue	2.98	8.42	5.6	481	1.03	0.22	0.04	0.03
16	North Fork of New River at Broward Boulevard	20.75	<>	5.7	1190	1.24	0.15	0.10	0.05
17	Plantation Canal W of salinity control structure	5.04	<>	6.9	612	0.84	0.06	0.03	0.02
19	South Fork of New River at River Reach	4.27	8.19	5.3	669	1.28	0.32	0.04	0.03
20	South Fork of New River at Bradford Marina Dock	5.20	6.80	5.0	586	1.40	0.23	0.04	0.03
36	Intracoastal Waterway at Commercial Blvd.	4.51	6.96	6.6	390	0.77	0.09	0.04	0.04
37	Intracoastal Waterway at Sunrise Blvd.	3.90	6.74	6.7	78	0.75	0.11	0.04	0.03
38	Intracoastal Waterway at 17th Street	2.42	5.62	6.6	132	0.56	0.06	0.04	0.03
49	Sospiro Canal at Las Olas Blvd.	3.12	<>	5.8	301	0.91	0.17	0.04	0.04
64	North Fork of New River at Sistrunk Boulevard	31.52	<>	5.4	1798	1.11	0.16	0.10	0.04
90	South Fork of New River just N of SR 84	4.97	<>	5.3	257	1.30	0.30	0.04	0.03
110	Dixie Highway on the Pompano Canal	13.56	<>	5.7	727	0.65	0.08	0.06	0.02
111	S. Fork Middle River at NE 15th Ave.	12.24	<>	5.7	734	0.93	0.12	0.06	0.04
112	N. Fork Middle River at NE 16th Ave.	5.60	<>	5.4	666	0.89	0.17	0.06	0.04
	Mean	**7.28**	**7.12**	**5.9**	**533**	**0.99**	**0.15**	**0.05**	**0.03**
	Maximum	**31.52**	**8.42**	**6.9**	**1798**	**1.40**	**0.32**	**0.10**	**0.05**
	Minimum	**2.40**	**5.62**	**5.0**	**78**	**0.56**	**0.06**	**0.02**	**0.01**

Notes: 1. Provided average values based on measurements taken during the period January, 1999 to November, 2007, available in STORET at the time this Study was conducted.
2. The Broward County Monitoring Program's organization ID in STORET is 21FLBROW.

Sources of Escherichia coli in a Coastal Subtropical Environment, Solo-Gabriele, H. et. al., 2000

Initial analysis of the North Fork of the New River showed that 90% of the samples collected exceeded the allowable standards for recreational use for E. coli. Based on this finding, spatial and temporal data were collected from the river between Gate S33 and the South Fork junction. The data showed that E. coli concentrations fluctuated with the tide. The highest concentrations corresponded with high tide, while the lowest concentrations corresponded with low tide. During high tide the water level rises to include previously dry soils, where E. coli is known to populate. The decreased moisture content of the elevated soil allows E. coli to survive where predators cannot. Notably, the tidal pattern did not occur until two days after rain events, presumably because it takes two days for the bacteria to recover from the stormwater flushing. Finally, the suggestion to further investigate the source of E. coli in the New River, by analyzing stormwater flows before entering the river system, was made.

Influence of Soil on Fecal Indicator Organisms in a Tidally Influenced Subtropical Environment, Desmarais, T., H. Solo-Gabriele and C. Palmer, 2002

The North Fork of the New River was selected to study fecal indicators due to its known high levels of bacteria and its tidally influenced nature. The data showed that the greatest concentrations of E. coli and C. perfringens were found within 50 cm of the water's edge. Due to the bacteria's close proximity to the river and daily tidal flows, the microbes may increase concentrations in the river beyond that of fecal bacteria. In addition to this, the study showed that E. coli and enterococci may multiply in sediments with finer grains and high organic concentrations, which likely cause elevated concentrations during dry weather. Unlike these bacteria, C. perfringens was shown not to reproduce in sediments and may prove useful in determining stormwater impacts.

Contract and Other Documents for the Restorative Dredging and Wetlands Enhancement Project, City Project No. 9842

The Restorative Dredging and Wetlands Enhancement Project was based on an initial study by CH2MHill in 1994. The study was to determine the amount of organic sediments in the North Fork of the New River between Broward Boulevard and Sistrunk Boulevard, to characterize the material for disposal purposes, to evaluate the impact of leaving the material in place, and to prepare cost estimates for removal. This study was not included in the package received from the City; however, it is assumed that the conclusions drawn from the report and other studies were used to define the requirements for dredging the North Fork and Argyle Canal. Cross sections for the North Fork and Argyle Canal, as well as site plans were included with the report.

The package of information received from the City included the contract documents and first and second addendums for the project; bid documents from the Contractor OHM Remediation Services; laboratory data acquired from the area previous to and during site work; payment documents such as invoices and change orders; and other legal papers accumulated between 1997 and 2000. The project entailed removing approximately 7,200 CY of material from the North Fork between Stations 20+00 and 29+00; removing approximately 1,900 CY of material from Argyle Canal between Stations 10+00 and 15+80; replacing exotic plant species with native wetland species along the north bank of the North Fork; and removing approximately 1,500 CY of additional material along the North Fork of the New River. The dredging was contracted for $54.30 and $52.00 per cubic yard for the sites, respectively.

According to Addendum No. 2, the Contractor based his bid on the return process water from the dredging and dewatering operations to the river after DNRP (Division of Natural Resource Protection) approval. However, DNRP did not approve returning the water to the river and the excess water was pumped to a nearby sanitary sewer for treatment. DNRP required samples from three locations testing for turbidity, total suspended solids, settleable solids, nutrients, and total and dissolved metals. Documents from DNRP specifically citing the reason(s) for this decision were not included in the package, but may prove useful when performing other dredging operations.

Laboratory data made available was collected prior to site work and added to Addendum No. 2. Sediment characteristics were provided from the 1994 study, An Evaluation of the Sediments in the North Fork of the New River. Data encompassed physical characteristics, toxicity characteristic leaching procedure (TCLP), total solids, volatile solids, particle size distribution (PSD), metals and total recoverable petroleum hydrocarbons (TRPH). Metals and herbicides data from the City of Fort Lauderdale Public Services Environmental Laboratory report dated August 24, 1994 for Argyle Canal were also provided in Addendum No. 2. All information used for bidding purposes showed that the sediments were within regulatory limits. During the dredging process air quality samples were taken based on citizen odor complaints. Evans Environmental and Geological Science and Management, Inc. collected samples between July 22 and July 25, 1997 testing for total dust, total volatile organic compounds (VOC), hydrogen sulfide, and total mercaptans. The final conclusion was that no significant or measurable air quality impact was caused by the river sediment treatment process. The sediment treatment process used during the dredging was not clearly defined in the report, but may be useful when developing City standards for dredging.

2.2.12 Problem Area Identification

In December of 2007, CDM requested an updated list of complaints including events of 2007 summer/wet season, complaint logs and known flooding problem areas, documents for the high water elevations if available, and City-identified serious problem areas (flooding homes, buildings, and evacuation routes). The following sections detail the data received from the City and subsequent processing methodologies. For the purposes of this study, a property was considered a serious flooding problem if a complaint was made to the City or if a claim was made with the federal government.

2.2.12.1 City Stormwater Citizen Complaints

Citizens have access to a 24-hour phone system to report flooding complaints within the City, and with every call the Maintenance Division responds by sending maintenance personnel to each location and enters all information into the City's HANSEN database. The City provided CDM with data from the HANSEN database between the dates of August 1999 and December 2007. The data included the service number, complaint date, street address or cross roads location, inspector comments, and either the designation SSC or SSCNO. SSC designations indicate that a stormwater control structure was present at the location, and SSCNO indicates that there was no stormwater control structure at the time of the complaint.

The data were converted using GIS geoprocessing to create the spatial distribution of customer complaints shown in **Figure 2-14**. The locations were verified through address geocoding to determine the percentage of agreement with existing street addresses. Any data with less than a one hundred percent agreement were verified by the City and the process was repeated. Locations provided as cross roads were assigned an address of a property located at the intersection.

2.2.12.2 Federal Emergency Management Agency Severe Repetitive Loss Claims

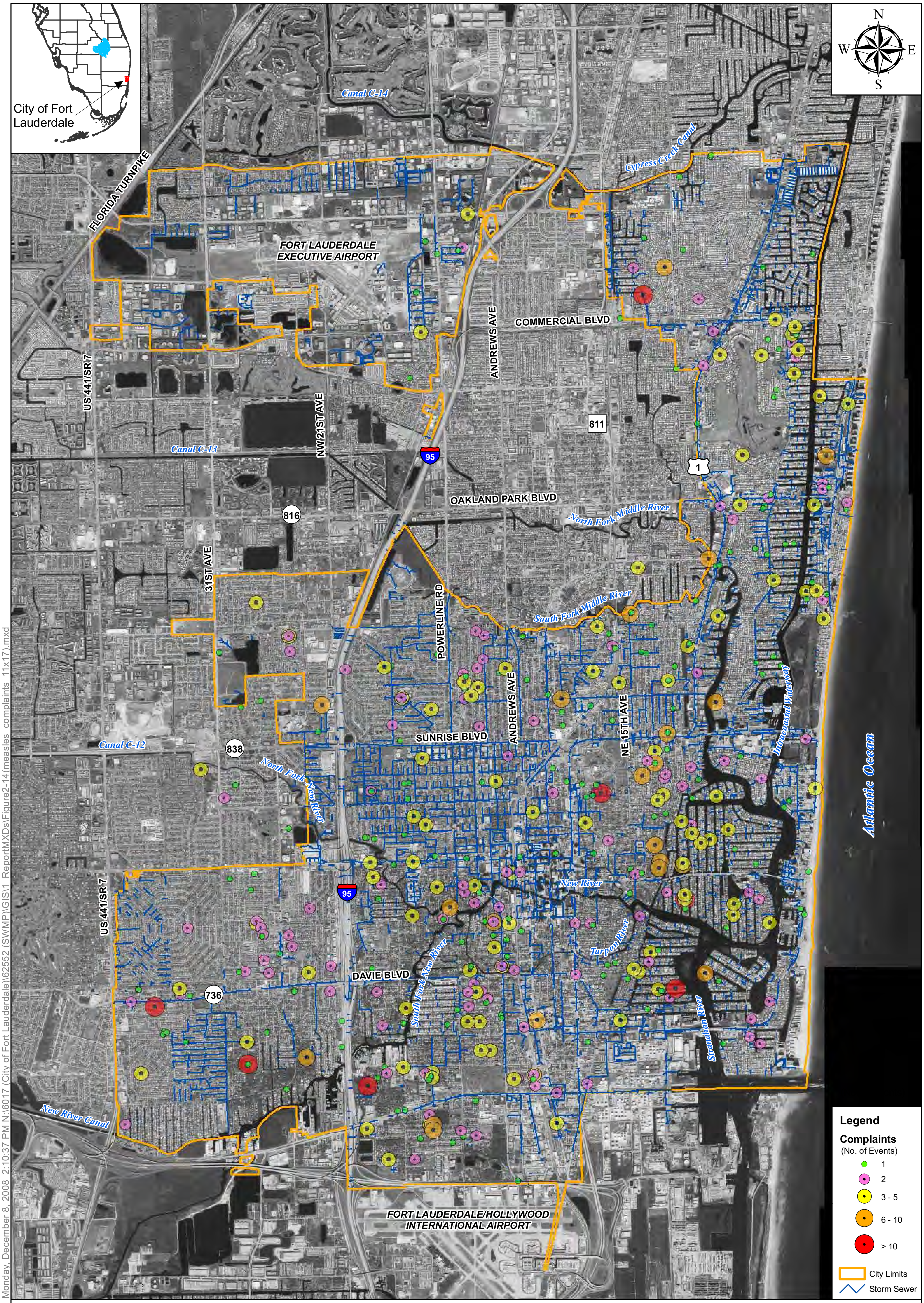
The Federal Emergency Management Agency's (FEMA) Severe Repetitive Loss Program provides funds to reduce or eliminate the long-term risk of flood damage to severe repetitive loss (SRL) structures insured under the National Flood Insurance Program (NFIP). A SRL property is defined as a residential property that is covered under an NFIP flood insurance policy and:

- has at least four NFIP claim payments over $5,000 each, with a cumulative amount of such payments exceeding $20,000; or

- has at least two separate claims payments with the cumulative amount of such building payments exceeding the market value of the building.

For both requirements, at least two of the referenced claims must have occurred within any ten-year period, and must be greater than 10 days apart.

Data for SRL properties within the City were provided with claims ranging from April 1979 to July 2007. Other information included the address, whether or not the property was insured, amount paid for damages, occupancy status (i.e. single family home), flood zone, and property value. The data were converted using GIS geoprocessing to create the regional map on **Figure 2-15**.



Monday, December 8, 2008 2:10:37 PM N:\6017 (City of Fort Lauderdale)\62552 (SWMP)\GIS\1 Report\MXDs\Figure2-14(measles complaints 11x17).mxd

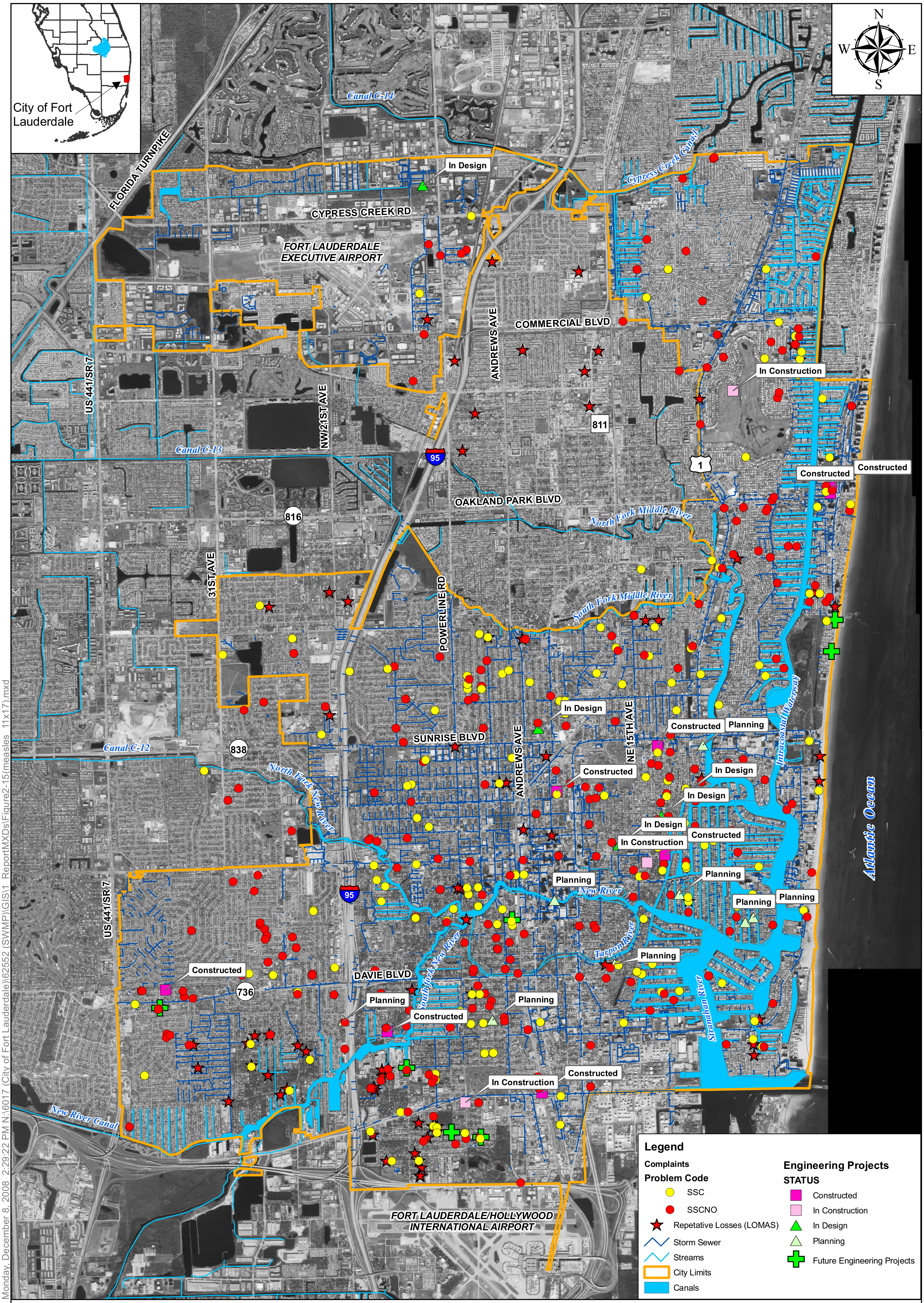
Source: City of Fort Lauderdale

CDM

City of Fort Lauderdale
100 North Andrews Avenue
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 2-14
City-Wide Stormwater Master Plan
Customer Complaints
Events Per Address

UPDATED
12-08-08



Note: SSC - complaint about existing storm drain; needs to be cleaned or not working as designed
SSCNO - flooding complaint where caller states there are no storm drains in the area

Source: City of Fort Lauderdale

CDM

City of Fort Lauderdale
100 North Andrews Avenue
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 2-15
City-Wide Stormwater Master Plan
Customer Complaints and Engineering
Project Locations

UPDATED
12-08-08

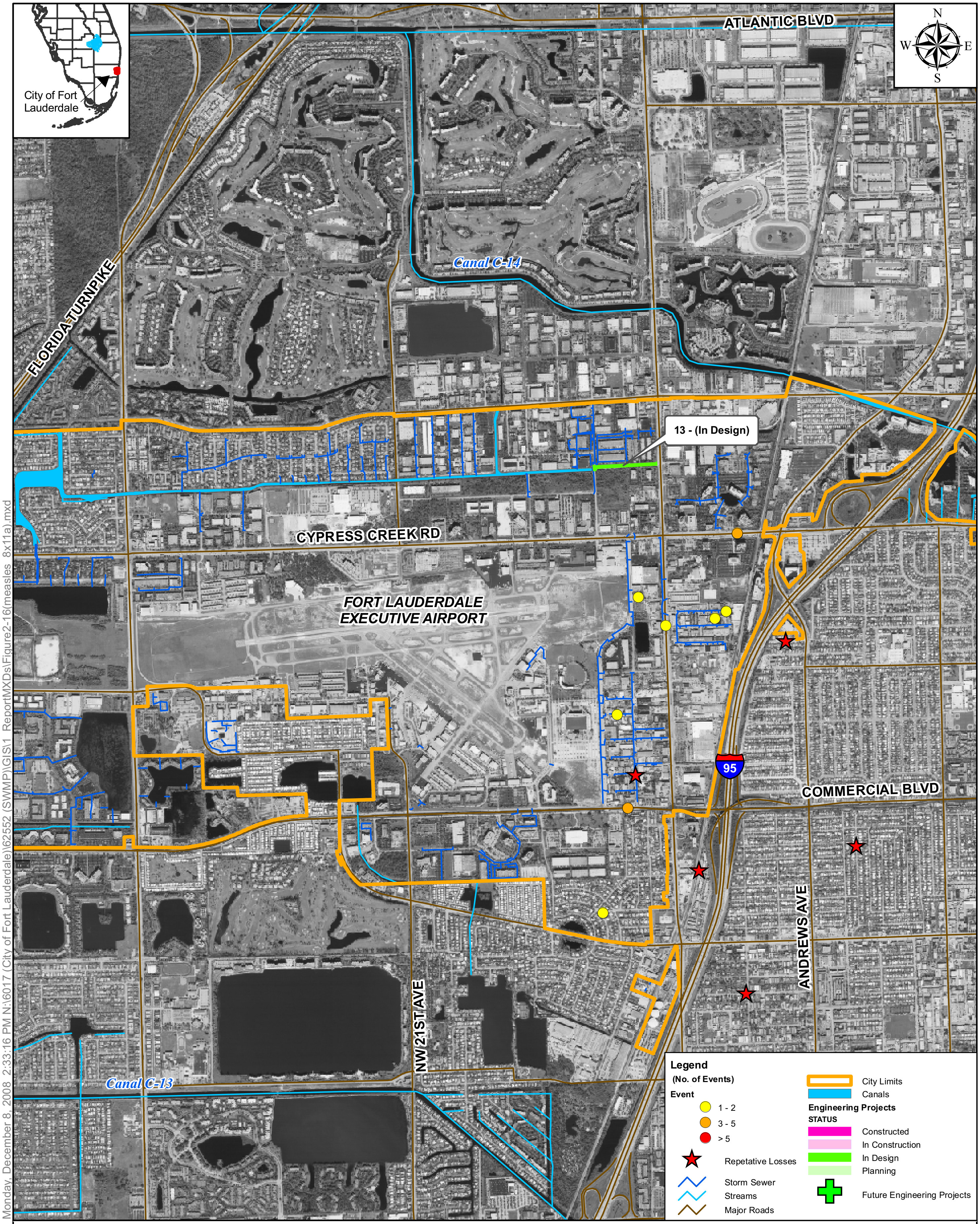
2.2.12.3 City Stormwater Engineering Projects

The Public Works Engineering Division is responsible for identifying, designing and constructing stormwater projects within the City. A meeting was held with a representative from the division to identify projects that were constructed since FY 2004-2005, currently in construction or design, and in the initial planning phase. The location and extent of these projects was discussed in depth, including the type of stormwater structures in each project. A list of these projects in included in **Table 2-10** below. Also identified in this meeting were potential future engineering projects. Design plans for the recently constructed projects were provided on a later date. The data gathered from the meeting and the design drawings were uploaded into GIS and added to the regional map in Figure 2-15. The local spatial layouts presented in **Figure 2-16** through **Figure 2-19** were used to identify stormwater problem areas within the City.

Ultimately, the problem areas were identified based on the frequency and concentration of SLRs, citizen complaints, and engineering projects to define areas of further study using the local and regional stormwater models.

Table 2-10. City Stormwater Engineering Projects.

Project No.	Project Location	Status
N/A	NE 26 Ave & Middle River Dr	Completed in FY04-05
N/A	Intersection of Victoria Pk Rd & Broward Blvd	Completed in FY04-05
11046Z	NE 32 St and NE 33 St alley	Completed in FY05-06
11046X	Oakland Park Blvd & NE 32 St alley	Completed in FY05
11046R	NE 17 Ave, from US1 to NE 9 St	Completed in FY05
11046Q	NE 4 Ave, from NE 6 St to NE 7 St	Completed in FY05
11046J	SW 12 Ct, from SW 36 Ave to SW 35 Ave	Completed in FY05
11046G	SW 2 Ave, from SW 23 Ave to SW 22 Ave	Completed in FY05
11046H	1613 SW 17 Ave cul de sac	Completed in FY05
11046A5	SW 9 Ave, S of SR 84	In Construction
11046A2	NE 23 Ave, cul de sac S of NE 44 St	In Construction
11046A4	Broward Blvd and SE 1 St	In Construction
11046A9	NW 65 St, from NW 9 Ave to NW 12 Ave	In Design
11046A7	NE 2 St, from NE 11 Ave to NE 13 Ave (alley)	In Design
11046A1	NE 11 St, from Andrews Ave to NE 4 St	In Design
11046A6	NE 19 Ave & 6 Ct to NE 18 Ave & 7 St	In Design
11046A3	NE 17 Ave, from NE 4 Ct to NE 6 St	In Design
10427	N New River Between US1 and Andrews Ave	In Planning
11046A10	Intersection of NE 16 St & NE 33 Ave, W of A1A	In Planning
11046A8	Intersection of SW 6 St & SW 3 Ave	In Planning
N/A	SW 6 Ave, from Davie Blvd to SW 20 St	In Planning
N/A	Riviera Isle Dr, S of Solar Plaza Dr to end	In Planning
N/A	Solar Plaza Dr & Flamingo Dr, from Riviera Isle Dr to end	In Planning
N/A	Bontona Ave, from Las Olas Blvd to end	In Planning
N/A	SE 11 St (at Hector Park)	In Planning
N/A	SW 21 Ave at SW 15 St, cul de sac to cul de sac	In Planning
N/A	NE 20 Ave, S of Sunrise Blvd to NE 7 St (tide valves)	In Planning
N/A	SW 13 Ct, W of SW 36 Ave	In Planning
N/A	SW 15 Ave, S of SW 20 St	In Planning
N/A	Intersection of SW 8 Ave & SW 30 St	In Planning
N/A	SW 29 St, E of SW 12 Ave to SW 9 Ave	In Planning
N/A	NE 18 St, W of A1A	In Planning



Monday, December 8, 2008 2:33:16 PM N:\6017 (City of Fort Lauderdale)\62552 (SWMP)\GIS\1 ReportMXDs\Figure2-16(measles 8x11a).mxd

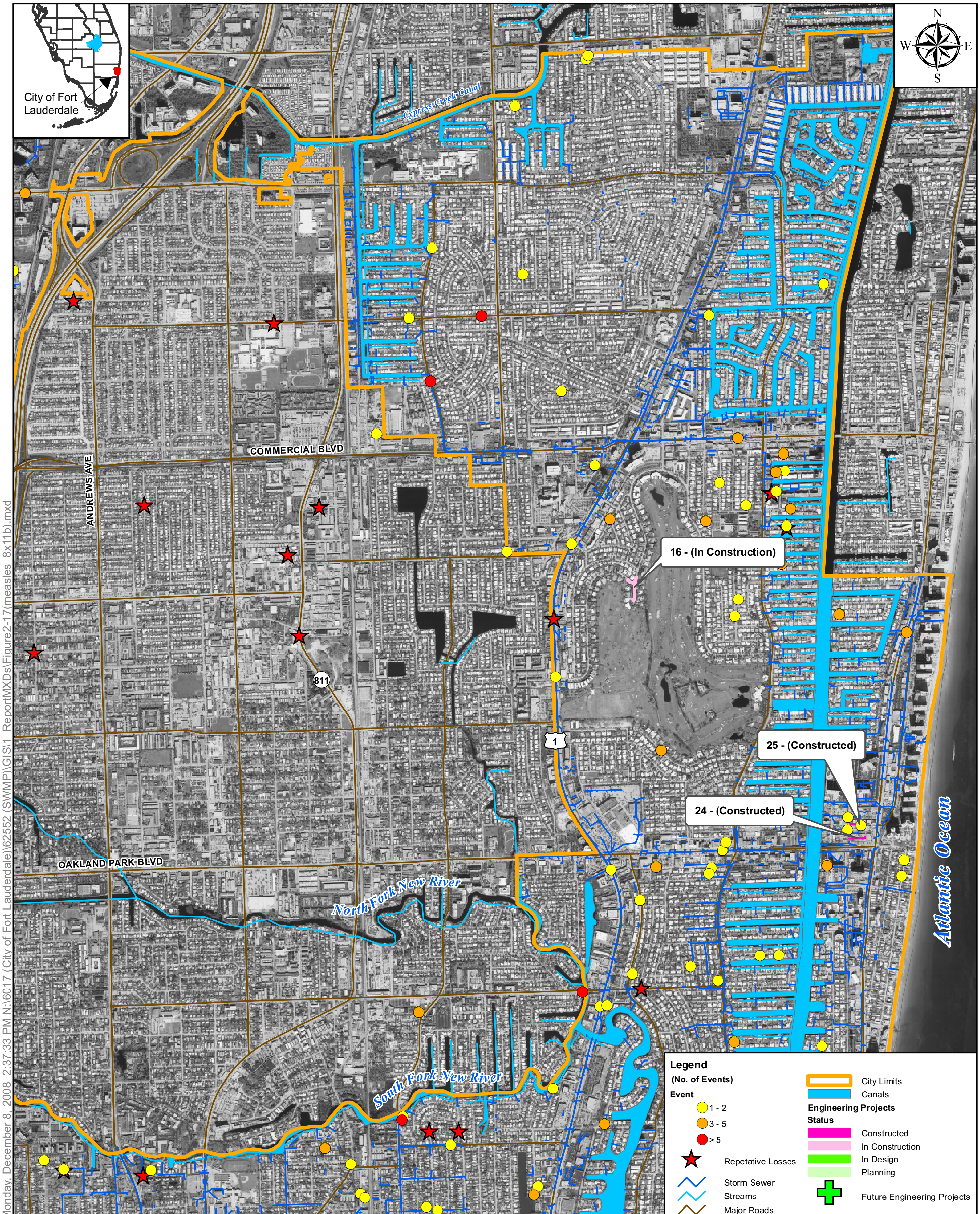
Source: City of Fort Lauderdale

CDM

City of Fort Lauderdale
100 North Andrews Avenue
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 2-16
City-Wide Stormwater Master Plan
Customer Complaints and Engineering
Project Locations - NW

UPDATED
12-08-08



Monday, December 8, 2008 2:37:33 PM N:\6017 (City of Fort Lauderdale)\62552 (SWMP)\GIS\1_ReportMXDs\Figure2-17(measles_8x11b).mxd

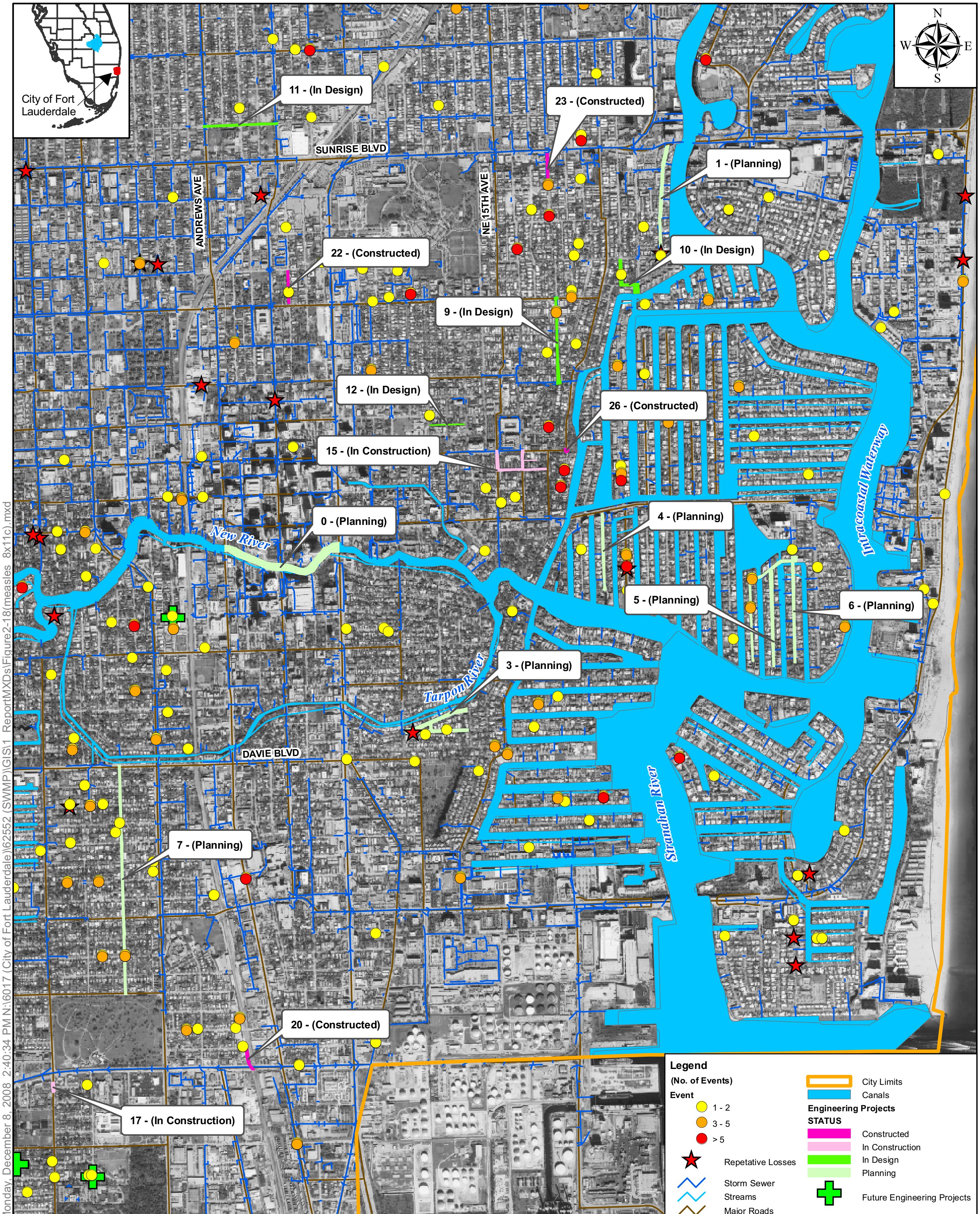
Source: City of Fort Lauderdale

CDM

City of Fort Lauderdale
100 North Andrews Avenue
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 2-17
City-Wide Stormwater Master Plan
Customer Complaints and Engineering
Project Locations - NE

UPDATED
12-08-08



Source: City of Fort Lauderdale

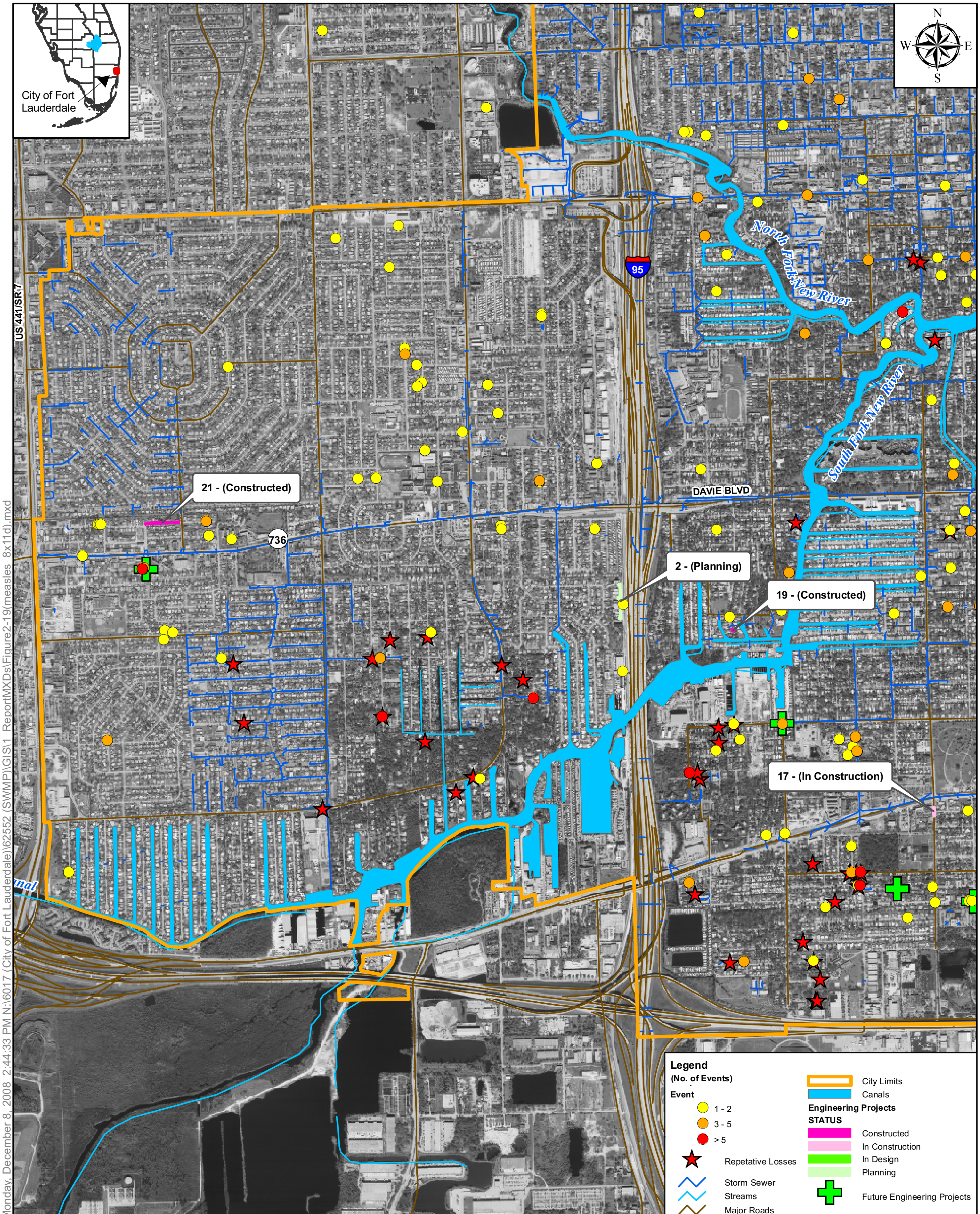
CDM

City of Fort Lauderdale
200 North Andrews Avenue
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 2-18

City-Wide Stormwater Master Plan
Citizen Complaints and Engineering
Project Locations - SE

UPDATED
12-08-08



Monday, December 8, 2008 2:44:33 PM N:\6017 (City of Fort Lauderdale)\62552 (SWMP)\GIS\1_ReportMXDs\Figure2-19(measles_8x11d).mxd

Source: City of Fort Lauderdale

CDM

City of Fort Lauderdale
100 North Andrews Avenue
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 2-19

City-Wide Stormwater Master Plan
Customer Complaints and Engineering
Project Locations - SW

UPDATED
12-08-08

Section 3
City-wide Regional Surface Water Quantity Evaluation

3.1 Overview

The City of Fort Lauderdale has contracted CDM to prepare a City-wide Stormwater Master Plan (SWMP). As part of this plan, surface water hydrologic and hydraulic modeling has been performed using U.S. Environmental Protection Agency (USEPA) Stormwater Management Model (SWMM) to estimate flooding and Levels of Service (LOS) in the City. The surface water quantity modeling has been divided into three main sections:

- City-wide regional modeling including model set-up, calibration, and design storm modeling;
- Regional alternative evaluations and recommendations; and
- Four (4) neighborhood models including model set-up and design storm modeling.

The surface water quality evaluations discussed in Section 4 were conducted utilizing a separate model, the Watershed Management Model (WMM) developed by CDM.

3.2 Background

The City of Fort Lauderdale is a nearly completely built-out urban area, with relatively low-lying topography that is intersected by numerous canals and rivers. The subtropical climate with high intensity rainfalls, relatively flat topography, limited soil storage (due to the topography and a water table near land surface), high amount of impervious , or paved, area, and limited available storage all contribute to severe flooding potential. As part of the SWMP, a regional hydrologic surface water model will be used:

- to locate, verify, and prioritize flooding problem areas within the City;
- to aid in the development of flood control LOS for the City;
- as boundary conditions for future local models; and
- in the alternative improvement evaluations.

This section details the methods used to establish data for and to perform the stormwater management evaluations. The USEPA SWMM Version 5.0.013 was used to simulate the surface water hydrology and hydraulics of the City-wide regional watershed.

3.3 Project Location

The boundaries of the regional model were developed based on the City limits, the locations of South Florida Water Management District (SFWMD) salinity control structures, and general topography. The model limits are approximately along Atlantic Boulevard to the north, along the Florida Turnpike to the northwest and then along US 441 for the remaining western border. In the southwest corner, the model boundary extends west for approximately two miles to the SFWMD G-54 control structure. The southern boundary follows the City limits, generally near I-595, except in the southwest corner where the boundary extends approximately one mile to the Dania Cutoff Canal. The eastern boundary follows the City limits. The watershed is over 40,000 acres (63 square miles) and is bounded by the Intracoastal Waterway at the downstream side, control structures G-57 and S-37B to the north and northwest, control structures S-36, S-33, and G-54 to the west, and a channel to the Dania Cutoff Canal to the south (see **Figure 3-1**).

The model contains four major watersheds served by rivers and canals including the:

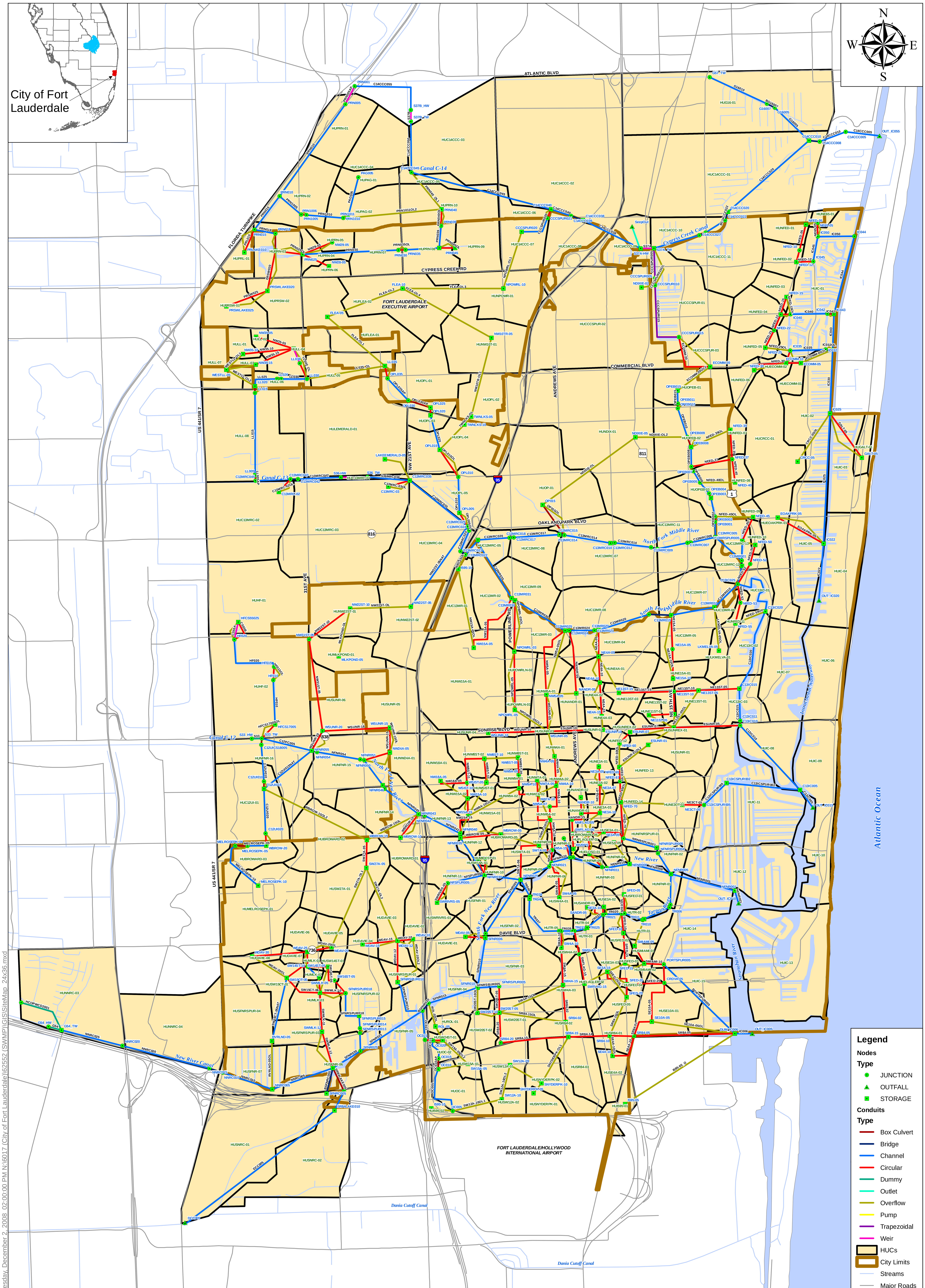
- Cypress Creek Canal (C-14);
- Middle River and Middle River Canal (C-13);
- North Fork of the New River (becomes the C-12 Canal); and
- New River and South Fork of the New River, which become the New River Canal.

Due to the locations of the salinity control structures, the Cypress Creek Watershed was divided into two Basins, Cypress Creek and West Cypress Creek Basins for model calibration purposes. For the remaining three watersheds, the calibration basins consist of the watershed areas downstream of the control structures, resulting in a total of five calibration basins (see Section 3.7).

3.4 Model Selection

SWMM is a dynamic hydrologic and hydraulic model capable of performing continuous or event simulations of surface runoff and groundwater baseflow, and subsequent hydraulic conveyance in open channel and pipe systems.

The hydrologic system operates by applying precipitation across Hydrologic Units (HUs), and then through overland flow and infiltration conveying surface runoff and groundwater baseflow to loading points on the user-defined stormwater management system. Runoff and baseflow hydrographs for these loading points provide input for hydraulic routing in downstream reaches.



Source: City of Fort Lauderdale

Note: Areas outside the City Limits that are included in the model hydraulically influence the City Stormwater System

Feet

0 2,000 4,000 8,000

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 3-1

City-Wide Stormwater Master Plan
Site Map and Model Schematic

UPDATED
12-02-08

The hydraulic flow routing routine of SWMM uses a link-node representation of the stormwater management system to dynamically route flows by continuously solving the complete one-dimensional Saint-Venant flow equations. The dynamic flow routing allows for representation of channel storage, branched or looped networks, backwater effects, free surface flow, pressure flow, entrance and exit losses, weirs, orifices, pumping facilities, rating curves, and other special structures/links. Control rules may be used to operate the structures based on timing and/or stage and flow conditions within the model.

3.5 Model Set-up

The hydrologic and hydraulic model parameters used for the model simulations are described herein. **Appendix 3A** provides the resultant hydrologic model data by HU. **Appendix 3B** provides the hydraulic model data by link and by node.

This stormwater model was built using elevations referencing the National Geodetic Vertical Datum of 1929 (NGVD). Most of the input data including the City survey were in this datum. Where necessary, historical or topographic data were converted from the North American Vertical Datum of 1988 (NAVD) to NGVD using a constant offset of +1.58 ft (NGVD = NAVD + 1.58') from the U.S. Army Corps of Engineers (USACE). The offset between datums does not vary appreciably over the project area.

3.6 Data Evaluation

CDM collected data from a variety of sources as described Section 2. The procedures used to implement this data in the construction of the model are described below.

3.6.1 Model Hydrologic Data

The City provided extensive survey for the project area, which was used in conjunction with the Light Detection and Ranging (LiDAR) data of Broward County to develop a digital elevation map (DEM) of the area, a topographic surface in three dimensions. The accuracy of the LiDAR elevations is less than that of the survey data; however, the relative change in elevation between LiDAR grid points is useful. Also, the LiDAR provides complete coverage of the City, whereas the survey provides only partial coverage and is not useful by itself for preparing a DEM. In order to align the two data sets as closely as possible, the LiDAR elevations were adjusted based on deltas between the LiDAR and survey where both were taken in the same location. For the local models discussed in Section 7, the survey data and the LiDAR were merged such that the LiDAR was used to fill in the project areas where there was no survey. For the regional model, the adjusted LiDAR grid was used to create the DEM.

3.6.1.1 Topographic Data

Topographic data was used to define hydrologic boundaries, overland flow slopes, out-of-bank channel cross-sections, critical flood elevations, and stage-area-storage relationships. The topographic data was derived based on the DEM described above.

3.6.1.2 Rainfall Data

Historic Rainfall Data (Calibration Rainfall)

CDM calibrated the regional model to one historic storm event, Hurricane Irene, which occurred on October 15, 1999. This high intensity event was recorded at 15-minute intervals at all the rain gauges inside or adjacent to the City, for a map and description of the rain gauges, see Section 2.The event was also recorded by telemetered staff gauges at the salinity structures within or at the boundary of the City, allowing for calibration based on recorded stages and the resultant flow estimates that were supplied by the SFWMD. See Section 2 for a detailed description of the collected data and the algorithm used by the SFWMD to estimate flows. The gauges used in the calibration of the regional model are listed in **Table 3-1** below. The recorded rainfall volumes listed in Table 3-1 are over the simulation period from October 10, 1999 to October 21, 1999. The bulk of the rainfall occurred over a two-day period from the 14th through the 15th.

Table 3-1. Calibration Rainfall Volumes

Rain Gauge	Rainfall Volume (in)
G54-R	12.9
S13-R	12.1
S33-R	10.4
S36-R	9.1
S37A-R	13.9

Thiessen polygons were created to distribute the rainfall over the City. Thiessen polygons are polygons whose boundaries define the area of influence based on relative distance to one gauge in a set of gauges. The polygons are created by drawing lines between all gauges, then making perpendicular bisectors of the lines to create the polygons. Therefore, each HU receives the input time series from the rain gauge that is closest to the HU centroid. The gauge data was similar enough to not warrant combining two or more gauges if the HU fell into two or more of the polygons, especially given the resolution of the regional model in terms of other model parameters.

Gauge S37B-R, located adjacent to the City, was not used because the measured volume was significantly lower (6.5 inches) than the other 5 gauges and the area of influence would have been rather small given the gauge's proximity to S37A-R.

Design Storm Rainfall Data

The design storm rainfall volumes for the predictive simulations, or events were taken from the SFWMD Permit Information Manual, Volume 4 for the 100-year, 72-hour design storm; the 25-year, 72-hour design storm; the 10-year, 24-hour design storm; the 5-year, 24-hour design storm; and the 2-year, 24-hour design storm. The standard SFWMD design storm distributions were used for the 72-hour and 24-hour periods.

According to the maps in the Permit Information Manual, rainfall over the City varies spatially for the major storms, with higher volumes to the north. CDM divided the HUs into north, central, and southern blocks for the 100-year, 72-hour storm based on the volume contours, and into north and south blocks for the 25-year, 72-hour and 10-year, 24-hour storms. The rainfall volumes did not vary appreciably across the study area for the 5- and 2-year, 24-hours storms, as shown below in **Table 3-2**.

Table 3-2. Rainfall Volumes in Inches for Production Simulations

Storms	North Model	Central Model	South Model
2-year, 24-hour	5.0	5.0	5.0
5-year, 24-hour	7.5	7.5	7.5
10-year, 24-hour	9.0	9.0	8.5
25-year, 72-hour	15.0	15.0	14.5
100-year, 72-hour	20.0	19.0	18.0

3.6.1.3 Hydrologic Units

The regional model watersheds were sub-divided into 255 hydrologically distinct subbasins defined as HUs as shown in Figure 3-1. The divisions were based on a combination of topographic information, stormwater pipes and catchments, and aerial photogrammetry. The hydrologic parameters assigned to each HU include area, width, slope, Directly Connected Impervious Areas (DCIA), roughness, initial abstraction, infiltration, and groundwater parameters. Infiltration, groundwater, and DCIA are described in the following sub-sections.

HU width was computed by dividing the HU area by a representative flow path length. This length was found by averaging three likely flow paths within a given HU, and HU slope was found from averaging the slopes along each of these paths.

The City-provided GIS layer of stormwater pipes was filtered to indicate which pipes were 36-inch diameter and greater. One of the model objectives was to include stormwater lines of this size and greater in the model. In order to not have "dry" pipes in the model, surface runoff from a HU must flow to the upstream end of each of these lines. Since each HU may only load to a single junction, each stormwater line of 36-inch diameter and larger had a designated HU loading runoff to the upstream end.

Due to the relatively flat nature of the topography, HU divides are often overtopped during high intensity events, requiring interconnecting links representing the topography of the divide, such as a road crown profile.

3.6.1.4 Soil Parameters

The infiltration database was developed using Horton soil parameters. Soil mapping with data obtained electronically from the NRCS was developed for this project as described in Section 2. The majority of the soils in the City are classified as dual class B/D soils. This indicates limited infiltration capacity unless subsurface conditions are improved for drainage. For stormwater modeling purposes, the dual class B/D soils were modeled as D soils, as were the areas left "blank" in the database. This was done to conservatively minimize soil storage and because the dual class soils are likely to behave as D soils in urban areas unless there is a ditch or canal intersecting the upper layers of the soil. In Section 2, Figure 2-5 shows the soil distribution based on the hydrologic soil group classification and Table 2-4 provides the area percentage of each hydrologic soil group present in the City.

The composite soil make-up was then used to determine weighted Horton soil characteristics including maximum and minimum infiltration rates, and soil storage. Soil storage varies depending on antecedent moisture conditions (AMCs). This model uses average antecedent moisture conditions (AMCII), which may be defined as the soil condition when the previous 5-day rainfall volume totals between 1.4 and 2.1 inches. This corresponds well with the measured rainfall prior to the calibration storm, Hurricane Irene, and is typical of design storm simulations. **Table 3-3** below displays the soil parameters by soil type (hydrologic group) for the dry and wet conditions.

Table 3-3. Global Soil Parameters

Soil Type	Max Inf Rate (in/hr)	Min Inf Rate (in/hr)	Decay Rate (1/sec x 10^{-4})	Dry Time (days)	Soil Storage (in)
A	12.0	1.0	5.56	1.0	6.75
B	9.0	0.50	5.56	1.0	5.0
C	6.0	0.25	5.56	1.0	3.8
D	4.0	0.10	5.56	1.0	1.4

The percent by area of each soil type within a HU is combined with the global parameters to calculate each HU's specific infiltration parameters.

3.6.1.5 Groundwater Parameters

SWMM has the capability of simulating the subsurface movement of the infiltrated volume into river and canal reaches (or any model node) as baseflow using the groundwater routines. For design storm simulations, normally the local groundwater baseflow is insignificant in comparison to the surface runoff, whereas regional groundwater flows can be significant (*CDM, Stormwater Master Plan for the C-100 Basin, Prepared for Miami-Dade County DERM, 2004*). The groundwater parameters were estimated from previous modeling experience and as expected, local HU baseflows were negligible for the design storm simulations within the model boundaries.

Regional groundwater flows were identified to be significant and were addressed in the model. There is a regional groundwater gradient in Broward County from the west (the Everglades and Water Conservation Areas) to the east (the Atlantic Ocean). After high intensity storms such as Hurricane Irene and the simulated design storms, this gradient increases and significant baseflow occurs in the surficial aquifer. Since the major rivers and canals in the area intersect the surficial aquifer, some of this baseflow is transferred into the surface water system. The boundary conditions for this model will be discussed in greater detail in Section 3.6.3, but for calibration one of the boundary conditions utilized is the measured inflows at the salinity control structures (inflows are calculated based on other measured data, see Section 2). The model would not calibrate well in any of the major canals to the receding limb of the storm using only these inflows. This is because the inflows may not account for the baseflow entering the canals downstream of the structures, the peak of which can occur days after the peak of the storm.

As discussed, this behavior is not unique to Broward County. CDM, as well as other consultants, found similar issues in the master planning for Miami-Dade County. During analysis of the C-100 Basin in Miami-Dade County, CDM found that there was more flow out of the S-123 salinity structure (at the outfall to Biscayne Bay) than there was rainfall on the basin during Hurricane Irene (as well as other storms). There are several ways of modeling this regional groundwater component. CDM has found that a good approximation is to use the SWMM groundwater routines to estimate the baseflow from areas that are outside the model and then direct that baseflow to nodes in the canals. Essentially, large HUs are placed outside the model boundary with parameters similar to those within the model. The surface runoff from these large areas is directed to a node that does not connect to the main model (a "dummy" outfall), while the baseflow that is generated is directed to nodes in the canals within the model.

The SWMM groundwater routine is a generic equation that may, with the right set of coefficients and exponents, be converted into a physically based routine. However, there is not enough known data outside the model boundaries to make that a reasonable option. Therefore, the method used was one in which the parameters became part of the calibration process such that they helped shape the receding limb of the flows and stages in the canals.

3.6.1.6 Directly Connected Impervious Area

The DCIA represents impervious areas for which there is no infiltration and where all precipitation runs off to the primary water management system. Land use data are used to estimate imperviousness, runoff, and pollutant load potential in stormwater evaluations. For this project, the land uses were grouped into nine categories of relatively homogeneous geophysical parameters. Present land uses within the watershed include:

- open or vacant lots/ parks;
- agriculture/ golf course;
- low density residential;

- medium density residential;
- high density residential;
- light industrial and commercial;
- heavy industrial/ transportation;
- wetlands; and
- waterbodies and watercourses.

The impervious areas, overland Manning's roughness (n), and initial abstraction (IA) (depression ponding depth) for each hydrologic unit were calculated in GIS using percentages of homogenous, or nearly homogenous, land use obtained from the City and the SFWMD (see Section 2), then applied guideline parameter percentages. These guideline percentages are based on Natural Resources Conservation Service (NRCS) methodology and CDM experience. For DCIA, the guideline percentages were confirmed within the project area using aerial photography and measuring approximate impervious area for each land use type over several representative areas. **Table 3-4** lists land use types and the corresponding hydrologic parameters.

For this report, the land uses supplied by the SFWMD for the year 2004 represents present land use. Due to the built-out condition of the model area, future land use would not be sufficiently different to provide significant changes in the surface water modeling. For the future land use conditions used in the water quality models, see Sections 2 and 4.

The hydrologic model parameters were determined for each HU by weighted averaging of the global values by percentage of land use category using GIS and spreadsheets.

Table 3-4. Hydrologic Parameters by Land Use

Land Use Category	Open, Park	Agr. & Golf Courses	Low Density Res.	Medium Density Res.	High Density Res.	Light Ind. & Com.	Heavy Ind.	Wetland	Water
% Impervious	5.0	5.0	15.0	35.0	82.5	90.0	90.0	100.0	100.0
% DCIA	1.0	1.0	7.5	23.0	65.0	81.0	81.0	100.0	100.0
Impervious n	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.1	0.024
Pervious n	0.400	0.300	0.250	0.250	0.25	0.250	0.25	N/A	N/A
Impervious IA (inches)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.50	0.10
Pervious IA (inches)	0.25	0.25	0.25	0.25	0.25	0.25	0.25	N/A	N/A

3.6.2 Hydraulic Model

The SWMM hydrologic/hydraulic model uses a node/link representation of the primary stormwater management system (PSMS). The PSMS is comprised of major canals and rivers, lakes, bridges, culverts and pipes greater then 36-inches in diameter for this model. Nodes are located at:

- The ends of culverts;
- Points along the rivers and canals where the geometry, direction, and/or slope of the channel varies significantly;
- Canal intersections;
- Structures along rivers and canals including pump stations, weirs and orifices;
- The end of stormwater pipes which are 36 inches in diameter or greater. Secondary systems of lesser diameter are coupled with surface runoff in the hydrologic model;
- Locations where the stormwater pipes change diameter (not all changes in diameter result in model nodes, some are aggregated into equivalent systems); and
- Points representing the HU low elevations.

The regional model contains 371 nodes, 214 of which are storage nodes, and 545 links, as shown on Figure 3-1.

3.6.2.1 Cross Sections

Cross section information was obtained from the Draft MIKE SHE/11 model of Broward County, recently updated for the ongoing Broward County Integrated Water Resources Management Master Plan and from data received from the City on the North Fork New River, pre-dredging survey (see Section 2 for more information and a map of cross-section locations). It should be noted that in implementing the cross-sections from the Broward County model, many of the sections had identical stations and elevations; therefore, the number of actual surveyed locations is much less than the number depicted in Figure 2-11.

The cross-sections (transects) from the Broward County model ended near the edge of water providing mainly bathymetry. The elevations are incomplete for open channel and floodplain evaluations. Therefore, it was necessary to combine the cross-sections obtained from the data compilation with over-bank (floodplain) profiles constructed from the topographic map. The two cross-sections were spliced together to form a transect that has sufficient depth to convey the 100-year design storm. Nearly all the river and canal reaches in the model have transects that have been spliced together from the collected data and GIS profiles.

3.6.2.2 Stage-Area Relationships

Stage-storage area relationships are necessary in relatively flat models where flood waters may overflow the channel banks and fill low-lying areas. An accounting of the volume of these areas is needed for both accurate flood elevation predictions as well as peak flow estimates.

However, it is also important to not "double-count" storage in the hydraulic models in order to provide an accurate estimate of peak flood elevations. In cases where the surveyed transect for a river or canal reach has been extended to account for portions of the floodplain, there is often significant storage then contained in the model link. An equivalent amount of storage is thus removed from the stage-area relationship in the adjacent storage junctions to compensate for this.

Stage-storage area relationships were computed for each HU using the combined topography from the surveys with ESRI ArcGIS and 3D Analyst. The plan areas for stages at 0.5 foot intervals of depth above node invert were calculated from the surface as appropriate. Not all HUs have related storage junctions as some HUs have no storage beyond that which is represented in the model links.

3.6.2.3 Culverts and Pipes

The City provided CDM with a GIS layer of storm drains as discussed in Section 2. This data was filtered for pipes 36 inches in diameter and greater and these storm lines were added to the model as previously discussed. There were a number of pipe sections with missing diameters. If such a section was between two other lines with known diameters, it was added to the model with an estimated diameter. For example, if the diameter field yielded -99 for a pipe section between a 36-inch diameter pipe and a 48-inch diameter pipe, the diameter was set to 42 inches as an estimate.

Most of the data were missing pipe invert elevations. Since this model was built to analyze high intensity design storms, it is likely that these pipes will be fully submerged during the time periods of interest. Therefore, estimated pipe inverts should produce similar model results as the actual inverts. Many of the pipe inverts were simply set to zero in the model; however, if this did not allow for ample cover from the top of the pipe to land surface, the inverts were lowered. There was also an effort made to gently slope the inverts toward the outfalls.

For this type of planning model, the pipes are evaluated in a clean condition; therefore, all reinforced concrete pipes were set to a Manning's roughness value of 0.015 unless the pipe was known to be a corrugated metal pipe (CMP), then the roughness was set to 0.024. The pipe lengths were determined using GIS. Entrance losses were set to 0.25 unless there were special circumstances. Exit losses ranged from 0.25 for straight sections of pipe to 1.0 for outfalls to lakes, ponds, or the Intracoastal Waterway.

For culverts under roadways along ditches and smaller canals, data was collected from the Draft MIKE SHE/11 model of Broward County, recently updated for the ongoing Broward County Integrated Water Resources Management Master Plan, and from site visits. For the most part, size of the culverts were found from these sources, whiles culvert inverts were estimated based on engineering judgment. The culvert lengths were determined using GIS.

In SWMM, culverts may be lengthened to ensure computational stability where necessary. The Manning's roughness coefficient (n) would then be altered for these lengthened culverts to account for the extra length. SWMM will automatically do this computation if certain controls are set, or SWMM will lower the time step accordingly to ensure stability in all conduit links. In the regional model, it was desirable to keep a relatively large time step because of the model's size. For the culverts that were artificially lengthened storage was removed from an adjacent node to compensate for the added volume. For smaller culverts, this step is not necessary because the added volume is minimal compared to the system, and SWMM makes this calculation internally.

3.6.2.4 Hydraulic Overland Flow

The overland flow link is a natural cross-section which is a profile representative of the topographic ridge along the boundary between the two HUs. The length of these channels is relatively short, typically 200 feet, while the widths are often quite large (on the order of hundreds to thousands of feet). The links act similar to a weir, which only begins to flow when the ponding on either side of the link reaches the height of the topographic ridge boundary. During high intensity events, surface ponding is prevalent and transfer will occur from one HU to another. It is desirable to keep these lengths relatively short (to approximate a weir), but some length is needed for computational stability.

Road overflows, as parallel conduits to culverts and bridges, are modeled with these types of links as well to simulate over-topping the road.

3.6.2.5 Bridges

A bridge presents a unique form of irregular cross-section because the flow may change from free-surface to a closed conduit if the stage rises above the lower chord elevation (bottom of the bridge). A custom conduit may be used in SWMM to convert an irregular channel cross-section to a symmetric closed conduit (by calculating outside of the model the width versus depth profile up to the lower chord). The custom conduit then behaves as any other closed conduit.

Typically, bridges are relatively short compared to the cross-sectional area and therefore may cause computational stability issues in the model or require very short time steps if left at their actual lengths. In order to not add excessive volume to the model (by letting SWMM lengthen these conduits internally), the bridge links are artificially lengthened, the Manning's roughness values are adjusted to compensate for the lengthening, and equivalent lengths of channel are subtracted from adjacent links to maintain volumetric continuity.

3.6.2.6 Control Structures

Initially during the calibration period, the salinity control structures were not added to the model. The recorded stages and estimated flows obtained from the SFWMD were instead used as boundary conditions and calibration points. After the first stage of calibration, Control Structures S37A, S37B, and S36 were added to the model as weirs. These control structures are multiple bay sluice gates that open from the bottom; however, during design storms (and for most of the calibration period), the gates are open and the structures behave as weirs. The weir lengths are found from the combined widths of the gates and the weir height is found from the maximum gate opening. At the peak of the storms, the stage may exceed the height of the weir, at this time the weir behaves as an orifice. The weir crest is set at the bottom invert of the gate. The size and inverts of the control structures were obtained from the SFWMD website, http://www.sfwmd.gov.

After these weirs were added to the model, the model was re-calibrated. Control Structures G54, G57, and S33 were not added to the model as weirs because they are located at the model boundary (see Section 3.6.3 for more discussion on boundary conditions).

3.6.3 Boundary Conditions

The model area is bounded by the Intracoastal Waterway and the Atlantic Ocean to the east, by Salinity Control Structures G57 and S37B to the north, by Salinity Control Structures S36, S33, and G54 to the west, and by a ditch to the Dania Cutoff Canal to the south.

Topographically, the boundary on the western side of the model (the Florida Turnpike and US 441) is considered as a no surface water flow (runoff) boundary, because any surface water inflow would be minimal compared to the flows through the salinity control structures (which are often very large inflows from west of the City). The same reasoning applies to the southern boundary created by SR 84 and I-595. However, there is not a well defined topographic boundary to the north. The boundary has been set based on approximate tributary areas to the C14 (Cypress Creek) and the G16 Canals. Fortunately, this boundary is well north of the City limits and the calibration of the C14 Canal at S37A is accurate, confirming the estimate of this boundary.

The regional model has two classifications of boundary conditions; calibration and production (design storm simulations). Within each classification, there are two types of boundary conditions; stage history (such as at an outfall), and flow history (inflows upstream of the control structures).

3.6.3.1 Calibration Boundary Conditions

Stage History Boundary Conditions

As discussed in Section 2, there were no recent tidal measurements in the Port Everglades Turning Basin (near the mouth of the New River), nor anywhere within 30 miles of the project site. The closest recorded tidal gauge was the NOAA gauge on Virginia Key in Miami-Dade County. However, there were tidal predictions of diurnal highs and lows at Port Everglades based on stage and timing offsets applied to the Virginia Key predictions. CDM used multiple months' worth of this data to relate the Virginia Key gauge to water levels at the Intracoastal Waterway near the south end of the project area. The measured Virginia Key gauge data was manipulated in range, translated in stage and in time to match the Port Everglades Turning Basin daily data. The same corrections were then applied to the measured Virginia Key gauge data (taken at 6-minute intervals) from the calibration period. This estimated stage history was used as a time series boundary condition for the outfalls at the southern end of the model.

At the northern end of the model, for the C14 (Cypress Creek) Canal's outfall to the Intracoastal, the tailwater at the G57 salinity structure was used to estimate the outfall time series. This gauge is over one mile inland from the mouth of the Cypress Creek Canal, up the G16 Canal which is approximately 100-ft wide and 15-ft deep. The gauge data was not used directly as the outfall time series, as there are losses along the canal, and therefore the outfall stage would be too high. Instead, the losses were estimated in a spreadsheet based on measured flows at the structure, and subtracted from the G57 time series. The adjusted time series was then set at the outfall and the model was run for the calibration period. The measured and simulated stages at the tailwater of G57 were then compared to test if the predicted losses matched the simulated losses. The estimate was then modified and the process repeated for several iterations until an acceptable match was obtained.

It should be noted that this method does not produce a unique answer. If the estimates of losses along the G-16 Canal are skewed, the estimate of the stage history of the Intracoastal Waterway would therefore be off. However, the model calibrates well with the tailwater gauge of the S37A structure, and the tributary area relying on this boundary condition for proper calibration is rather small. Most of the model areas in the north-central and northwest portions of the model are calibrated to the headwater stage at the S37A structure, which is measured data.

The stage history boundary conditions include:

- South Intracoastal Waterway – measured at 6-minute intervals and estimated from Virginia Key Tidal Gauge as described above;
- North Intracoastal Waterway – measured at 15- minute intervals and estimated from G57 Tailwater Gauge as described above;
- S37A Headwater Gauge – measured at 15-minute intervals;

- S36 Headwater Gauge – measured at 15-minute intervals; and
- S13 Tailwater Gauge – measured at 15-minute intervals in the Dania Cutoff Canal.

Flow History Boundary Conditions

The City of Fort Lauderdale receives significant inflows from western Broward County through the salinity control structures during high intensity storms. These flows must be accounted for in the model. As noted in Section 2, the SFWMD estimates flows based on other parameters measured at the structures including stages and gate openings. Although not direct measurements, the estimates have been verified and are considered reliable for this effort. The estimated flows are added to the model as time series inflows to the boundary nodes at Structures G57, S37A, S37B, S36, S33, and G54. Additionally, there is a small inflow just downstream of the G54 salinity structure in the Halloway Canal. This time series was found using the Draft MIKE SHE/11 model of Broward County, recently updated for the ongoing Broward County Integrated Water Resources Management Master Plan.

3.6.3.2 Design Storm Boundary Conditions

Stage History Boundary Conditions

For the design storms, the outfall boundary condition was estimated to be fixed at 2.5 ft NGVD. This was the one-year stillwater boundary condition estimated by CDM for past City and County projects. The one-year stillwater was determined based on estimates of the 100 and 500-year stillwater elevations taken from the FEMA FIS (1997). These were compared to the mean sea level (MSL) at Port Everglades Turning Basin obtained from the National Oceanographic and Atmospheric Administration (NOAA). A regression analysis was then performed based on the 500-year, the 100-year, and MSL to estimate the 1-year stillwater elevation. For design storm simulations the S37A and S36 stage based boundary condition has been removed and the two structures have been added as weirs in the model as described in the previous section.

The stage history boundary conditions in the Dania Cutoff Canal may not be reliably estimated for the design storm simulations, which would potentially cause unknown boundary conditions along the southern border of the model. However, flows in the channel connecting the model to this boundary condition were not significantly high during the peak of the storm during calibration. Additional calibration simulations were performed with a no flow boundary (as opposed to a stage history boundary) at the node connecting to the Dania Cutoff Canal and the calibration results were not significantly changed. Therefore, this stage history boundary condition has been removed from the model for the design storm simulations.

Flow History Boundary Conditions

One of the challenges of this modeling effort was in estimating the flows that would occur upstream of the project area for the various design storms. These inflows were measured at the salinity control structures for the calibration storm, and therefore were flow history boundary conditions. The Draft MIKE SHE/11 model of Broward

County had significant discrepancies with the estimated flows at the salinity control structures during the calibration period that limited its usefulness. Instead, the flows from upstream of the City (west) were estimated using equivalent HUs.

It was determined that these inflows must be related to rainfall volumes, and that they should reasonably match peak flows and receding limbs of the calibration event. Although spreadsheets could be used to relate flows to rainfall and a set of inflow time series could be produced for each structure, this method proved to be cumbersome. A simplified approach was utilized in which an equivalent HU upstream of each structure was created. The HU area and other hydrologic parameters were then modified until the surface runoff combined with the baseflow produced flows similar to the historical flows at each structure. In this manner, the HUs may be added to the model, and flows automatically vary with precipitation event.

The regional model was checked against the calibration event after these changes to the flow boundary conditions were made, and Structures S37A, S37B, and S36 were added to the model. Except for the time period prior to the onset of the storm where the gate condition varied (the three structures are modeled as wide open, actual gate openings were smaller until just prior to the storm), the model remained calibrated. For design storms, the peak of the storm is closer to the beginning of the simulation at which time it is expected that the structures would be fully open.

After calibration, the flow history of Osceola Creek was added to the model. Osceola Creek takes inflow from Fort Lauderdale-Hollywood International Airport (FLL) at the southern end. CDM has previously developed a SWMM model of FLL for the Broward County Aviation Department (BCAD). This model was run for the various design storms to provide the inflow time series.

The peak inflow in Osceola Creek for the 100-year, 72-hour storm is estimated to be 40 cfs. This relatively small addition of tributary flow does not change the calibration of the South Fork of the New River (of which Osceola Creek is a tributary). Therefore, the calibration has not been modified. It does however, change stages and flows in the Edgewood neighborhood of Fort Lauderdale, and therefore was added to the design storm simulations.

3.7 Model Calibration

Calibration refers to the process where model parameters are adjusted so that the outputs (flows and stages during a rainfall event) reasonably match observed or measured values. As discussed, CDM calibrated the regional model to one high intensity event, Hurricane Irene, which occurred on October 15th, 1999. One storm was chosen based on the Scope of Services and with consideration of the availability of data (historic flow, rainfall and/or gate operation).

The model was run for several days prior to the onset of the storm to establish the antecedent moisture conditions, then three days to encompass the storm event and an additional five days to simulate the receding stormwater levels.

In the City, rainfall from Hurricane Irene began late in the day on October 13, 1999, although the peak of the storm did not occur until the afternoon of the 15th. The model simulation ran from October 10, 1999 through October 21, 1999.

Rainfall varied over most of the project area, from approximately 9 inches at Structure S-36 to 13 inches at Structure S37A over the model simulation time period.

Due to the locations of the salinity structures and the relative independence of the major canals and rivers, the calibration was divided into five sections:

1. Cypress Creek Basin: This basin in the northeast corner of the project area is located along the C-14 (Cypress Creek) Canal, downstream of Structure S37A.

2. West Cypress (C-14) Basin. This basin in the northwest corner of the project area is located along the C-14 (Cypress Creek) Canal, between Structures S37A and S37B.

3. Middle River Basin: This basin in the center of the model, outside City limits. The basin includes the C-13 Middle River Canal and the Middle River downstream of Structure S36 to the Intracoastal Waterway.

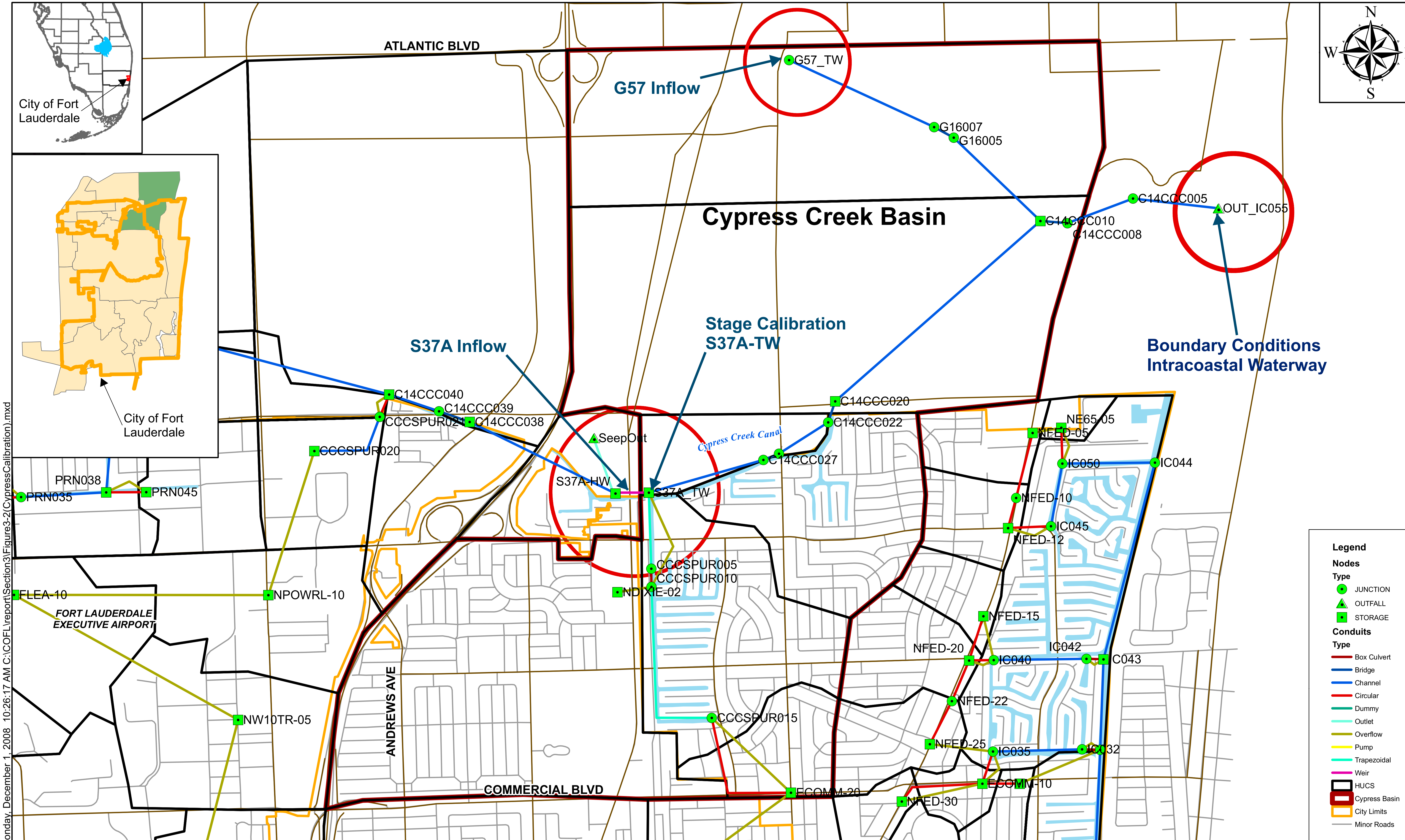
4. North Fork New River Basin: This basin, located in the west central part of the study area includes the C-12 Canal and the North Fork of the New River. This basin and the following basin both are influenced by the New River Basin which is downstream between the outfall at the Port Everglades Turning Basin and the confluence of the North and South Forks of the New River.

5. South Fork New River Basin: This basin, located in the southwest part of the study area includes the New River Canal and the South Fork of the New River. This basin and the previous basin both are influenced by the New River Basin which is downstream between the outfall at the Port Everglades Turning Basin and the confluence of the North and South Forks of the New River.

These five basins do not cover the entire model. Most notably, the eastern portion of the model along the Intracoastal Waterway, including Fort Lauderdale Beach and the area west of Structure S36, are not included. For these areas there are downstream boundary conditions, but no source of stage information to calibrate the model.

3.7.1 Cypress Creek Basin

Figure 3-2 displays the extent of this basin in the northeast corner of the study area between Structures S37A and G57 and the Intracoastal Waterway. The boundary conditions for this portion of the model are the Intracoastal stage estimation (see Section 3.6.3) at the outfall of Cypress Creek and inflow time series at Structures G57 and S37A. The calibration point is the measured tailwater at Structure S37A.



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CDM

Source: City of Fort Lauderdale

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100 North Andrews Ave
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Figure 3-2
City-Wide Stormwater Master Plan
Cypress Creek Basin
Calibration

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The major calibration parameter in this basin was Manning's roughness in the center channel of Cypress Creek. Other calibration parameters included HU width, slope and DCIA; although it was determined that DCIA should remain at the values estimated from land use.

The model was not as sensitive to soil parameters including the available soil storage because the soil storage is on the order of 1 to 2 inches and the rainfall volumes ranged from 9 to 14 inches. Additionally, the rising water table effectively cuts off soil storage near the peak of the storm. Since there is little remaining soil storage at the onset of the storm, much of the precipitation becomes surface runoff. Changes may be made to the shape of this hydrograph using other calibration parameters including HU width and slope, but the volume of inflows to the system is generally set. The stage-storage is measured and should not be a calibration parameter, which leaves roughness and base flow as the major calibration parameters.

Figure 3-3 displays the calibration results of this basin as compared to the tailwater gauge at Structure S37A. Because the boundary condition is so close to this gauge, and the majority of the inflows are set, the calibration of this small basin relied on properly modeling the canal reaches and bridges. This calibration shows a very accurate match between observed and modeled stages.

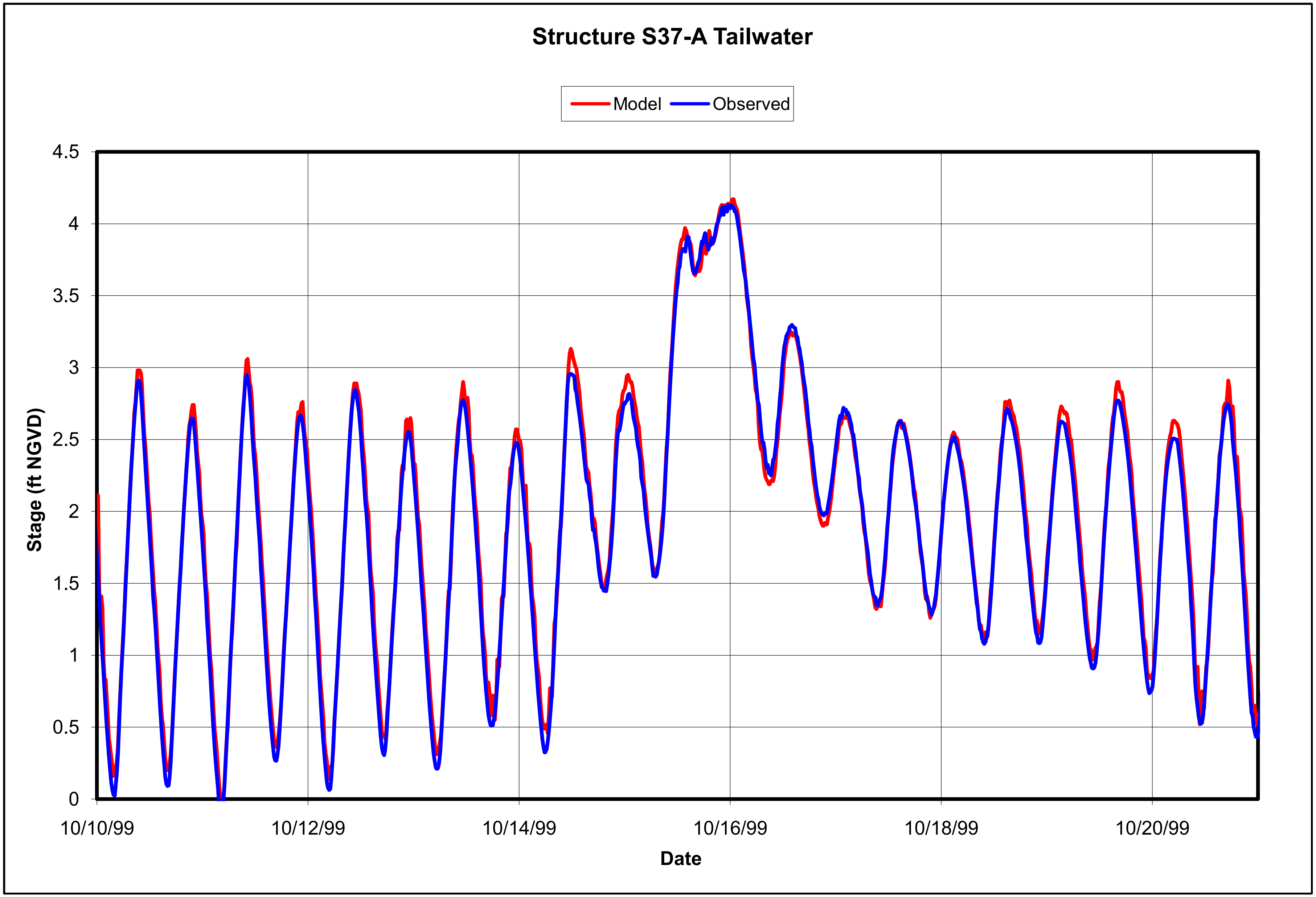
3.7.2 West Cypress Basin

Figure 3-4 displays the extents of this basin in the northwest corner of the project area between Structures S37A and S37B. The boundary conditions for this portion of the model are the measured tailwater at Structure S37A and the inflow time series at Structure S37B. The calibration point is the measured tailwater at Structure S37B.

The major calibration parameter in this basin was Manning's roughness in the center channel of Cypress Creek. Other calibration parameters included HU width, slope and DCIA; although it was determined that DCIA should remain at the values estimated from land use. Other parameters that were tested include the groundwater variables of porosity and hydraulic conductivity as well as the groundwater coefficients. The estimates of the regional baseflow (see Section 3.6.1.5) were also varied as a calibration parameter.

Figure 3-5 displays the calibration of this basin compared to the tailwater gauge at Structure S37B. This calibration also shows a very tight match between observed and modeled stages, especially at the peak of the storm. Again, the boundary condition is relatively close to the calibration point. Additionally, simulating the receding limb to match the observed data required calibrating the regional baseflow as described previously. Calibrating the canal reaches and bridges (achieved by primarily manipulating roughness) was the key to providing the accurate representation.

Figure 3-3. Cypress Creek Basin Calibration



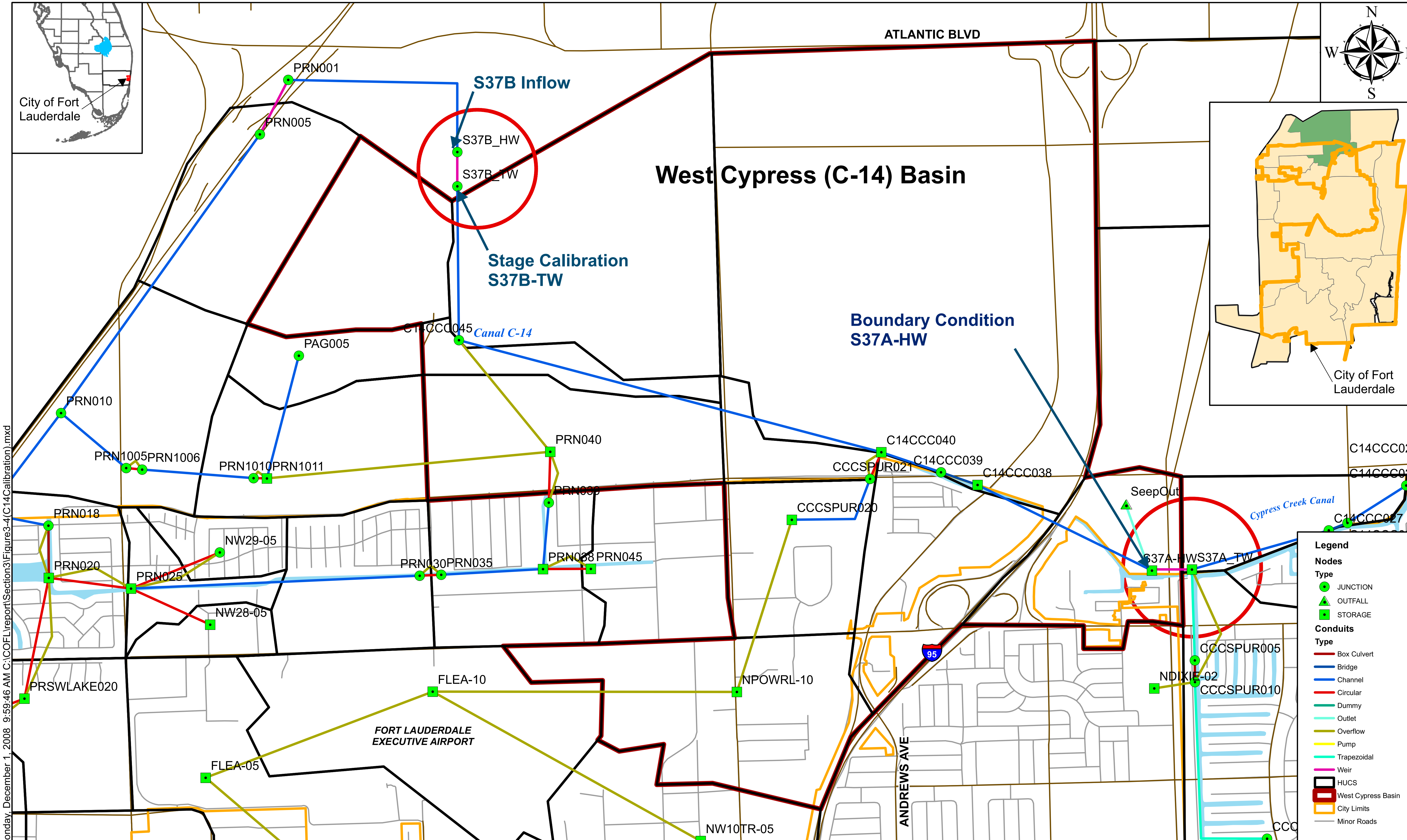


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Figure 3-4
City-Wide Stormwater Master Plan
West Cypress (C-14) Basin
Calibration

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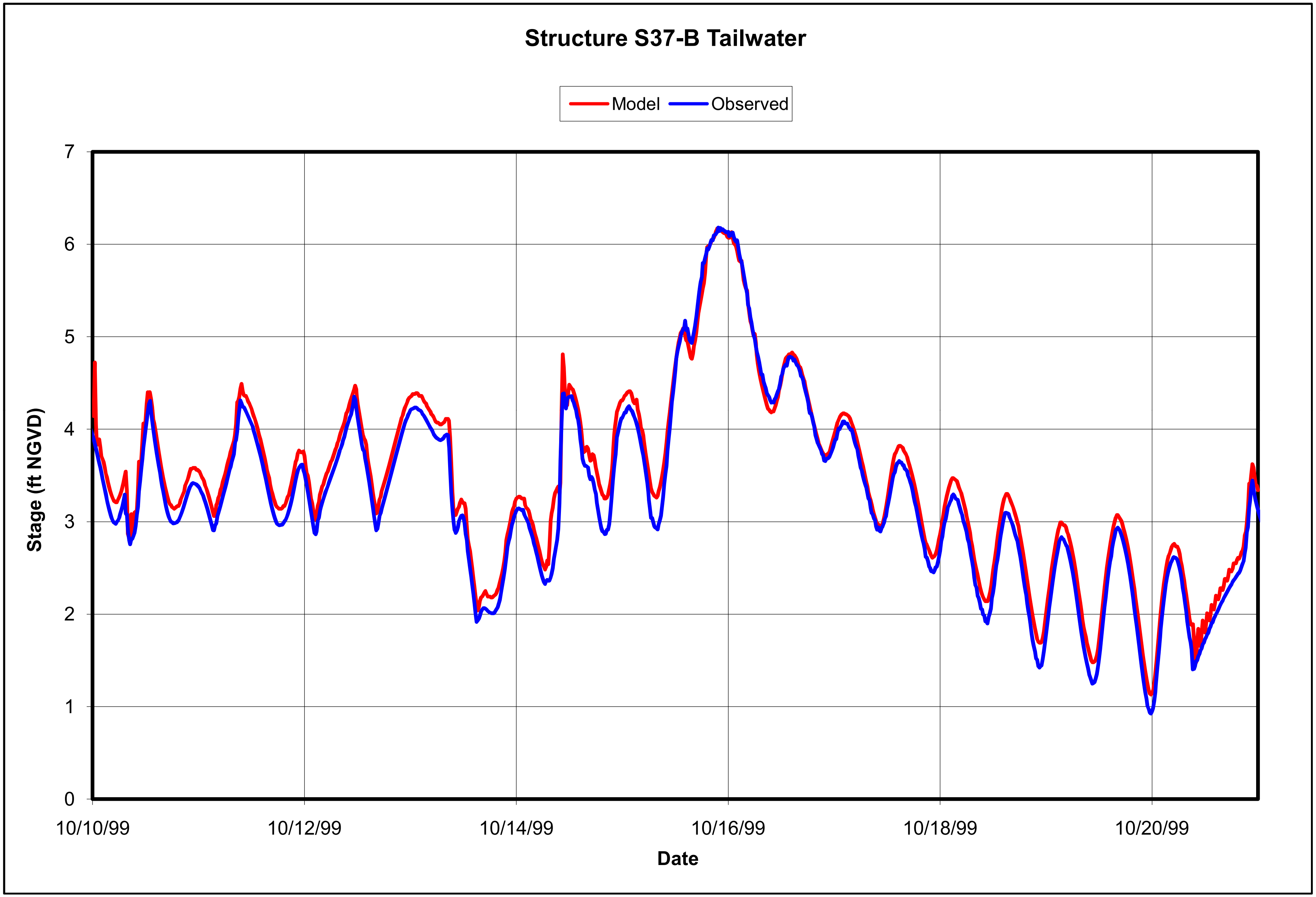
Figure 3-5. West Cypress (C-14) Basin Calibration



3.7.3 Middle River Basin

Figure 3-6 displays the extents of this basin in the north-central to central area of the project area between Structure S36 and the Intracoastal Waterway along the Middle River and Middle River Canal (C-13). The boundary conditions for this portion of the model are the Intracoastal stage estimation (see Section 3.6.3) at the outfall of the Middle River in the Intracoastal Waterway and inflow time series at Structure S36. The calibration point is the measured tailwater at Structure S36.

The major calibration parameter in this basin was Manning's roughness in the center channel of the Middle River and the Middle River Canal. Other calibration parameters included HU width and slope. The estimates of the regional baseflow (see Section 3.6.1.5) were also varied as calibration parameters, mainly by varying the porosity, hydraulic conductivity, and groundwater coefficients.

Figure 3-7 displays the calibration of this basin compared to the tailwater gauge at Structure S36B. This calibration shows a tight match between observed and modeled stages. Although the simulated peak stage at this location is very close to the observed value, the model lags the observed peak in time. For this regional model, considering its purpose, matching the peak stage is the primary goal, with matching the receding limb being a secondary goal (to predict duration of flooding throughout the study area). Matching the timing is a tertiary goal and this lag is likely due to the uncertainty in the boundary condition (although there may be other explanations).

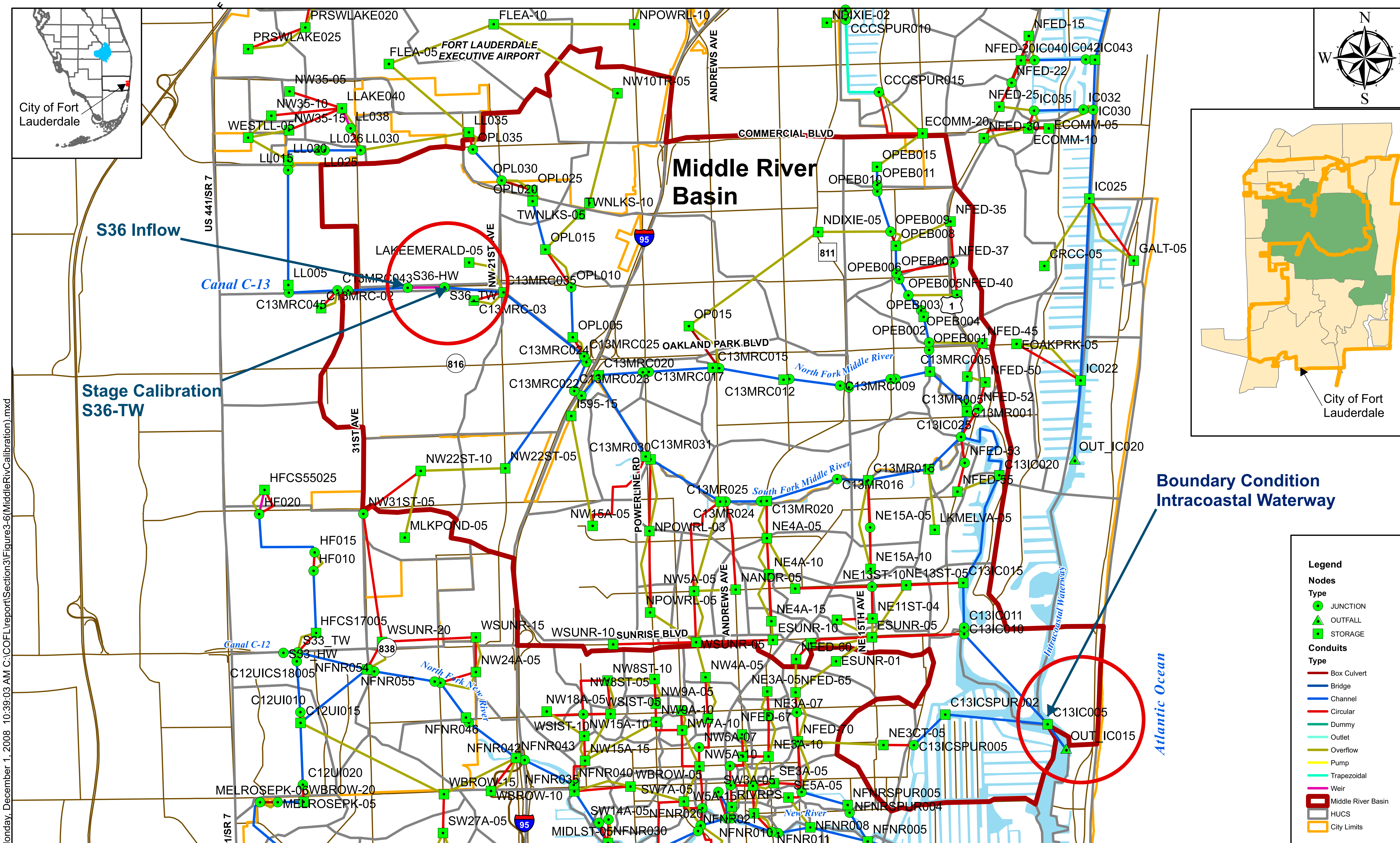
3.7.4 North Fork New River Basin

Figure 3-8 displays the extents of this basin in the west central part of the project area between Structure S33 and the confluence of the North and South Forks of the New River along the C-12 Canal and the North Fork of the New River. This calibration shares the New River Basin with the South Fork New River Basin (Section 3.7.5). The New River Basin contains the New River from the confluence of the two forks to the mouth at the Port Everglades Turning Basin.

The boundary conditions for this portion of the model are the Intracoastal Waterway stage estimation (see Section 3.6.3) at the Port Everglades Turning Basin and inflow time series at Structure S33. The calibration point is the measured tailwater at Structure S33.

The major calibration parameter in this basin was Manning's roughness in the center channel of the New River and the North Fork of the New River.

Figure 3-9 displays the calibration of this basin compared to the tailwater gauge at Structure S33. This calibration shows a fairly tight match between observed and modeled stages. In this case, the modeled stage is approximately 0.1 ft lower than the observed stage (and again there is a lag). This difference is within accepted tolerance for a planning level model.



Source: City of Fort Lauderdale

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CDM

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Figure 3-6
City-Wide Stormwater Master Plan
Middle River Basin
Calibration

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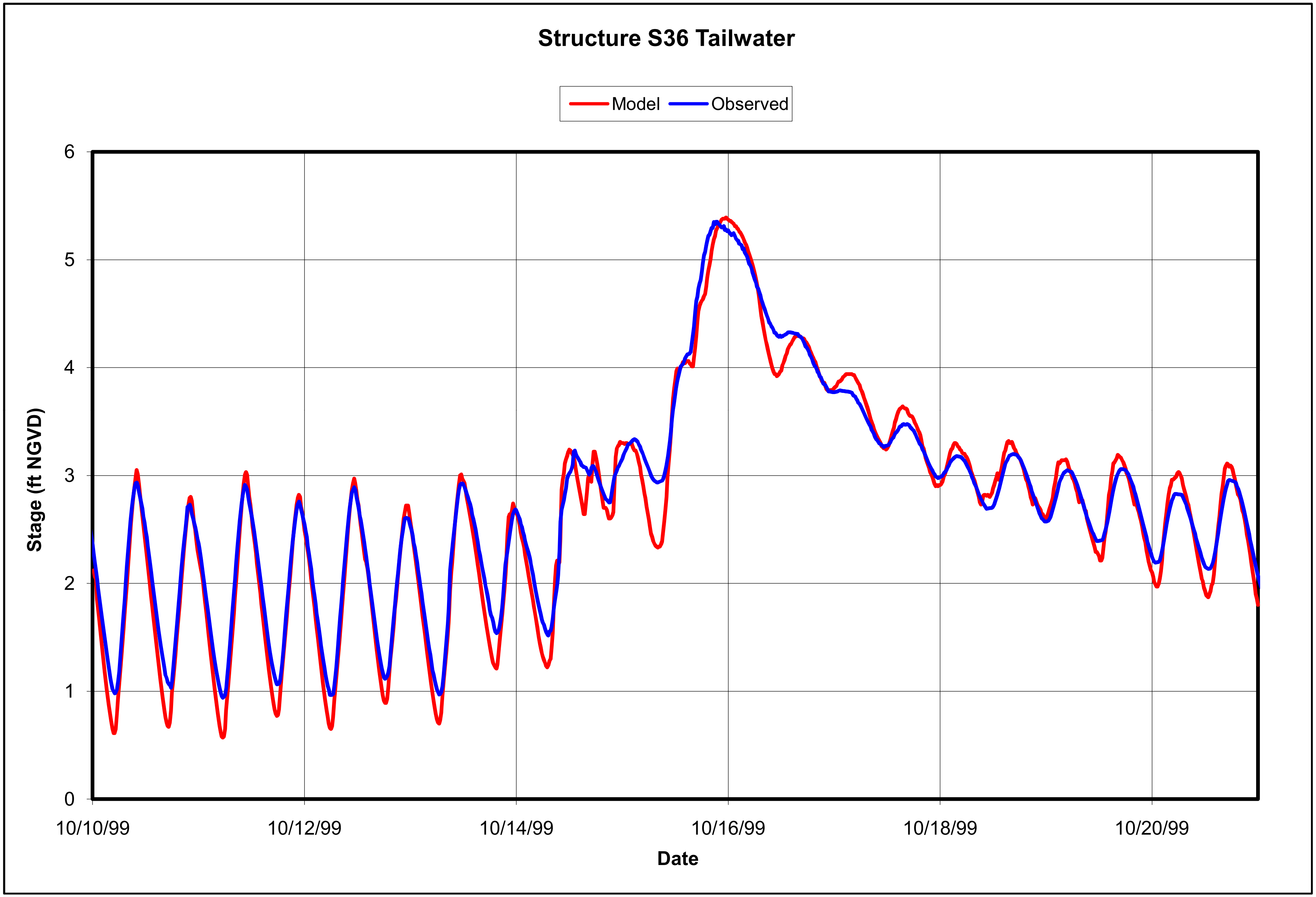
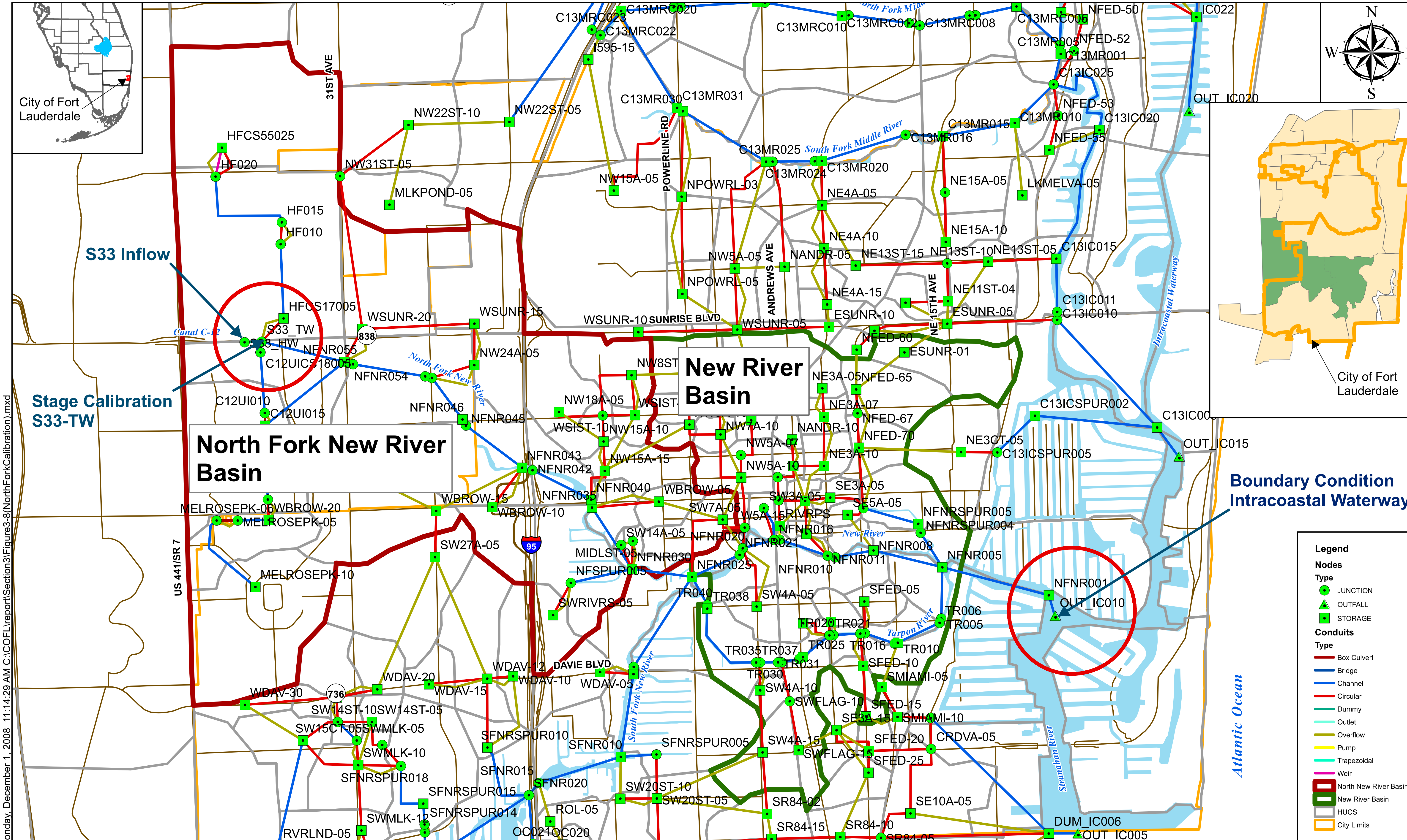
12-01-08

Figure 3-7. Middle River Basin Calibration





Source: City of Fort Lauderdale

CDM

0 2,000 4,000 8,000 Feet

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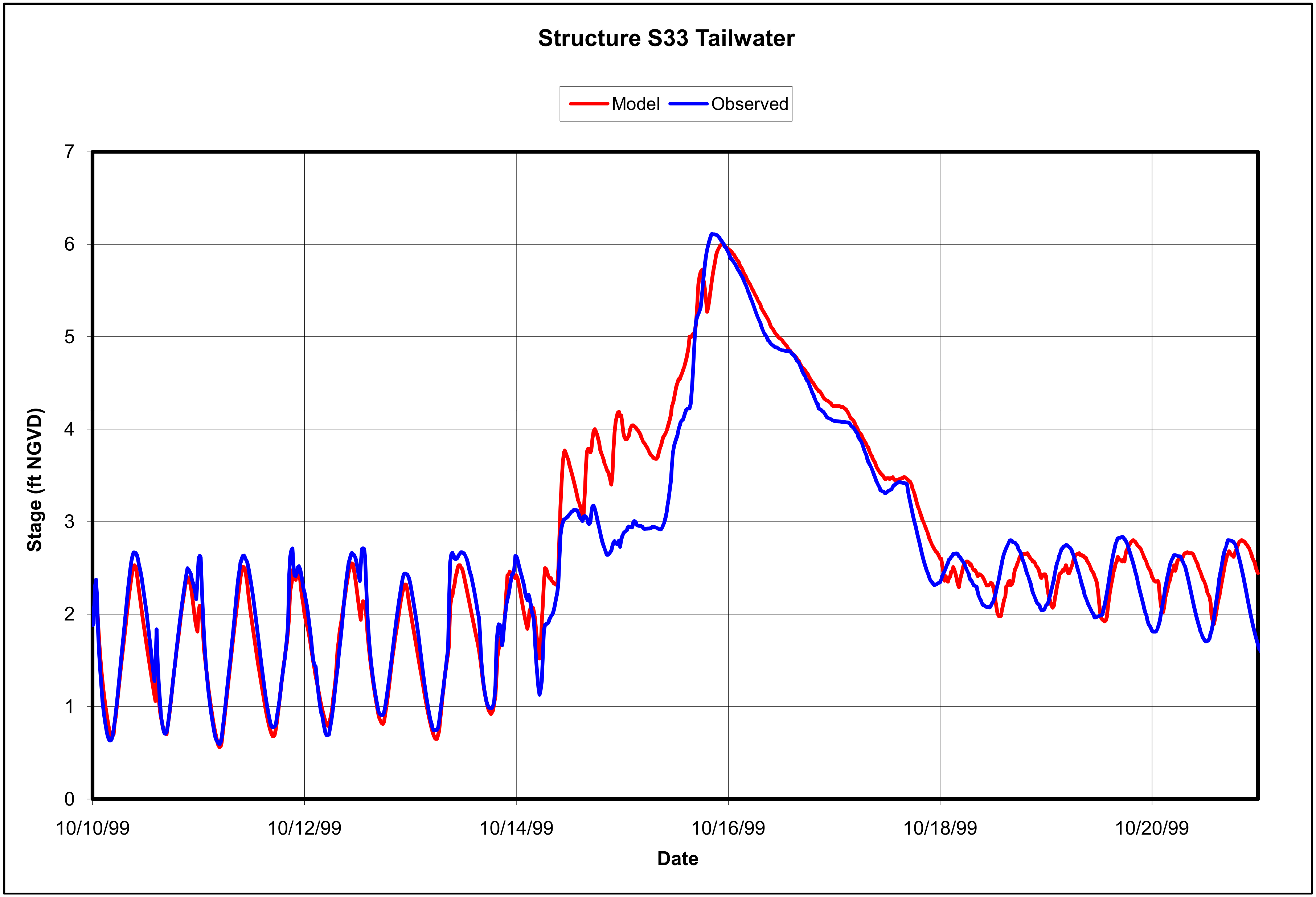
Figure 3-8
City-Wide Stormwater Master Plan
North Fork New River Basin
Calibration

UPDATED 12-01-08

Figure 3-9. North Fork New River Basin Calibration



The calibration is not a good match between the afternoon of the 14th and early on the 15th, prior to the onset of the peak of the storm. Although the peak is of primary importance, much effort was spent trying to improve this result. It is likely that this discrepancy is a result of the uncertainty of the boundary condition, and could also be a consequence of the SFWMD structure operations (of this structure and/or those upstream in western Broward County).

3.7.5 South Fork New River Basin

Figure 3-10 displays the extents of this basin in the southwest section of the project area between Structure G54 and the confluence of the North and South Forks of the New River along the New River Canal and the South Fork of the New River. This calibration shares the New River Basin with the North Fork New River Basin (Section 3.7.4). The New River Basin contains the New River from the confluence of the two forks to the mouth at the Port Everglades Turning Basin.

The boundary conditions for this portion of the model are the Intracoastal Waterway stage estimation (see Section 3.6.3) at the Port Everglades Turning Basin and inflow time series at Structure G54 (including the Halloway Canal inflows). The calibration point is the measured tailwater at Structure G54.

The calibration parameters that this basin was sensitive to were the same as in Section 3.7.4, Manning's roughness in the channels and canals.

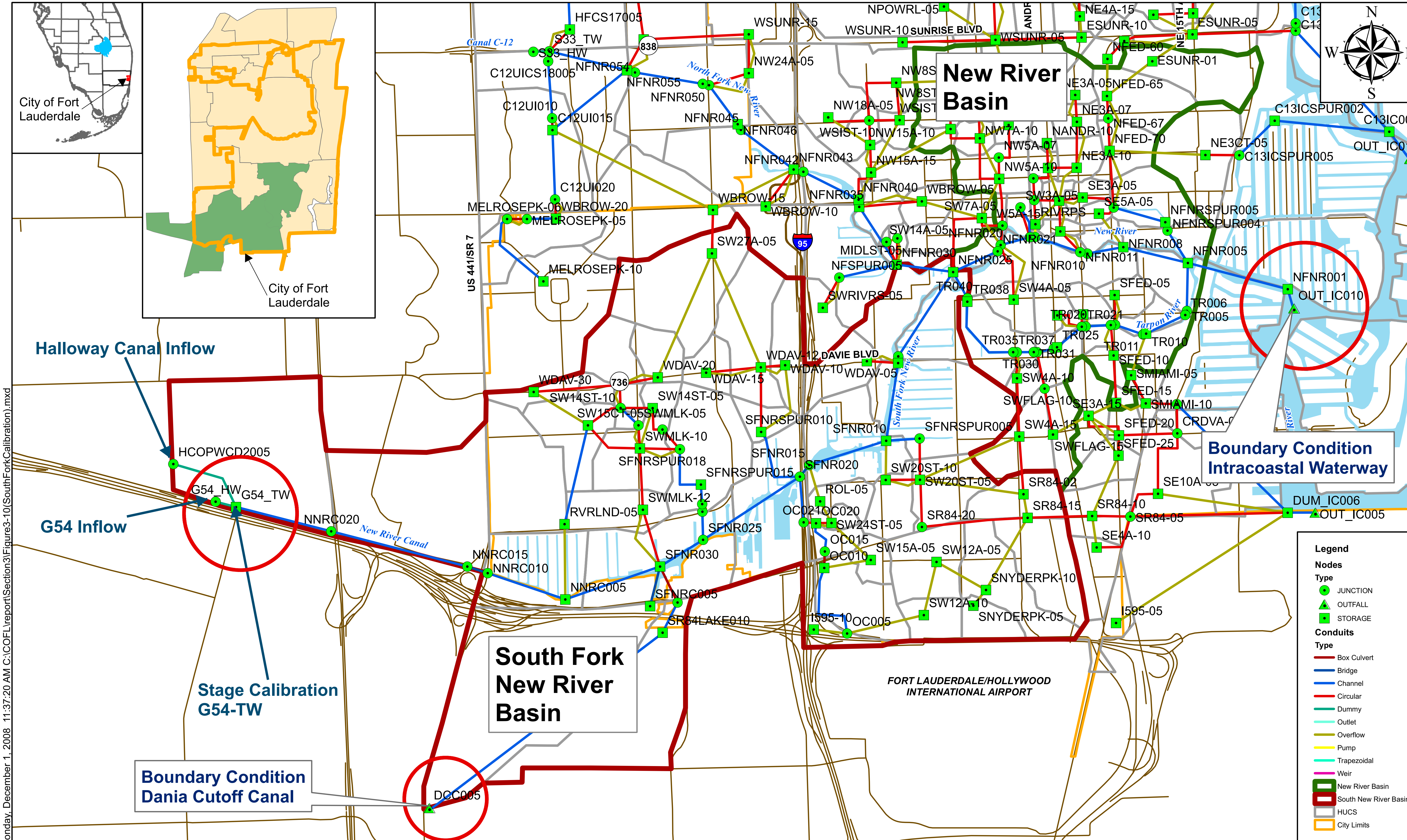
Figure 3-11 displays the calibration of this basin compared to the tailwater gauge at Structure G54. This calibration shows a fairly tight match between observed and modeled stages. The modeled peak stage is again very close to the observed stage (yet again there is a lag). The calibration is again not a very good match between the start of the storm on the 14th and early on the 15th, prior to the onset of the peak of the storm. Again, the peak is of primary importance, but effort was again spent trying to improve this result.

Since this basin and the North Fork New River Basin share the same boundary condition, and the differences at this time are similar, it remains likely that this discrepancy is a result of the uncertainty of the boundary condition. However, it is also possible that this was a consequence of the SFWMD structure operations.

3.8 Regional Model Application and Results

A regional model has been developed and calibrated to a high intensity storm using USEPA SWMM Version 5.0.013 for the City of Fort Lauderdale SWMP to perform the following:

- Design storm simulations of the 2-yr, 24-hour; 5-yr, 24-hour; 10-yr, 24-hour; 25-yr, 72-hour and 100-yr, 72-hour events. The design storm simulations were performed for the existing hydrologic and hydraulic conditions;



Source: City of Fort Lauderdale

CDM

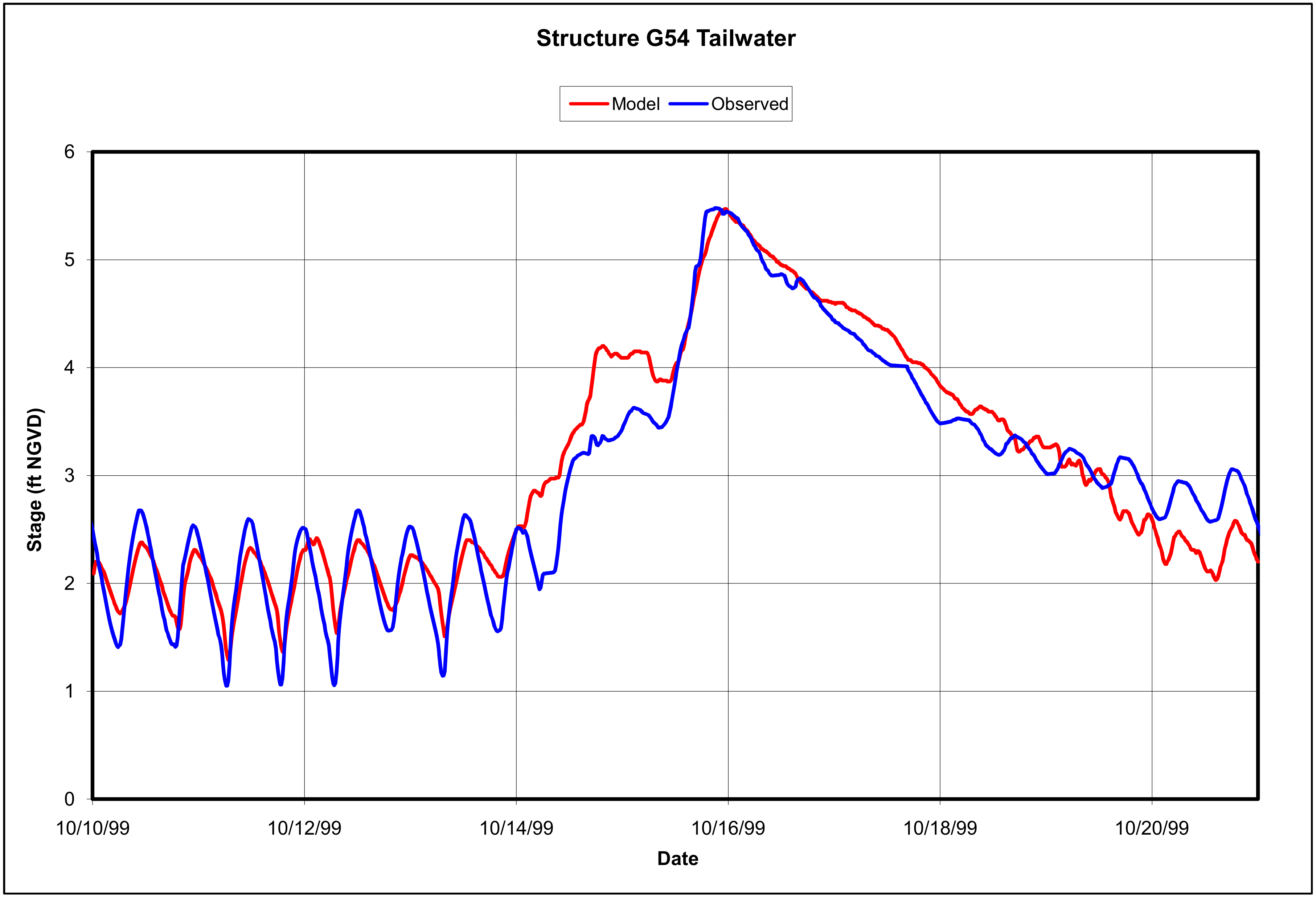
0 2,000 4,000 8,000 Feet

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 3-10
City-Wide Stormwater Master Plan
South Fork New River Basin
Calibration

UPDATED 12-01-08

Figure 3-11. South Fork New River Basin Calibration



- To locate and prioritize water quantity (flooding) problem areas within the City;
- To aid in the development of Levels of Service (LOS) for the City;
- To serve as boundary conditions for future, local models (four of which are performed as part of this scope of service – see Section 7); and
- To perform alternative improvement evaluations (see Section 6).

For these reasons, the model was evaluated for average wet season antecedent conditions, including the high water table and initial stages. Existing conditions refers to the current land use hydrology and the hydraulic components that are in place at the time of this evaluation.

As described in Section 3.6.3, the design storm simulations use a fixed stage boundary condition of 2.5 ft NGVD for the Intracoastal Waterway and inflows based on upstream HUs at the various salinity control structures developed during the calibration phase.

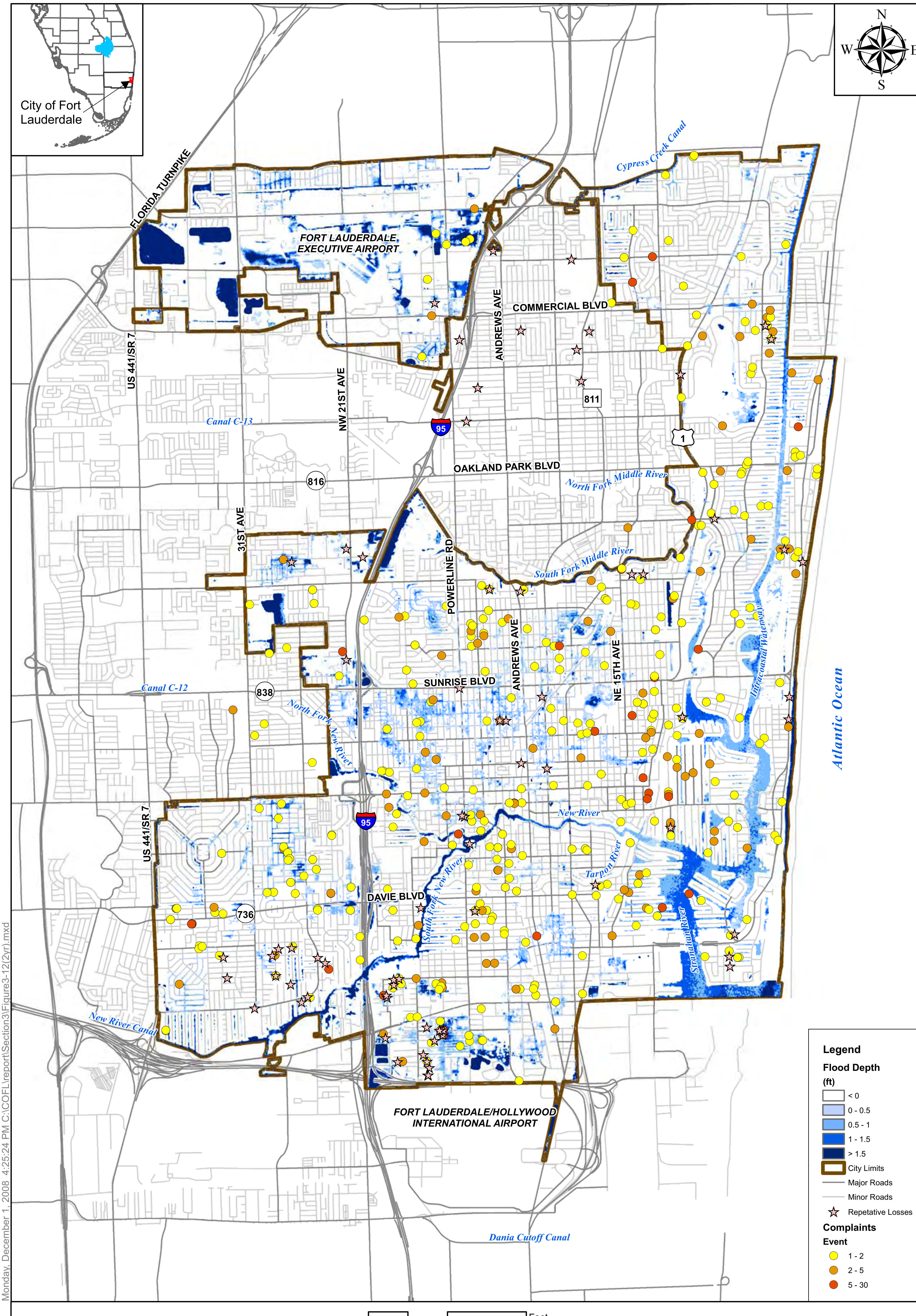
3.8.1 Regional Flooding

Figures 3-12 through 3-16 display the approximate extents of flooding in the City for the 2-yr, 24-hour; 5-yr, 24-hour; 10-yr, 24-hour; 25-yr, 72-hour and 100-yr, 72-hour design storm events, respectively. These flood maps are not built to the detail of FEMA maps, but show approximately where the simulated peak stages intersect the topography of the City for problem area verification and identification. The figures also show the locations of repetitive loss claims and complaints that were provided by the City of Fort Lauderdale and discussed in Section 2 of this report.

The model indicates that there is significant street flooding to be expected, even for the smaller storms, which correlates well with the observed flooding in the City. It should be noted that for the regional model, the separate hydrologic units are rather large, and therefore, there is no fine detail in parts of the model, especially in the finger isles. Thus, there are locations of complaints and repetitive losses in which the model does not indicate flooding. For the larger storms, hundreds of buildings are expected to be flooded, and most roads are flooded as well. **Appendix 3C** presents a table of peak stages by model node for the five design storms.

3.8.2 Ranking of Flooding Problem Areas

The City of Fort Lauderdale was subdivided into 52 neighborhoods in order to develop criteria for ranking the water quantity (flooding) problem areas. **Figures 3-17 and 3-18** display the neighborhood divisions for the northern and southern portions of the City, respectively. These neighborhood boundaries may not match the exact street locations that are generally accepted because there was also a need for the areas to conform to the flood map. Therefore, these areas are generally bounded by the City's neighborhoods.



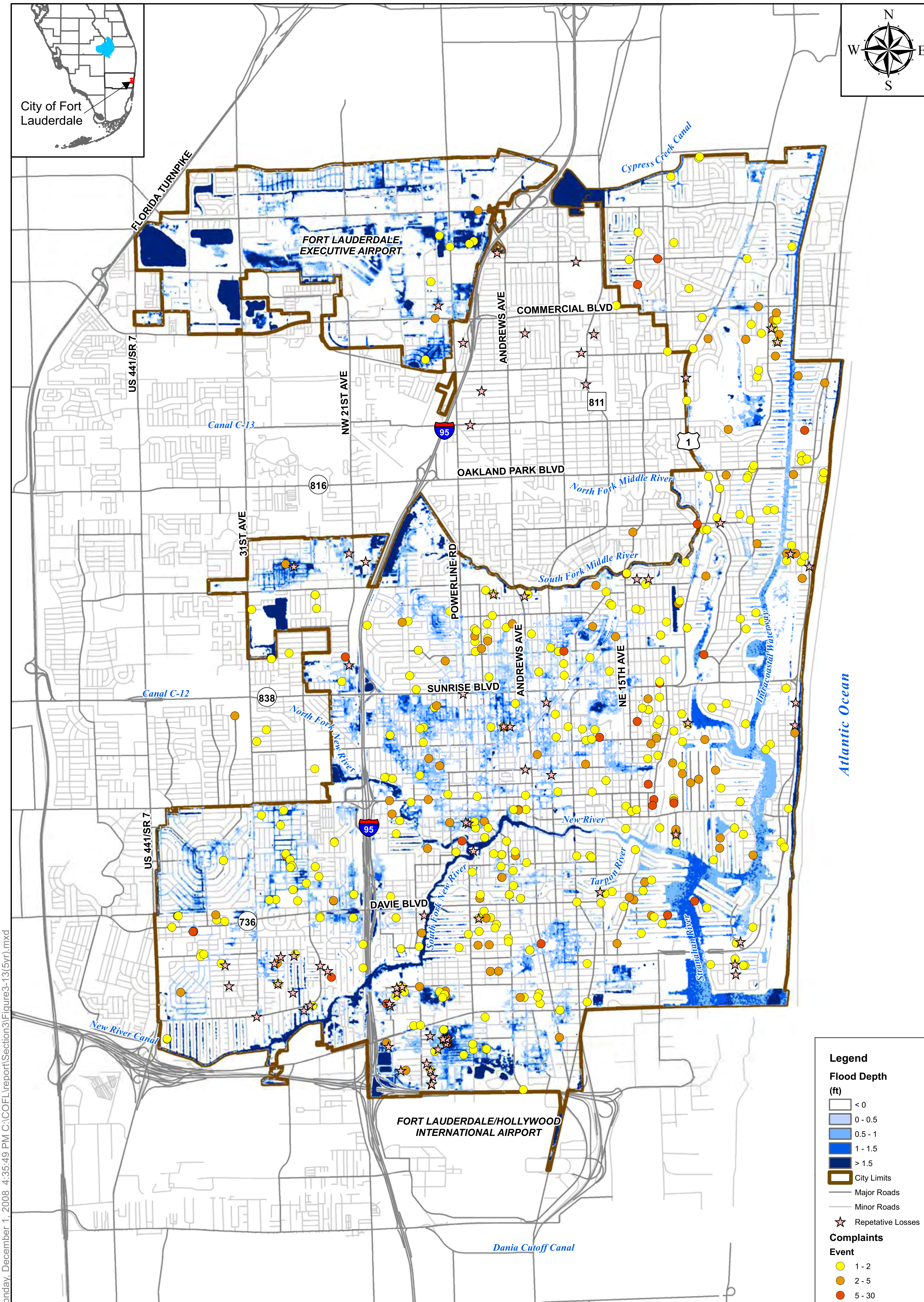
Source: City of Fort Lauderdale

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 3-12
City-Wide Stormwater Master Plan
Simulated Peak Flood Map
2-Year, 24-Hour Storm

UPDATED
12-01-08



0 2,000 4,000 8,000 Feet

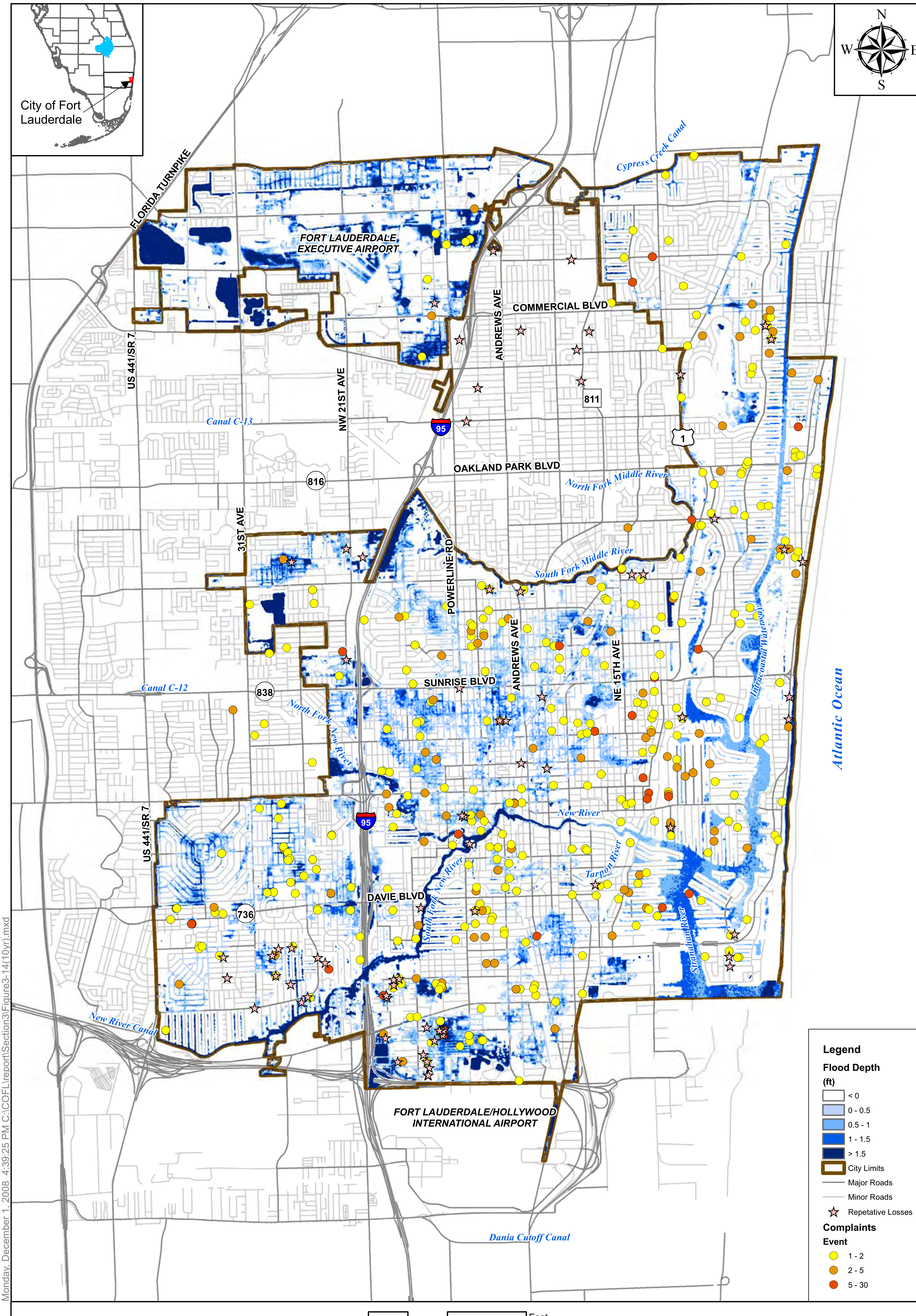
Source: City of Fort Lauderdale

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 3-13
City-Wide Stormwater Master Plan
Simulated Peak Flood Map
5-Year, 24-Hour Storm

UPDATED 12-01-08



Monday, December 1, 2008 4:39:25 PM C:\COFL\report\Section3\Figure3-14(10yr).mxd

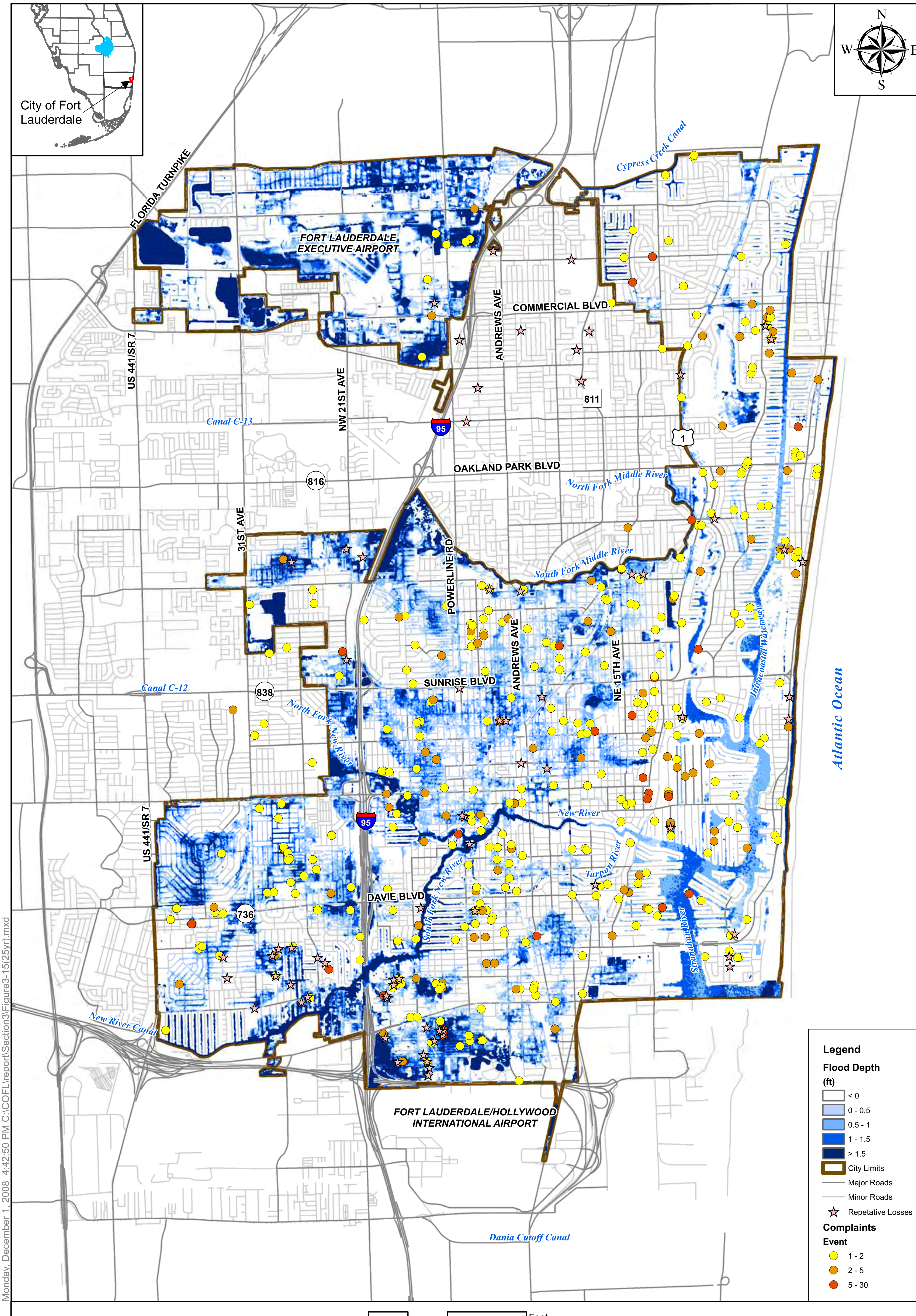
Source: City of Fort Lauderdale

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 3-14
City-Wide Stormwater Master Plan
Simulated Peak Flood Map
10-Year, 24-Hour Storm

UPDATED
12-01-08



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Source: City of Fort Lauderdale

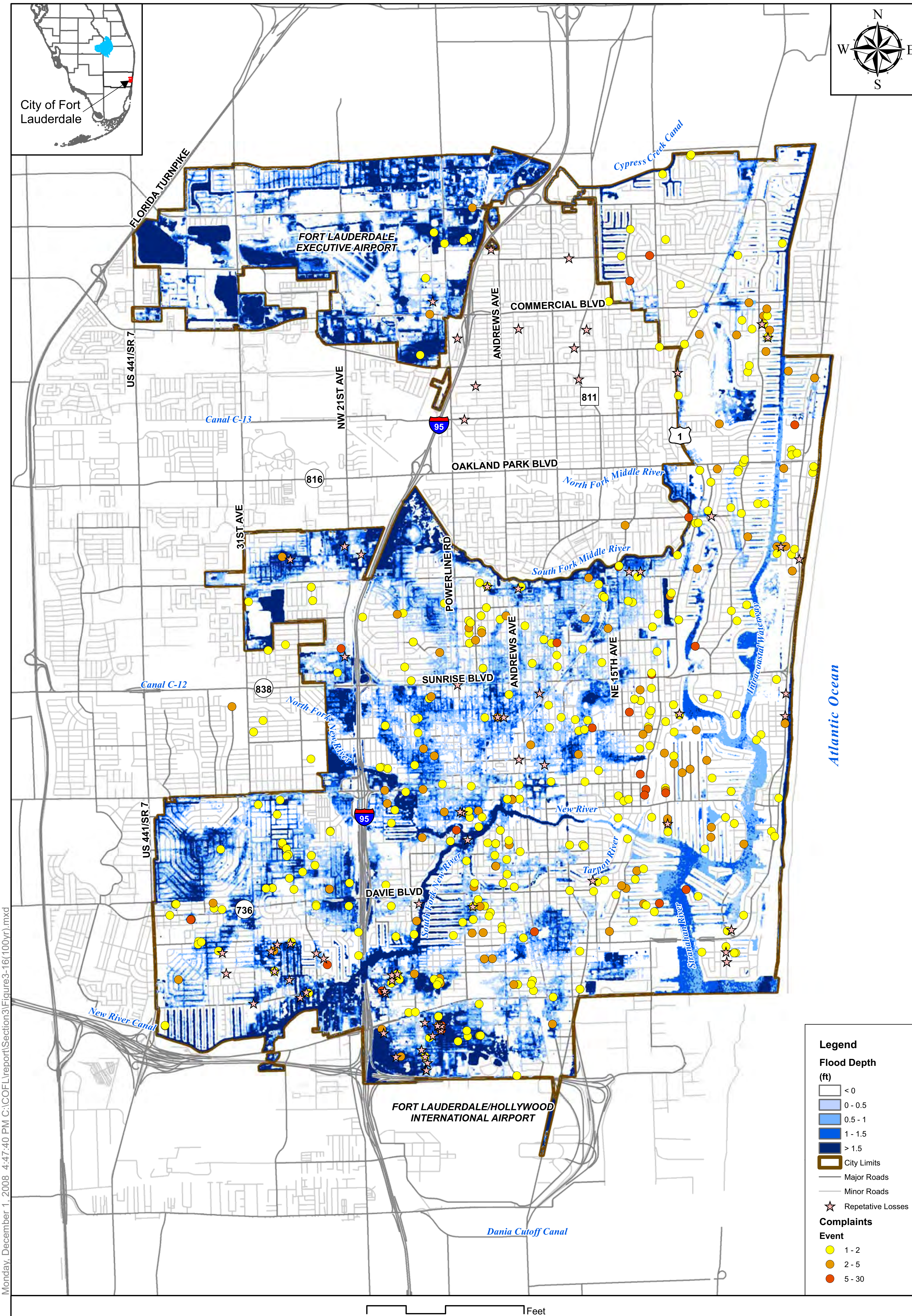
CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 3-15

City-Wide Stormwater Master Plan
Simulated Peak Flood Map
25-Year, 72-Hour Storm

UPDATED
12-01-08

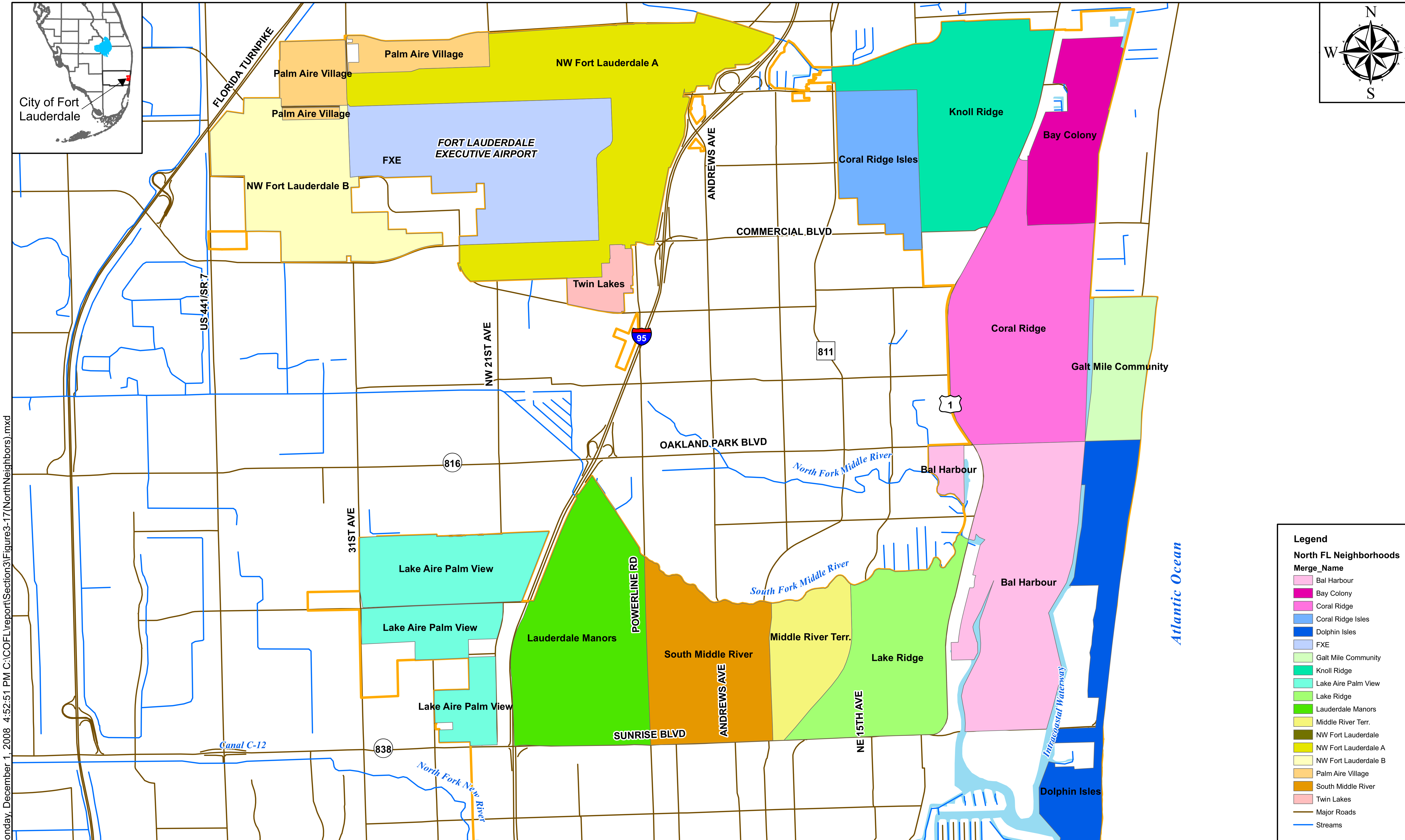


Source: City of Fort Lauderdale

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

UPDATED
12-01-08



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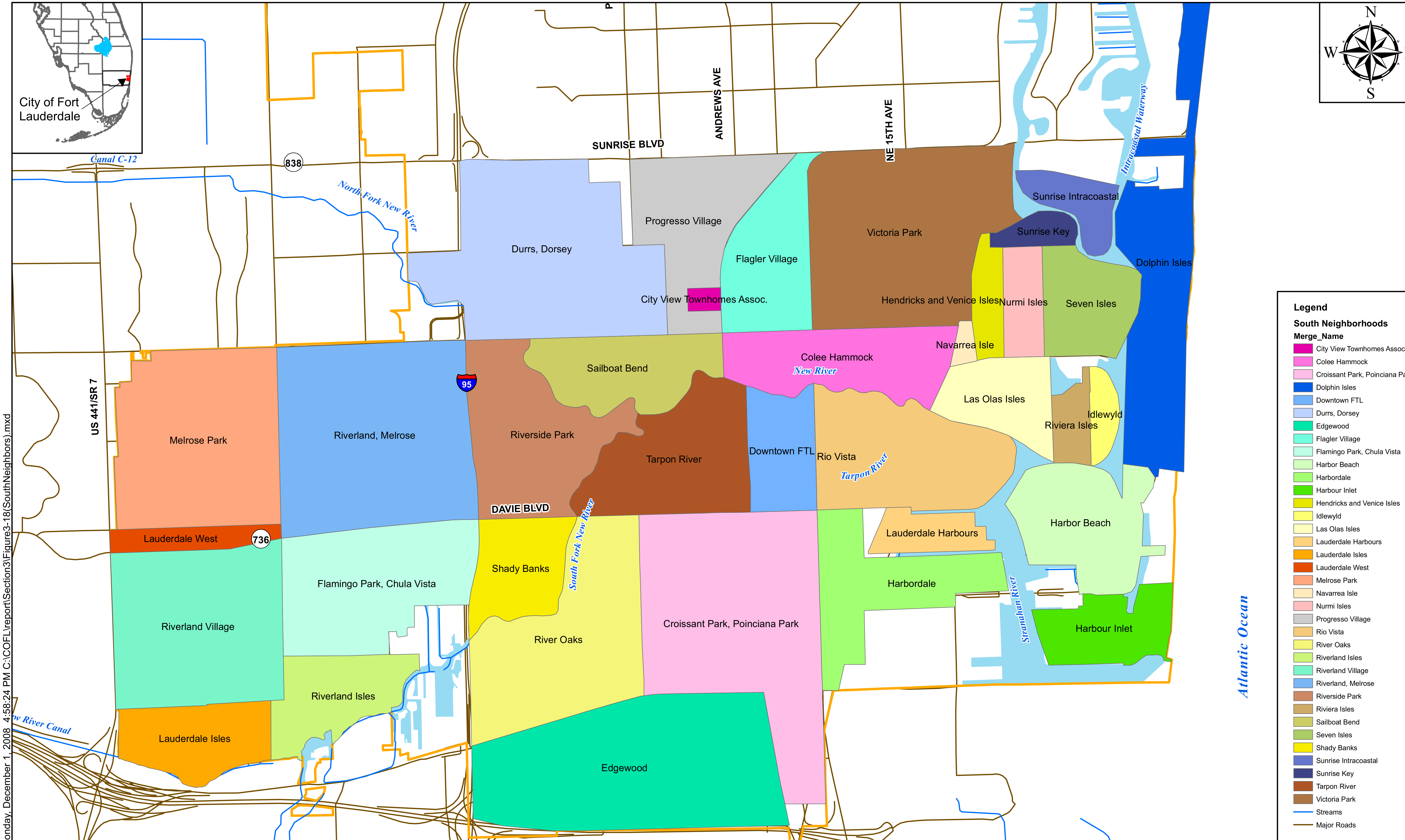
Source: City of Fort Lauderdale

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 3-17
City-Wide Stormwater Master Plan
North Fort Lauderdale
Neighborhoods

UPDATED
12-01-08



Monday, December 1, 2008 4:58:24 PM C:\COFL\report\Section3\Figure3-18(SouthNeighbors).mxd

Source: City of Fort Lauderdale

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 3-18
City-Wide Stormwater Master Plan
South Fort Lauderdale
Neighborhoods

UPDATED
12-01-08

Once the neighborhoods were subdivided, two metrics were used to rank the flooding problem areas based on the model results. The first was the length of roads flooded at the peak of the 5-year, 24-hour design storm. The second was the number of buildings flooded at the peak of the 100-year, 72-hour design storm.

3.8.2.1 The 5-year Storm Level of Service

One measurement of the LOS provided by a city is whether or not a road is flooded above the crown for the 5-year design storm. In this case, GIS was used to compare the topography of the City to the peak stages of the 5-year, 24-hour storm. If the comparison of the topography with the flood elevation indicates that the peak flood elevation was more than 3 inches above the road crown, than this LOS is not expected to be met. The lengths of road where this LOS is not met are summed for each neighborhood and presented in **Table 3-5**.

3.8.2.2 The 100-year Storm Level of Service

Another measurement of LOS is the number of structures (buildings and houses) that are expected to be flooded at the peak of the 100-year, 72-hour design storm. Since the finished floor elevation of each building within City limits is not part of the survey information, and the LiDAR is an estimate beneath every building (for a discussion of the "bare earth" LiDAR grid, see Section 2), a conservative estimate was used in the comparison of the topography and the peak flood stage for this analysis. That is, if the peak flood stage was greater than 1.0 foot above the topographic estimate at a building site, the building was counted as potentially flooded. The number of buildings where the LOS is not met for this criterion are summed for each neighborhood and presented in **Table 3-6**.

3.8.2.3 Repetitive Losses and Complaints

The repetitive losses and complaints that were analyzed in Section 2 were also subdivided by neighborhood so that observed flooding could be used in the determination of which neighborhoods should be identified as priorities for local modeling. **Table 3-7** provides the ranking of neighborhoods by the number of complaints.

3.8.3 Selection of the Local Models

CDM ranked the neighborhoods based on the aforementioned criteria and selected neighborhoods for which the more detailed, local models would be created. It was determined that some of the neighborhoods that are listed high in the model rankings did not have observed flooding as severe as others that are ranked lower. This is not completely unexpected since the regional model is only an approximation of the actual flooding and depends on the stormwater system survey supplied by the City, some of which is incomplete, especially in neighborhoods that are newly added to the City of Fort Lauderdale. Neighborhoods that were excluded due to the uncertainty of the analysis include Twin Lakes North Homeowners Association and Melrose Park.

Table 3-5. Ranking by LOS for Road Flooding During 5-Year, 24-Hour Storm

Neighborhood	Area (Ac)	5-yr Storm Roadway Flooding* (ft)	Percent of Citywide (%)	Rank (by %)	Normalized Roadway Flooding (ft/Ac)	Rank (by ft/Ac)
Riverland, Melrose	728	62,900	10.5%	1	86.4	3
Durrs, Dorsey	703	59,400	10.0%	2	84.5	4
Melrose Park	578	47,900	8.0%	3	82.8	5
Edgewood	745	41,200	6.9%	4	55.3	10
Progresso Village	314	40,900	6.9%	5	130.3	2
Lake Aire Palm View	705	36,400	6.1%	6	51.6	11
NW Fort Lauderdale A	1231	34,400	5.8%	7	28.0	17
South Middle River	605	29,600	5.0%	8	48.9	13
Lauderdale Manors	889	28,900	4.8%	9	32.5	16
Croissant Park, Poinciana Park	777	27,100	4.5%	10	34.9	14
Riverland Village	544	26,800	4.5%	11	49.2	12
Palm Aire Village	297	21,200	3.6%	12	71.4	8
Flagler Village	255	21,000	3.5%	13	82.4	6
Middle River Terr.	297	19,400	3.3%	14	65.4	9
Sailboat Bend	250	19,000	3.2%	15	76.0	7
Victoria Park	668	16,200	2.7%	16	24.3	18
Twin Lakes North	88	16,100	2.7%	17	183.7	1
Lake Ridge	608	14,300	2.4%	18	23.5	19
Flamingo Park, Chula Vista	433	14,200	2.4%	19	32.8	15
Coral Ridge	969	12,900	2.2%	20	13.3	27
River Oaks	518	11,300	1.9%	21	21.8	21
FXE	889	10,200	1.7%	22	11.5	28
Bal Harbour	927	9,100	1.5%	23	9.8	29
Tarpon River	356	5,700	1.0%	24	16.0	23
Knoll Ridge	798	4,800	0.8%	25	6.0	33
Colee Hammock	296	4,100	0.7%	26	13.8	25
Riverside Park	389	3,800	0.6%	27	9.8	30
Riverland Isles	206	3,000	0.5%	28	14.6	24
Downtown FTL	165	2,800	0.5%	29	17.0	22
Shady Banks	188	2,500	0.4%	30	13.3	26
NW Fort Lauderdale B	628	2,200	0.4%	31	3.5	35
Lauderdale Isles	206	2,000	0.3%	32	9.7	31
Lauderdale West	77	1,800	0.3%	33	23.4	20
Harbordale	291	1,800	0.3%	34	6.2	32
Coral Ridge Isles	350	1,500	0.3%	35	4.3	34
Rio Vista	402	1,100	0.2%	36	2.7	37
Bay Colony	376	1,100	0.2%	37	2.9	36
Galt Mile Community	261	390	0.1%	38	1.5	39
Lauderdale Harbours	90	190	0.0%	39	2.1	38
Idlewyld	48	20	0.0%	40	0.4	40
Dolphin Isles	698	19	0.0%	41	0.0	41
City View	16	0	0.0%	42	0.0	42
Harbor Beach	294	0	0.0%	42	0.0	42
Harbour Inlet	175	0	0.0%	42	0.0	42
Hendricks and Venice Isles	72	0	0.0%	42	0.0	42
Las Olas Isles	172	0	0.0%	42	0.0	42
Navarrea Isle	17	0	0.0%	42	0.0	42
Nurmi Isles	90	0	0.0%	42	0.0	42
Riviera Isles	61	0	0.0%	42	0.0	42
Seven Isles	187	0	0.0%	42	0.0	42
Sunrise Intracoastal	92	0	0.0%	42	0.0	42
Sunrise Key	49	0	0.0%	42	0.0	42
Sum	**20,300**	**596,300**				

*Road crown flooded by 3 inches, flooded roadways coincident to two neighborhoods were counted for both neighborhoods

Table 3-6. Ranking by LOS for Potential Building Flooding During 100-Year, 72-Hour Storm

Neighborhood	Area	100-yr Storm Buildings Flooded*	Percent of Citywide	Rank	Normalized Buildings Flooded	Rank
	(Ac)	(count)	(%)	(by %)	(count/Ac)	(by count/Ac)
Edgewood	745	565	10.9%	1	0.8	2
Melrose Park	578	291	7.3%	2	0.5	3
Twin Lakes North	88	227	37.3%	3	2.6	1
Lake Aire Palm View	705	170	3.5%	4	0.2	7
Durrs, Dorsey	703	152	3.1%	5	0.2	9
Flamingo Park, Chula Vista	433	151	5.0%	6	0.3	4
Victoria Park	668	113	2.4%	7	0.2	11
NW Fort Lauderdale A	1231	98	1.1%	8	0.1	18
Riverland Village	544	96	2.5%	9	0.2	10
Riverland, Melrose	728	89	1.8%	10	0.1	15
River Oaks	518	70	1.9%	11	0.1	14
Middle River Terr.	297	67	3.3%	12	0.2	8
Croissant Park, Poinciana Park	777	66	1.2%	13	0.1	16
Sailboat Bend	250	63	3.6%	14	0.3	6
Riverland Isles	206	60	4.2%	15	0.3	5
Progresso Village	314	51	2.3%	16	0.2	13
Lake Ridge	608	50	1.2%	17	0.1	17
Lauderdale Manors	889	39	0.6%	18	0.0	21
South Middle River	605	32	0.8%	19	0.1	19
Bal Harbour	927	17	0.3%	20	0.0	26
Lauderdale West	77	13	2.4%	21	0.2	11
Riverside Park	389	13	0.5%	21	0.0	23
Downtown FTL	165	8	0.7%	27	0.0	20
Flagler Village	255	8	0.5%	27	0.0	24
NW Fort Lauderdale B	628	8	0.2%	27	0.0	27
Shady Banks	188	8	0.6%	27	0.0	22
Tarpon River	356	8	0.3%	27	0.0	25
FXE	889	6	0.1%	28	0.0	28
Coral Ridge	969	6	0.1%	28	0.0	30
Colee Hammock	296	2	0.1%	30	0.0	28
Coral Ridge Isles	350	1	0.0%	31	0.0	31
Knoll Ridge	798	1	0.0%	31	0.0	32
Bay Colony	376	0	-		-	-
City View	16	0	-		-	-
Dolphin Isles	698	0	-		-	-
Galt Mile Community	261	0	-		-	-
Harbor Beach	294	0	-		-	-
Harbordale	291	0	-		-	-
Harbour Inlet	175	0	-		-	-
Hendricks and Venice Isles	72	0	-		-	-
Idlewyld	48	0	-		-	-
Las Olas Isles	172	0	-		-	-
Lauderdale Harbours	90	0	-		-	-
Lauderdale Isles	206	0	-		-	-
Palm Aire Village	297	0	-		-	-
Navarrea Isle	17	0	-		-	-
Nurmi Isles	90	0	-		-	-
Rio Vista	402	0	-		-	-
Riviera Isles	61	0	-		-	-
Seven Isles	187	0	-		-	-
Sunrise Intracoastal	92	0	-		-	-
Sunrise Key	49	0	-		-	-
Sum	**20,300**	**2,549**				

*Estimated building finished floor approximately 1-ft above DEM, 100-year storm peak flood > 1.0 ft to count

Table 3-7. Ranking by Complaints

Neighborhood	No. of Repetitive Losses	Repetitive Losses Rank	No. of Complaints	No. of Complaints Rank
Victoria Park	1	16	111	1
Croissant Park, Poinciana Park	2	9	64	2
River Oaks	5	3	62	3
Coral Ridge	4	4	47	4
Edgewood	14	1	42	5
Tarpon River	1	16	42	5
Dolphin Isles	4	4	41	7
South Middle River	2	9	39	8
Riverland, Melrose	0	25	37	9
Lake Ridge	2	9	35	10
Bal Harbour	1	16	34	11
Durrs, Dorsey	0	25	31	12
Riverland Village	2	9	29	13
Sailboat Bend	2	9	27	14
Colee Hammock	0	25	26	15
Rio Vista	1	16	25	16
Las Olas Isles	1	16	24	17
Middle River Terr.	0	25	24	17
Flamingo Park, Chula Vista	6	2	23	19
Riverside Park	0	25	23	19
Galt Mile Community	0	25	21	21
Hendricks and Venice Isles	0	25	21	21
Lauderdale Manors	1	16	21	21
Lake Aire Palm View	4	4	20	24
Lauderdale Harbours	0	25	20	24
Harbor Beach	1	16	14	26
NW Fort Lauderdale A	1	16	12	27
Harbordale	0	25	11	28
Lauderdale West	0	25	11	28
Nurmi Isles	0	25	11	28
Flagler Village	2	9	9	31
Riviera Isles	0	25	9	31
Seven Isles	0	25	9	31
Shady Banks	1	16	9	31
Harbour Inlet	2	9	7	35
Idlewyld	0	25	6	36
Knoll Ridge	0	25	6	36
Progresso Village	4	4	6	36
Sunrise Intracoastal	0	25	6	36
Sunrise Key	0	25	4	40
Lauderdale Isles	0	25	3	41
Bay Colony	0	25	2	42
Melrose Park	0	25	2	42
Riverland Isles	4	4	1	44
Twin Lakes North	0	25	1	44
City View	0	25	0	45
Coral Ridge Isles	0	25	0	45
Downtown FTL	0	25	0	45
FXE	0	25	0	45
Palm Aire Village	0	25	0	45
Navarrea Isle	0	25	0	45
NW Fort Lauderdale B	0	25	0	45

The conclusions from the neighborhood ranking analysis were that:

1. The neighborhood defined by the Edgewood Civic Association was to be divided into two parts, East Edgewood and West Edgewood, due to the size of the neighborhood and the significant flooding problems in the area. These are two of the areas modeled in detail in Section 7.

2. The neighborhood defined as Victoria Park Civic Association was identified as the third local model described in Section 7. Although Victoria Park was ranked as the 16th worst flooded neighborhood by length of road flooded during the 5-year storm and 7th in number of buildings flooded during the 100-year storm, it had received the most complaints. Additionally, there is anecdotal evidence that there is significant flooding close to the Intracoastal Waterway that the regional model would not be able to simulate, but that the local model would due to the higher level of refinement. The high instances of observed flooding, combined with the relatively high model ranking were sufficient cause to include this neighborhood in the local modeling task.

3. The final neighborhood to be modeled in detail was Progresso Village. This neighborhood ranked second in feet of flooded road during the 5-year storm when normalized by neighborhood area. Since this neighborhood is much smaller than some of the others on the list, this is a reasonable metric to use.

3.9 Regional Model Conclusions

The US EPA Stormwater Management Model Version 5.0.013 was set up, calibrated, and applied for SFWMD design storms to analyze regional water quantity (flooding) problems in the City of Fort Lauderdale. The regional model was used to estimate Levels of Service within City limits, to provide boundary conditions for detailed local models, which will be discussed in Section 7, and to be used as a base model for regional alternative solutions to flooding problems (Section 6).

The following conclusions are offered:

- SWMM was calibrated to Hurricane Irene, which occurred in October 1999. This corresponds with the end of the wet season in South Florida, with an elevated water table and therefore matches the necessary antecedent conditions for the design storm simulations.

- Simulated and observed peak stages were compared at 5 stage gauge locations. The simulated and observed peak stages match well at all gauge locations and the regional model is considered calibrated to the extent described in the scope of services of this project.

- The model was converted from calibration model to production mode for design storms by converting the boundary conditions as described in Section 3.6.3.

- This regional model is evaluated as a well-maintained system, with unobstructed, well-maintained pipes and culverts exhibiting relatively low Manning's roughness values. It is recommended that routine maintenance be performed by the City on the PSMS to achieve this condition.

- The model was applied for the 2-year, 24-hour; 5-year, 24-hour; 10-year, 24-hour; 25-year, 72-hour; and 100-year, 72-hour design storms. The results indicate significant surface flooding, even for the smaller storms.

- The model was used to verify and identify potential problem areas.

- One LOS estimated by the model was the length of road flooded during the peak of the 5-year, 24-hour storm. These values were calculated using the model results and GIS, and then compared by City neighborhood.

- Another LOS analyzed was the number of buildings flooded during the peak of the 100-year, 72 hour design storm. GIS was again used to tabulate these instances using the model results, and then the count was compared by City neighborhood.

- Using these metrics, combined with the locations of repetitive losses and complaints, CDM and the City of Fort Lauderdale agreed on four local models to be developed to a higher degree of refinement: Edgewood East, Edgewood West, Victoria Park, and Progresso Village.

- It is recommended that the City's GIS stormline layer of stormwater pipes be updated to include pipe sizes and inverts where missing, and culverts.

Section 4
City-wide Regional Water Quality Evaluation

This section provides a description of the Watershed Management Model (WMM), and its application to the SWMP watershed. CDM applied the WMM to the study area for existing (2004) and future land use conditions. These simulations included stormwater runoff, baseflow, septic tanks, and point sources. The stormwater flows and loads consider existing and future best management practices (BMPs).

4.1 Watershed Management Model and Application

The public domain WMM was used to provide hydrologic and water quality modeling to aid in estimating both the relative levels of pollutant load increases and effectiveness of potential changes in land use and BMPs. WMM is used in this project to estimate annual and seasonal pollution loads from stream baseflow, stormwater runoff, and septic tanks and to compare them in relative magnitude among the hydrologic units (HUs) defined in the City.

Data required to use the WMM include: event mean concentrations (EMCs) for each pollutant type and land use; land use and associated imperviousness; pervious and impervious runoff coefficients; areas served by septic systems and septic system failure rates; average annual and monthly precipitation; annual and seasonal baseflow and average baseflow concentrations; wastewater treatment plant point source flows and pollutant concentrations; and other stream flows and concentrations. WMM uses a simple database platform to estimate annual and/or wet-dry seasonal pollutant loads from many available data sources within a watershed.

WMM evaluates and estimates pollutant loads for each HU or tributary area specified by the user within a larger watershed. Land use, septic tank coverage, point sources flows and concentrations, and BMP type and area coverage are specified for each HU. WMM allows the user to create different scenarios based on modifications on any of the input parameters, which is normally used in sensitivity analyses and calibration; and, on land use coverage modifications and BMP implementations to evaluate alternatives of onsite and regional pollutant loading reduction strategies. Strategies that may be identified using the WMM include: Nonstructural controls (e.g., land use controls and buffer zones); and Structural controls (e.g., onsite and regional wet detention ponds, grassed swales, dry detention basins, and retention-infiltration basins and buffers).

WMM produces estimates of annual and seasonal flow volumes; pollution loads; and concentrations of nutrients (total phosphorus, dissolved phosphorus, total nitrogen, and total Kjeldahl nitrogen), heavy metals (lead, copper, zinc, and cadmium), oxygen demand and sediment (BOD, COD, total suspended solids, and total dissolved solids), and fecal coliform.

WMM does not directly account for physical, chemical, and/or biological growth or decay processes characteristic of in-stream flow. For simplicity, WMM applies a delivery ratio from 0 to 1 to account for reduction in runoff pollution load due to uptake, transformation, and/or removal in the stream courses. This parameter is typically used for calibration of estimated loads using available stream flow and concentration data.

In summary, WMM constitutes a tool for planning-level evaluations of the long-term (annual or seasonal) watershed pollution loads and the relative benefits of pollution managements strategies to reduce these loads. This relative loading model provides practitioners with information to make decisions for implementation of BMP projects and management criteria based on the relative contribution of pollution loadings from various areas within a watershed (e.g., agriculture versus urban land use).

4.1.1 Rainfall/Runoff Relationships

WMM calculates annual runoff volumes for the pervious/impervious areas in each land use category by multiplying the average annual rainfall volume by a runoff coefficient.

The total average annual surface runoff from land use L is calculated by weighting the impervious and pervious area runoff factors for each land use category as follows:

$$R_L = C \times P$$

In which, C can be expressed in terms of composite value of pervious and impervious runoff coefficients as in:

$$R_L = \left[C_P(1 - IMP_L) + C_I \times IMP_L\right] \times P$$

Or as:

$$R_L = \left[C_P + (C_I - C_P)IMP_L\right] \times P$$

Where:

R_L = total average annual surface runoff from land use L (in/yr/unit area);
IMP_L = fractional imperviousness of land use L;
P = long-term average annual and seasonal precipitation (in/yr);
C_P = pervious area runoff coefficient; and
C_I = impervious area runoff coefficient.

Total runoff in a basin is the area-weighted sum of R_L for all land uses.

4.1.2 Non-point Pollution Loading Factors

WMM estimates pollutant loadings based upon non-point pollution loading factors (expressed as pounds per acre per year) that vary by land use and the percent imperviousness associated with each land use. The pollution loading factor M_L is computed for each land use L by the following equation:

$$M_L = EMC_L * R_L * K$$

Where:

M_L = Loading factor for land use L (lbs/ac/yr);

EMC_L = Event mean concentration of runoff from land use L (mg/L). EMC_L varies by land use and by water quality constituent. Land use EMCs are derived from monitoring data of flow-weighted average concentrations for a storm event from single land use catchments. EMCs are defined as the sum of individual measurements of stormwater constituent loads divided by the storm runoff volume.

R_L = Total average annual surface runoff from land use L (computed from annual precipitation, land-use imperviousness, and runoff coefficients (in/yr); and

K = 0.2266 (this is a conversion constant)

By multiplying the pollutant loading factor for each land use by the acreage in each land use and then summing for all land uses, the total annual pollution load from a water quality basin can be computed. Land use specific event mean concentrations were applied to the existing and future land use scenarios within the study area.

4.1.3 Watershed Characteristics

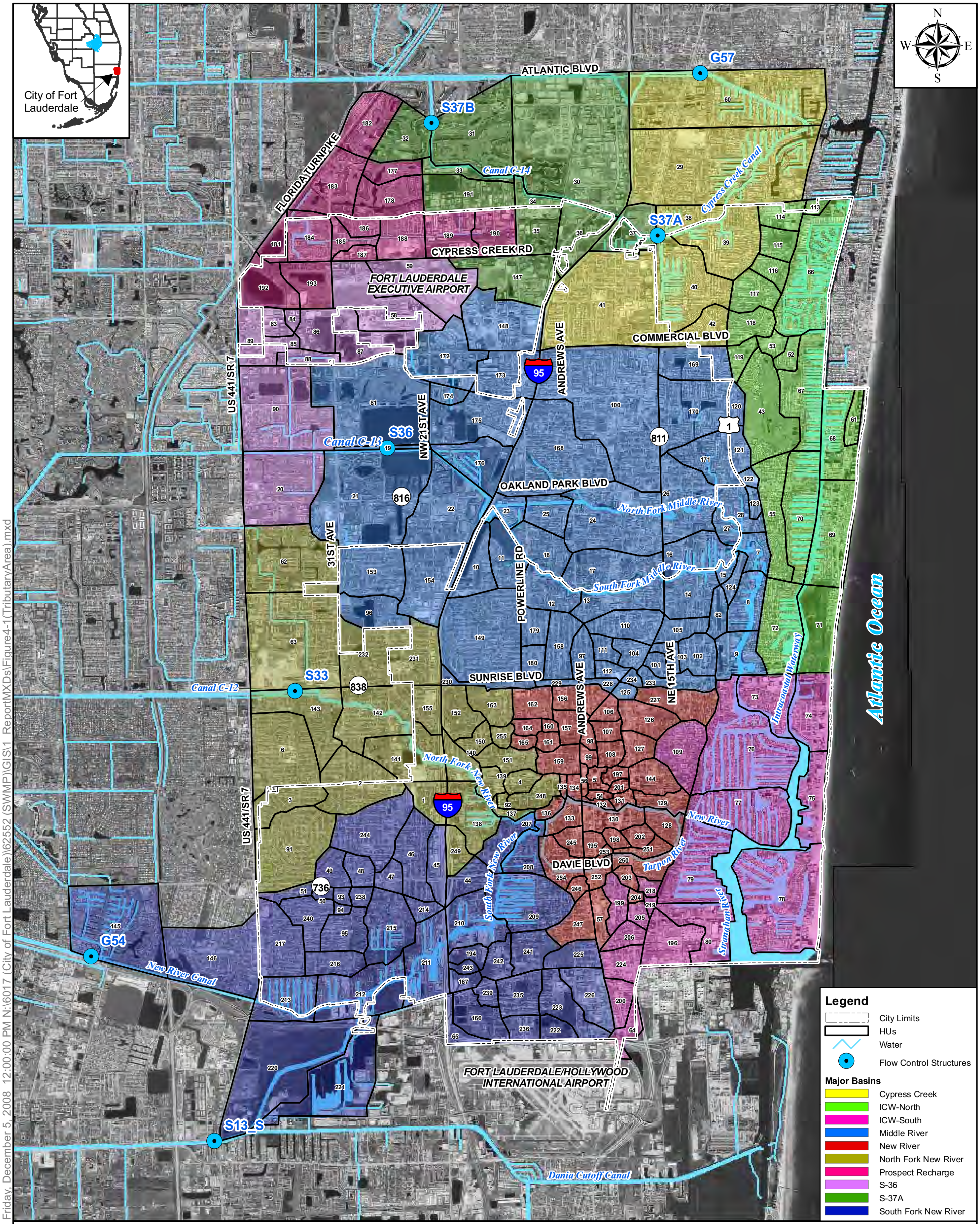
4.1.3.1 Tributary Area

The tributary area considered for the WMM is that defined in Section 3 for the Water Quantity Evaluations. By doing this, the WMM is in concordance with the water quantity model and results derived from both evaluations. **Figure 4-1** presents the tributary area included in the WMM, identifying major streams, canals, and potential point and non-point sources.

The extension of the tributary area includes the Cities: Oakland Park, Wilton Manors, Lauderdale Lakes, Pompano Beach, Tamarac, and Fort Lauderdale.

4.1.3.2 Land Use

Existing and future land uses were considered in the WMM application, defining two separate scenarios. The City provided CDM with an existing land use coverage, which was included as part of the parcel GIS coverage. For this information to be used in this project, additional processing was needed which is presented in detail in Section 2.2.3.



Friday, December 5, 2008 12:00:00 PM N:\6017 (City of Fort Lauderdale)\62552 (SWMP)\GIS\1 ReportMXDs\Figure4-1(TributaryArea).mxd

0 1 2 4 Miles

Source: City of Fort Lauderdale

CDM	City of Fort Lauderdale 100 North Andrews Ave Fort Lauderdale, Florida 33301 Tel # (954) 828-5000	**Figure 4-1** City-Wide Stormwater Master Plan Tributary Area	UPDATED 12-05-08

Figure 2-6 shows the existing land use coverage for the project. **Table 4-1** provides a summary of the land use coverage and the estimated percent imperviousness per major basin. A detailed land use breakdown per hydrologic unit identifying also these parameters is presented in **Appendix 4A**.

Figure 2-7 shows the future land use coverage used in the project and defined according to the procedure detailed in Section 2.2.3. **Table 4-2** provides a summary of the changes of the estimated future land use coverage with respect to the existing coverage at a major basin scale. Table 4-2 indicates that there is not a significant change in the estimated future land use from the current conditions.

4.1.3.3 Topography and Soils

In Figure 2-4, the LiDAR data collected for the project was represented in a 50-feet digital elevation model (DEM). This DEM shows high ground elevation around A1A, US-1, the Executive Fort Lauderdale Airport, north of Sunrise Boulevard east and west of I-95, and west of US-441 south of Davie Boulevard. Low ground elevations are located around the New and Middle River and its fingering canals, especially in those canals located around East Las Olas Boulevard.

In Figure 2-5, the NRCS soil distribution is presented according to the hydrologic soil group classification. As stated in Section 2.2.2, 20 percent of the study area is covered by type A soil, which overlays 68 percent of the HUs in the regional model.

4.1.3.4 Best Management Practices Coverage and Efficiency

BMPs are nonstructural and structural measures aimed at reducing pollutant loading from stormwater runoff. Nonstructural BMPs include reduction of directly connected impervious area (DCIA), fertilizer management in agricultural lands and in residential areas, planning and regulation, conservation and water recycling, and education and outreach programs. Typical structural BMPs include grassed swales, wet/dry retention or detention ponds, exfiltration trenches, green rooftops, porous pavement, wetlands, and onsite separation devices (e.g., baffle boxes, oil-water separators).

The WMM allows accounting for the benefit of BMP loading reduction by defining the BMP coverage for the study area. Information regarding the spatial distribution of the BMPs in the City is not available, thereby; coverages from stormwater permits and GIS processing are typically used to estimate BMP coverage. The SFWMD maintains two databases that were used in this study to represent BMP coverage.

Table 4-1. Existing Land Use Coverage by Major Basin.

Major Basins	Agricultural	Commercial and Services	High Density Residential	Industrial	Institutional	Low Density Residential	Medium Density Residential	Recreational / Open Land	Transportation, Utilities, and Communication	Upland Forests	Water/ Wetlands	Total (acres)	Percent [1] Imperviousness
Cypress Creek	0.0%	13.0%	27.7%	0.9%	7.2%	0.0%	38.2%	1.0%	4.7%	0.0%	7.3%	3,426.3	50%
ICW-North	0.0%	10.7%	12.8%	0.0%	3.5%	0.0%	44.6%	12.4%	1.8%	0.0%	14.3%	3,163.8	35%
ICW-South	0.0%	18.7%	15.3%	1.4%	4.8%	0.0%	31.1%	6.1%	3.4%	0.2%	19.0%	3,291.8	45%
Middle River	0.0%	14.1%	16.0%	4.9%	6.7%	0.1%	34.7%	7.5%	6.8%	0.5%	8.6%	10,398.8	48%
New River	0.0%	29.0%	19.6%	5.4%	10.3%	0.0%	19.0%	10.8%	3.3%	0.0%	2.5%	2,154.6	57%
North Fork New River	0.0%	13.1%	15.7%	3.0%	8.2%	0.0%	39.6%	9.5%	7.2%	0.3%	3.4%	4,564.9	46%
South Fork New River	0.3%	6.4%	7.6%	3.1%	6.9%	1.1%	41.6%	6.4%	9.2%	1.7%	15.6%	6,414.3	40%
Prospect Recharge	0.0%	6.9%	23.5%	8.7%	4.3%	0.0%	12.6%	18.0%	7.7%	7.0%	11.4%	1,843.4	44%
S36	0.1%	17.4%	8.5%	8.2%	4.0%	0.0%	20.2%	7.7%	25.1%	1.4%	7.5%	2,156.2	59%
S37A	0.0%	34.8%	14.5%	11.4%	0.9%	0.0%	0.5%	19.9%	10.6%	0.1%	7.3%	2,794.7	59%
Total (Regional Model)	**0.1%**	**14.8%**	**15.3%**	**4.2%**	**6.1%**	**0.2%**	**32.2%**	**8.8%**	**7.5%**	**0.9%**	**9.9%**	**40,319.0**	**47%**

Notes: 1. The total impervious area percentage is an area-weighted value of directly connected impervious area (DCIA) estimates for each land use.
2. Land use coverage based on the SFWMD 2004 land use and the City's coverages.

Table 4-2. Future Land Use Coverage by Major Basin.

Major Basins	Agricultural	Commercial and Services	High Density Residential	Industrial	Institutional	Low Density Residential	Medium Density Residential	Recreational / Open Land	Transportation, Utilities, and Communication	Upland Forests	Water/ Wetlands	Total (acres)	Percent [1] Imperviousness
Cypress Creek	0.0%	13.0%	27.7%	0.9%	7.2%	0.0%	38.2%	1.0%	4.7%	0.0%	7.3%	3,426.3	50%
ICW-North	0.0%	10.7%	12.9%	0.0%	3.5%	0.0%	44.9%	11.9%	1.8%	0.0%	14.3%	3,163.8	36%
ICW-South	0.0%	18.7%	15.6%	1.4%	4.8%	0.0%	31.8%	5.1%	3.4%	0.2%	19.0%	3,291.8	46%
Middle River	0.1%	14.2%	16.1%	5.0%	6.8%	0.1%	35.1%	6.5%	6.9%	0.5%	8.6%	10,398.8	48%
New River	0.0%	29.7%	21.4%	5.4%	10.7%	0.0%	19.4%	7.4%	3.3%	0.0%	2.5%	2,154.6	59%
North Fork New River	0.0%	13.7%	16.8%	3.1%	8.3%	0.0%	41.3%	5.9%	7.2%	0.3%	3.4%	4,564.9	48%
South Fork New River	0.3%	6.5%	8.0%	3.1%	6.9%	1.2%	42.2%	5.3%	9.2%	1.7%	15.6%	6,414.3	41%
Prospect Recharge	0.0%	6.9%	23.5%	8.8%	4.3%	0.0%	12.6%	17.9%	7.7%	7.0%	11.4%	1,843.4	44%
S36	0.4%	17.4%	8.5%	8.5%	4.0%	0.0%	20.2%	7.0%	25.2%	1.4%	7.5%	2,156.2	59%
S37A	0.0%	34.9%	14.5%	11.5%	0.9%	0.0%	0.5%	19.8%	10.6%	0.1%	7.3%	2,794.7	59%
Total (Regional Model)	**0.1%**	**15.0%**	**15.7%**	**4.3%**	**6.1%**	**0.2%**	**32.8%**	**7.6%**	**7.5%**	**0.9%**	**9.9%**	**40,319.0**	**48%**

Notes: 1. The total impervious area percentage is an area-weighted value of directly connected impervious area (DCIA) estimates for each land use.
2. Land use coverage based on the SFWMD 2004 land use and the City's coverages.

Environmental Resource Permits (ERPs)

These permits are required for any activity that may impact on wetlands, alter surface water flows or contribute to water pollution. Although they are required for the design and construction of stormwater treatment facilities with drainage areas greater than 1 acres unless specific exemptions apply, they are also used to regulate other activities such as dredging and filling in wetlands, constructing flood protection facilities, and site grading. In Broward County, particularly, ERPs are also required for any type of project related to sanitary sewers, water main, and pump station installations, repairs, and removals. This GIS database includes records from the year 1995 to the present.

The ERP GIS coverage showed an extensive number of locations throughout the modeled area. The nature of the major permitted areas included within the study area was verified by looking into the still-growing online SFWMD permitting database. A significant percent of these spot-checked project areas are associated to activities which do not include or require stormwater treatment. The original ERP GIS coverage was significantly reduced after this verification, which in turn allowed identifying the type of stormwater treatment provided by each permitted area. The most common stormwater treatment practice was the implementation of swales and exfiltration trenches.

Management and Storage of Surface Water (MSSW) Permits

Management and Storage of Surface Waters (MSSW) permits or similar type of permits preceded ERPs to exclusively regulate stormwater treatment before the implementation of the stormwater rule by the SFWMD in 1983. This GIS database includes records from the year 1978 to the present.

The MSSW GIS coverage showed a greater number but much smaller permitted areas with respect to the ERP coverage. The newly developed areas identified as a result of the historical land use comparison often overlapped the MSSW GIS coverage, identifying areas within a large development that has been phased out in time and for which the MSSW GIS permit has been issued for the entire development. Verification of the type of stormwater treatment provided by looking into the online permit information was also performed but limited due to the greater number of permitted areas. In general, the permitted areas provided onsite detention/retention via the construction of swales and/or exfiltration trenches.

Historical Land Use Analysis

In addition to these databases, a comparison of historical land uses was also considered as a way to define the BMP coverage. For this comparison, it is desired to have a historical land use as close as possible to 1983, the year the stormwater rule was implemented. SFWMD land use coverage from the year 1988 was available for this comparison. This procedure considers that all the new developments that took place from 1988 through the existing land use condition (2004) have been covered by the stormwater rule, and treatment has been provided onsite.

These three proxies were considered, compared, processed, and finally appended together to define the BMP coverage for the study area. Due to the presence of a great number of waterbodies within the study area, and considering the fact that is of common practice to utilize them as stormwater wet detention areas, it was expected that the HUs they are in are treated by this stormwater treatment alternative.

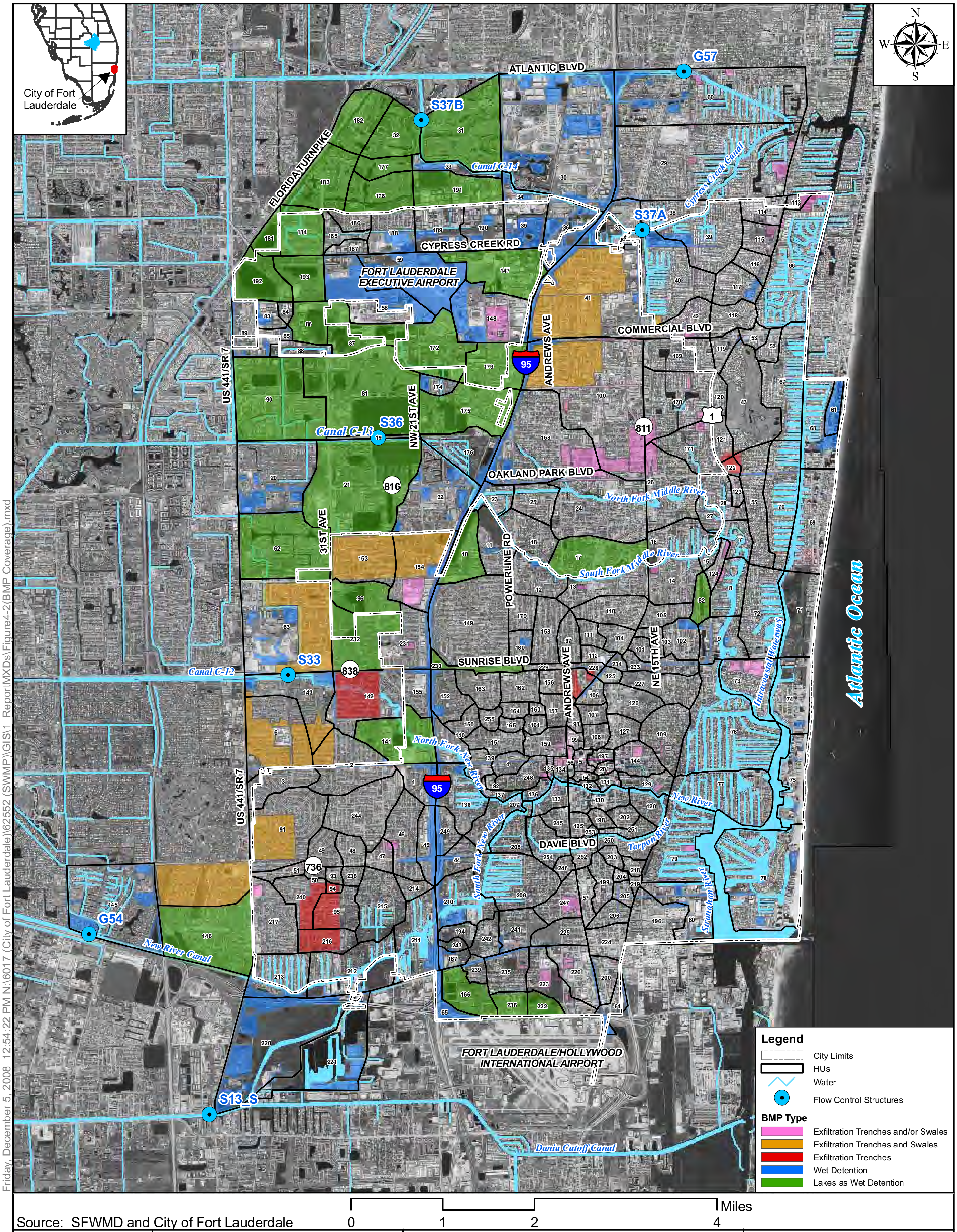
Figure 4-2 shows the estimated BMP coverage for the study area developed as described above. **Table 4-3** provides the BMP coverage in percentage of land use category per major basin.

Table 4-4 provides the estimated removal efficiency used in the WMM for each of the BMP practices identified within the study area.

Table 4-4. BMP Removal Efficiencies for each Water Quality Parameter.

Parameter	Grassed Swales (1)	Wet Detention (2)	Exfiltration Trench (3)	Exfiltration Trench and Swales	Exfiltration Trench and/or Swales (3)
BOD	30	55	70	80	70
COD	30	30	30	40	30
TSS	80	85	90	95	90
TDS	10	40	50	60	50
TP	40	65	50	60	50
DP	10	70	50	60	50
TKN	40	37	50	60	50
NO2/NO3	40	80	50	60	50
Pb	75	75	90	95	90
Cu	50	60	90	95	90
Zn	50	85	90	95	90
Cd	65	80	90	95	90
Bacteria	50	20	70	80	70

(1) Watershed Management Model Version 4.0 User's Manual, CDM, 1998.
(2) "Pollutant Removal Efficiencies for Typical Stormwater Management Systems in Florida", Harper 1999 (in italics); and WMM User's Manual.
(3) SFWMD's BMP Manual for South Florida Urban Stormwater Management Systems, 2002.
(4) Estimated from efficiencies for a combination of grassed swales and exfiltration trench.



Friday, December 5, 2008 12:54:22 PM N:\6017 (City of Fort Lauderdale)\62552 (SWMP)\GIS\1 ReportMXDs\Figure4-2(BMP Coverage).mxd

Source: SFWMD and City of Fort Lauderdale

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 4-2
City-Wide Stormwater Master Plan
Estimated BMP Coverage

UPDATED
12-05-08

Table 4-3. Estimated Existing BMP Coverage for the Study Area Summarized by Major Basin and BMP Type.

Major Basin	BMP Type	Agricultural	Commercial and Services	High Density Residential	Industrial	Institutional	Low Density Residential	Medium Density Residential	Recreational / Open Land	Transportation, Utilities, and Communication	Upland Forests	Water/ Wetlands	Total BMP (acres) [1]
Cypress Creek	Exfiltration Trenches and Swales		1.1%	45.3%	7.9%	10.5%			0.9%	2.9%			467.87
	Exfiltration Trenches and/or Swales		8.4%	1.1%		1.1%		0.5%		7.1%			68.11
	Wet Detention		2.4%	2.9%		23.2%		1.1%	0.0%	74.1%			228.51
	Cypress Creek Total [2]		**11.9%**	**49.3%**	**7.9%**	**34.8%**		**1.6%**	**0.9%**	**84.2%**			**22.3%**
ICW-North	Exfiltration Trenches		2.4%										8.28
	Exfiltration Trenches and/or Swales		2.8%	5.7%					0.0%	0.1%			32.66
	Wet Detention		10.7%	10.6%		12.7%		0.1%	0.1%	19.7%			105.69
	ICW-North Total		**15.9%**	**16.3%**		**12.7%**		**0.1%**	**0.1%**	**19.7%**			**4.6%**
ICW-South	Exfiltration Trenches and/or Swales		6.7%	0.4%						0.6%			43.89
	Wet Detention		5.0%	1.6%	0.0%	4.6%		0.0%		69.7%			124.55
	ICW-South Total		**11.8%**	**2.0%**	**0.0%**	**4.6%**		**0.0%**		**70.3%**			**5.1%**
Middle River	Exfiltration Trenches		1.8%		0.2%				0.0%	0.0%			27.01
	Exfiltration Trenches and Swales		2.1%	13.4%	5.2%	7.9%		5.6%	8.2%	1.1%		0.2%	610.43
	Exfiltration Trenches and/or Swales		8.1%	5.0%	11.8%	7.7%		1.7%	0.2%	6.4%			425.79
	Lakes as Wet Detention	100.0%	21.0%	29.0%	25.8%	31.0%	89.1%	13.2%	46.3%	33.4%	89.4%	55.7%	2,774.43
	Wet Detention		10.0%	8.3%	9.2%	11.7%		1.5%	0.9%	75.1%			1,009.58
	Middle River Total	**100.0%**	**42.9%**	**55.7%**	**52.2%**	**58.4%**	**89.1%**	**22.0%**	**55.7%**	**116.0%**	**89.4%**	**55.8%**	**46.6%**
New River	Exfiltration Trenches		2.4%	0.0%	3.6%				1.1%	0.8%			22.27
	Exfiltration Trenches and/or Swales		1.8%	1.5%	0.6%	17.6%		0.5%	0.1%	27.3%			79.60
	Wet Detention		0.0%	0.0%		0.1%		0.0%	0.2%	9.3%			7.62
	New River Total		**4.2%**	**1.5%**	**4.2%**	**17.7%**		**0.6%**	**1.4%**	**37.4%**			**5.1%**
North Fork New River	Exfiltration Trenches		3.3%		0.1%	1.9%		4.7%	8.0%	0.6%		3.2%	153.91
	Exfiltration Trenches and Swales		21.3%	25.7%	0.5%	15.5%		27.2%	8.2%	2.7%	36.1%	6.4%	921.17
	Exfiltration Trenches and/or Swales		1.7%	0.1%	2.0%	2.6%				0.5%			24.80
	Lakes as Wet Detention		13.5%	14.5%	28.8%	17.8%		19.1%	45.4%	15.4%	16.5%	36.7%	941.34
	Wet Detention		13.0%	1.5%	5.8%	3.7%		0.5%	0.2%	87.0%			405.95
	North Fork New River Total		**52.9%**	**41.7%**	**37.1%**	**41.4%**		**51.4%**	**61.7%**	**106.1%**	**52.6%**	**46.3%**	**53.6%**
Prospect Recharge	Lakes as Wet Detention		4.1%	92.1%		17.3%		53.5%	91.0%	85.9%	54.7%	93.6%	1,232.60
	Wet Detention		16.3%	34.3%	14.8%	74.8%		2.5%		76.4%			365.99
	Prospect Recharge Total		**20.4%**	**126.5%**	**14.8%**	**92.1%**		**56.0%**	**91.0%**	**162.3%**	**54.7%**	**93.6%**	**86.7%**
S36	Lakes as Wet Detention	7.6%	33.9%	42.1%	14.1%	77.3%		57.4%	53.0%	5.6%	35.2%	89.3%	818.04
	Wet Detention		32.0%	20.0%	17.5%	82.0%		3.1%	3.6%	97.5%			804.90
	S36 Total	**7.6%**	**65.9%**	**62.2%**	**31.6%**	**159.3%**		**60.6%**	**56.6%**	**103.1%**	**35.2%**	**89.3%**	**75.3%**
S37A	Exfiltration Trenches and Swales		0.4%	0.1%						0.0%			4.74
	Lakes as Wet Detention		28.1%	58.9%	24.1%	63.2%		100.0%	54.2%	33.7%		34.6%	1,089.66
	Wet Detention		34.0%	15.3%	11.7%	2.7%			0.0%	93.7%			709.08
	S37A Total		**62.5%**	**74.4%**	**35.8%**	**65.8%**		**100.0%**	**54.2%**	**127.5%**		**34.6%**	**64.5%**
South Fork New River	Exfiltration Trenches		0.1%			2.5%		7.1%	0.2%				201.67
	Exfiltration Trenches and Swales		6.6%	19.5%		4.0%		6.5%	3.7%	4.3%	9.0%	4.2%	406.89
	Exfiltration Trenches and/or Swales		0.0%			10.0%		0.0%		1.8%			54.85
	Lakes as Wet Detention		9.3%	21.8%	17.9%	6.8%		9.2%	16.8%	10.8%	18.5%	6.9%	677.51
	Wet Detention		19.6%	4.9%	6.7%	21.5%		2.5%	6.7%	87.1%			822.76
	South Fork New River Total		**35.5%**	**46.2%**	**24.6%**	**44.8%**		**25.3%**	**27.5%**	**104.0%**	**27.5%**	**11.1%**	**33.7%**
Grand Total [3]		17.5%	36.5%	48.0%	33.5%	46.4%	13.7%	21.9%	42.8%	106.4%	48.5%	27.2%	39.0%

Notes: 1. Total amount of acres for each BMP Type available per Major Basin.
2. Total percent of acres per land use covered by BMP types available within each Major Basin. Areas treated by two or more type of BMPs explain percentages higher than 100 percent.
3. Total percent of acres per land use covered by any BMPtype within the entire Regional Model Area. Areas treated by two or more type of BMPs explain percentages higher than 100 percent.

4.1.4 Model Input Parameters

This section provides a summary of the existing hydrologic and watershed characteristics, and input parameters required by the WMM including rainfall, impervious cover percentage, runoff coefficients, event mean concentrations, baseflow and baseflow loading factors, and delivery ratios.

4.1.4.1 Rainfall

Annual and seasonal rainfall is used in the WMM to estimate runoff from pervious and impervious areas, and consequently, water quality pollutant loading rates. Figure 2-8 in Section 2.2.5 shows the location and the period of record available from these gauges and other rainfall gauges that were initially considered. Both are located on water control structures also monitored and operated by the SFWMD. **Table 4-5** provides information on the rainfall gauges shown in Figure 4-5 identified by DBKEY.

From the gauges identified in Table 4-5, six stand out for having long record periods and moderate to good quality data, namely: PT224, PT369, 06177, 05801, 05796, and 05797. The pair of gauges conformed by PT369 and 05796, and by 06177 and PT224 is redundant according to their spatial location within the study area. Therefore, only PT369 and 06177 were considered for further analysis for having better quality data than their pairs. In order to compare variability and major statistics on annual rainfall records, a Winkler plot was developed for the selected four gauges. **Figure 4-3** provides annual rainfall statistics for the gauges 05801, 06177, PT369, and 05797.

Figure 4-6 (as presented in Section 4.1.4.8) exhibits a significant difference of approximately 5 and 8 inches between 06177 and 05801 and PT369, respectively. Considering the fact that the distances between these gauges is relatively short, it may suggest that 06177 is overestimating the amount of annual rainfall with respect to the values recorded in neighbor stations.

Gauges 05801 and 05797 have similar average annual rainfall. However, when evaluating their data series in detail were found to have 56 and 18 months, respectively, with missing daily records that were completed for further analysis with data collected at neighbor stations. Considering this fact, it was decided that gauge 05801 provides more accurate annual and seasonal rainfall values for the project.

Based on long-term climate monitoring data, rainfall in the City of Fort Lauderdale averages about 57 inches annually, with almost 72 percent of this volume occurring during the 6 months from May through October.

For the study area, the wet season is typically considered to occur during the months of May through October, which is also verified in the annual distribution of rainfall shown in **Figure 4-4**. Based on the 05801 gauge's 45-year record, the wet season accounts for 72 percent (i.e., 41.1 inches) of the average annual rainfall (57.1 inches), the remaining volume is distributed during the months of November and April in the hydrological year.

Table 4-5. Rainfall Gauges Located within the Study Area.

DBKEY	Station Name	Agency	Period	Easting	Northing
PT222	083163-1	NOAA	1948-1984	935119	642947
PT223	083163-2	NOAA	1963-1969	929649	642911
PT224	083163-3*	NOAA	1969-1999	918709	642843
PT226	083165-1	NOAA	2001-2001	934000	632741
PT227	083168-1	NOAA	1952-1966	946017	649078
PT369	087254-1*	NOAA	1948-2001	934802	691412
06177	DIXIE WA_*	NOAA	1914-1998	918782	643379
16613	FTL	WMD	1991-2008	916613	640236
05801	G54_R*	WMD	1957-2001	908926	640923
K8626	G54_R	WMD	1997-2008	908926	640923
K8628	G57_R	WMD	1997-2008	943262	690690
06203	LAUDPBAH_R	NOAA	1952-1966	948837	647916
06179	POMPANOB_	NOAA	1941-1998	934878	691543
05796	POMPANOF_*	WMD	1957-2002	938066	691362
16682	S33_R	WMD	1993-2008	920436	655884
05797	S36_R*	WMD	1959-2002	925637	669573
16681	S36_R	WMD	1991-2008	925637	669573
16680	S37A_R	WMD	1991-2008	940883	681556
16612	S37B_R	WMD	1991-2008	928114	687893

* Gauges with moderate to good quality data and with longest record period.

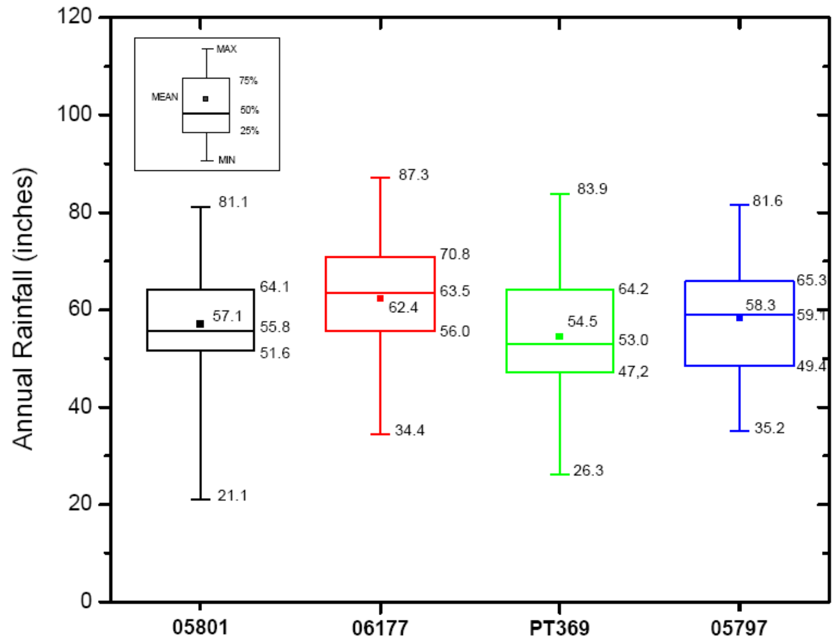


Figure 4-3. **Annual Precipitation at Gauges 05801, 06177, PT369, and 05797.**

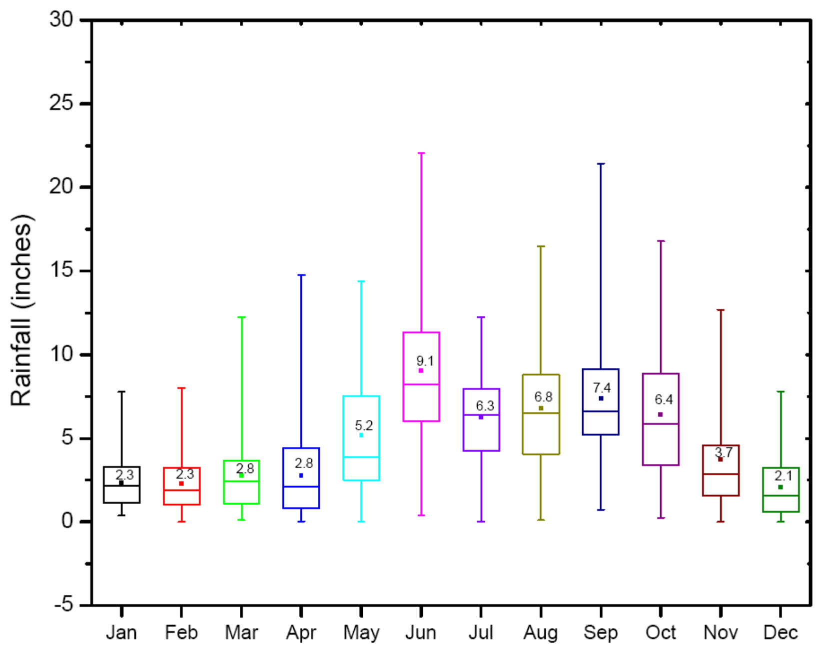


Figure 4-4. Monthly Mean Precipitation Distributions for Gauge 05801.

4.1.4.2 Impervious Cover Percentage

Runoff is directly related to the runoff coefficient which is developed from the percentages of pervious and impervious areas. Each land use category has an expected range for these percentages depending upon local conditions. The more the impervious area, the greater the runoff is from a particular land use category. A portion of the impervious area may runoff to a pervious area and be retained onsite. On the other hand, another portion of the impervious area is directly connected to overland flow leaving the site through the drainage system. This latter scenario describes what is known as directly connected impervious area (DCIA), which could vary from 20 to 100 percent of the total impervious area. The WMM uses DCIA in its calculations since non-DCIA runoff is considered lost to baseflow.

Table 4-6 provides the impervious cover percentages considered in the water quantity evaluations and the DCIA values included in the WMM simulations.

Table 4-6. Land Use Impervious Cover Percentage and DCIA.

Land Use Category	Impervious Cover (%)	DCIA (%)
Agricultural	5	1
Commercial and Services	90	81
High Density Residential	82.5	65
Industrial	90	81
Institutional	90	81
Low Density Residential	15	7.5
Medium Density Residential	35	23
Recreational/Open Land	5	1
Transportation/utilities/communication	100	90
Upland Forests	5	1
Water/Wetlands	100	25

4.1.4.3 Runoff Coefficients

WMM calculates the annual and seasonal runoff from pervious and impervious areas by multiplying the annual and seasonal rainfall by the runoff coefficient of each land use category. The runoff coefficient is estimated as a composite value of the coefficients assigned to pervious and impervious areas and the DCIA percentages for each land use category.

Table 4-7 provides the pervious and impervious runoff coefficients and the estimated composite runoff coefficient for each land use category.

Table 4-7. Runoff Coefficients per Land Use Categories.

Land Use Category	Impervious Runoff Coefficient	Pervious Runoff Coefficient		Runoff Coefficient Composite Value (for Cp 0.1, 0.05) [1]	
		Other Soil Type	Soil Type A		
Agricultural	0.9	0.1	0.05	0.11	0.06
Commercial and Services	0.9	0.1	0.05	0.75	0.74
High Density Residential	0.9	0.1	0.05	0.62	0.60
Industrial	0.9	0.1	0.05	0.75	0.74
Institutional	0.9	0.1	0.05	0.75	0.74
Low Density Residential	0.9	0.1	0.05	0.16	0.11
Medium Density Residential	0.9	0.1	0.05	0.28	0.25
Recreational/Open Land	0.9	0.1	0.05	0.11	0.06
Transportation/utilities/ communication	0.9	0.1	0.05	0.82	0.82
Upland Forests	0.9	0.1	0.05	0.11	0.06
Water/Wetlands	0.9	0.1	0.05	0.30	0.26

[1] Runoff coefficient estimated for both 0.1 and 0.05 pervious runoff coefficients, which correspond to soils with non-A and A hydrologic soil group, respectively.

Pervious runoff coefficients (Cp) for land uses overlaying type A soils according to the HSG classification were assigned a lower runoff coefficient to account for their better drainage capacity. As stated before, 68 percent of the HUs intersect type A soils, which corresponds to 20 percent of the entire study area. For these HUs, the pervious runoff coefficient was an area-weighted value of soils types with a typical Cp value of 0.10 within the HU.

4.1.4.4 Event Mean Concentrations

Event mean concentrations (EMCs) are used in the WMM to calculate the loading rates by multiplying them with the runoff from each land use category. EMCs are also land use specific values that are usually estimated by sampling stormwater runoff of storm events at different durations in drainage system watersheds dominated by a particular land use category. Therefore, EMCs are an important component of non-point source (NPS) pollution estimates in the WMM.

Nationwide and local studies have reported EMC values for selected land use categories. The nationwide urban runoff program (NURP) was a research project conducted between 1978 and 1983 oriented to evaluate the impact of stormwater runoff in waterbodies and the performance of the implementation of stormwater management practices. CDM has also played a significant role in compiling, documenting, and creating an EMC database at national and regional levels. The

CDM Southeast US EMC database, with 44 stations in Florida, was completed in 2001 for the most common developed and undeveloped land use categories. Environmental Research and Design has also collected EMC data in Central and South Florida and documented it in several reports (Harper, 1992; Harper, 2003). The aforementioned references and several others were consulted to define the EMC set of values to use in the project.

Table 4-8 provides a summary of the selected EMC values for the twelve NPDES parameters and for each land use category.

4.1.4.5 Flow and Water Quality Monitoring Data

Flow and water quality stations were looked for in the study area. The SFWMD's hydrologic database (DBHYDRO) was the main source of daily flow data. **Figure 4-5** shows the location of the flow and water quality stations from the SFWMD network identified in the area. The closest stations to the coastal area are also the structures that serve as divide between freshwater and brackish water.

Flow and water quality stations are needed to evaluate potential locations to validate the WMM. In order to do this, both daily flow and water quality grab sample data should be available at the same location and for a common record period of at least five (5) years to estimate seasonal and annual 'measured' loads.

Streamflow Data

The main source available in the area for streamflow and stage data is the SFWMD. Upstream and downstream stage data of the salinity-control structures and estimated discharge through the structures is available on a daily time step from the SFWMD. Streamflow measurements are not available at any other locations within the study area. Flow discharges through these salinity-control structures are computed using theoretical discharge-coefficient ratings based on manual readings of gate openings, stages by the SFWMD and the U.S. Army Corps of Engineers (USACE).

Table 2-7 (as presented in Section 2.2.6) provides a summary of flow and stage gauges identified within the study area. At the stage gauges located on gate (G) and spillway (S) structures, headwater and tailwater elevations are measured to estimate discharge passing through the structure.

Water Quality Data

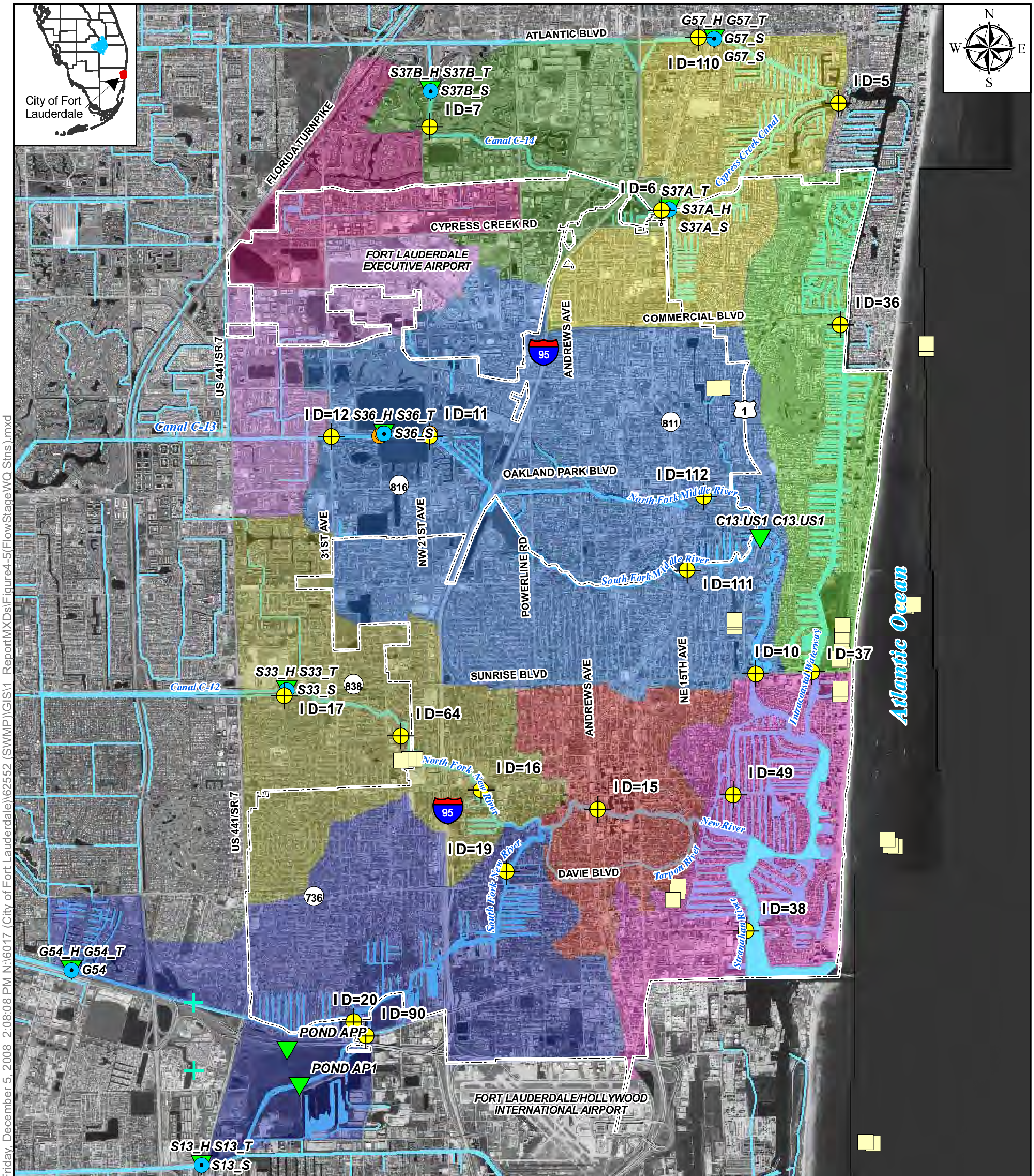
Water quality information was obtained from STORET (EPA's storage and retrieval environmental database). Information in STORET is provided by federal, state, and private environmental monitoring programs. For this project, the major sources of this information were the Broward County's Department of Natural Resources Protection (BCDNRP) monitoring program (21FLBROW), Lakewatch (21FLKWAT), and the South Florida Water Management District (21FLSFWM). Lakewatch and SFWMD have stations mostly located in lakes and coastal areas, where flow measurements are not estimated.

Table 4-8. Runoff Event Mean Concentrations (EMCs) for Annual Load Calculations.

Land Use Category	DCIA	BOD	COD	TSS	TDS	TP	DP[2]	TKN	NO2+ NO3	Pb	Cu	Zn	Cd	Fecal Coliform (counts/100 mL) [1]
Low Density Residential	7.5	10	62	21	152	0.28	0.18	1.18	0.27	0.0046	0.0045	0.0260	0.0011	146,027,000,000
Medium Density Residential	23	7	60	26	117	0.34	0.20	1.64	0.50	0.0082	0.0080	0.0419	0.0012	146,027,000,000
High Density Residential	65	11	86	71	72	0.45	0.27	1.84	0.58	0.0115	0.0109	0.0903	0.0002	98,863,000,000
Commercial and Services	81	17	83	94	130	0.43	0.26	2.20	0.63	0.2140	0.0061	0.1700	0.0013	51,245,500,000
Industrial	81	11	69	64	163	0.35	0.15	1.27	0.70	0.0102	0.0146	0.0955	0.0011	51,245,500,000
Institutional	65	11	86	71	72	0.45	0.27	1.84	0.58	0.0115	0.0109	0.0903	0.0002	51,245,500,000
Agricultural	1	5	51	94	100	0.29	0.12	1.46	0.03	0.0050	0.0040	0.0230	0.0000	136,050,000,000
Recreational / Open Land	1	13	63	16	187	0.21	0.15	0.71	0.04	0.0010	0.0010	0.0100	0.0010	49,885,000,000
Upland Forests	1	1	51	8	100	0.05	0.01	0.86	0.30	0.0010	0.0010	0.0000	0.0010	49,885,000,000
Water/Wetlands	25	3	51	11	100	0.02	0.01	1.18	0.00	0.0010	0.0010	0.0060	0.0000	49,885,000,000
Transportation, Utilities, and Communication	90	7	11	49	121	0.27	0.10	1.58	0.65	0.2110	0.0400	0.1670	0.0013	51,245,500,000

"Evaluation of Alternative Stormwater Regulations for Southwest Florida" ERD (Harper, 2003).
NPDES Part II Stormwater Permit Applications for Sarasota County.
CDM Southeast Database (2001).
Nationwide Urban Runoff Program (NURP), 1983
CDM Data Compilation of 192 NPDES MS4 Permit Application Results.
Graves et al (2004) "Water Quality Characteristics of Storm Water from Major Land Uses in South Florida".
Mean wetfall concentration - Tampa NURP Study.
Estimaved EMC from Medium Density Residential and Recreational / Open Land.

1 EMC values for Fecal Coliform were taken from manuals and previous Studies: City of Rockledge, BMP Manual, Harvey Harper/PLSM, Sarasota Bay NEP, Sarasota NURP/NAPL, and Sarasota County.



Friday, December 5, 2008 2:08:08 PM N:\6017 (City of Fort Lauderdale)\62552 (SWMP)\GIS\1_ReportMXDs\Figure4-5(FlowStageWQ Stns).mxd

Legend

- City Limits
- Water
- Stage Gauges (H: Headwater, T: Tailwater)
- Flow Gauges
- Broward County DNRP Water Quality Monitoring Program

Additonal Water Quality Stations
Organization Name

- Biological Research Associates (Florida)
- Florida LAKEWATCH
- SFWMD

Major Basins

- Cypress Creek
- ICW-North
- ICW-South
- Middle River
- New River
- North Fork New River
- Prospect Recharge
- S-36
- S-37A
- South Fork New River

0 1 2 4 Miles

Source: SFWMD

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 4-5
City-Wide Stormwater Master Plan
Flow, Stage, and Water Quality Stations

UPDATED 12-05-08

From these sources, water quality data collected as part of the Broward County monitoring program offers more periodicity and spatial variability for some of the parameters of interest considered in this Project. Broward County has used its monitoring network to conduct water chemistry and bacteriological studies (TR:94-03, 1994; TR:01-09, 2001). For these studies, additional monitoring locations have been temporarily installed for specific data collection as appropriate.

Localized studies (Solo-Gabriele et al, 2000; Desmarais et al, 2002) led by the University of Miami on the North Fork of the New River oriented to identify the source of fecal contamination have generated an intense bacteriological data collection moderately disperse throughout that reach of the New River.

Figure 4-5 shows the location of identified stations with water quality data and approximate location of monitoring stations used for localized studies. Table 2-9 in Section 2.2.10 provides a summary of the average concentrations of water quality parameters in the BCDNRP monitoring network located within the study area.

4.1.4.6 Baseflow and Baseflow Loading Factors

Besides runoff, baseflow constitutes the second largest source of flow, and thereby, load in a waterbody. Baseflow is originated from the infiltration of water through pervious, and sometimes also, impervious areas reaching the water table to be transported to the nearest waterbody to become part of the seasonal and annual flow. Baseflow is not as variable as overland flow since it does not respond immediately to atmospheric changes. However, it could account for as much as 40 to 60 percent of the total annual flow observed in a waterbody.

Typically, a baseflow separation technique is used to determine the percent of daily and annual flow due to groundwater interception. The technique used for this project was TSPROC, part of PEST, which is a model independent parameter estimation and predictive uncertainty analysis software. TSPROC is a time series processor used by PEST to prepare input files and for postprocessing of simulation runs. One of the applications that it provides is to estimate baseflow by using a high pass filter to remove high frequency signals resulting in the suitable separation of the quickflow component of streamflow (i.e., runoff). The baseflow is therefore calculated by subtracting this component (runoff) from the measured streamflow.

Daily streamflow measurements were obtained from the SFWMD's hydrological database (DBHYDRO) at G-54, G-57, S-36, and S-37B. Daily runoff values for the record of period were subtracted from streamflow to obtain daily baseflow values, which were annually averaged. The results are shown in **Table 4-9**. The WMM requires the input of baseflow in inches per year. Therefore, the annual baseflow in cubic feet per second was distributed across the tributary area. The tributary area for each structure was reported in a USGS report that evaluated the discharge coefficients used by the SFWMD to estimate streamflow (Tillis and Swain, 1998).

Table 4-9. Baseflow Estimation Using TSPROC.

Structure	Flow (in/yr)	Runoff (in/yr)	Baseflow (in/yr)
G57	17.3	7.8	9.5
G54	79.3	22.7	52.7
S37B	58.4	25.2	33.2
S36	53.7	25.4	28.3

The baseflow estimates presented in Table 4-9, however, do not seem realistic. The WMM considers baseflow the portion of rainfall that infiltrates pervious areas, reaches the water table, and moves with the groundwater flow until it intersects a surface waterbody. The baseflow estimates suggest that the groundwater basin is much larger than that of the structure tributary area. Perhaps, the Everglades area is the source of the excessive baseflow observed at these structures.

The measured flow at structure S37A is lower than the flow observed at the upstream structure S37B, showing an apparent discontinuity on the observed flow. The Prospect Wellfield site, located east of the Florida Turnpike and south of Cypress Creek, is most likely forcing recharge from water coming from the north and west of the C-14 canal reducing the amount of flow observed at S37A. However, the estimated baseflow for S37B suggests that the influence of the Prospect Wellfield site is not present for the S37B tributary area.

Baseflow concentrations were estimated from correlating water quality and rainfall records. Water quality records were selected for this analysis for having been collected on dates with at least three precedent consecutive days of no-rain. The premise is that flow conditions in the receiving waters after three days of any rainfall event will be predominantly of baseflow. The station No. 17 of the BCMP was used for this analysis. The rainfall gauges at the structure S33 has records for the water quality collection period, and because of its proximity to the water quality station it was used for the analysis, instead of G54.

Another factor influencing baseflow estimates shown in Table 4-9, is the inconsistency in the drainage area found from different sources (Tillis and Swain, 1998; SFWMD GIS delineation).

Table 4-10 shows the baseflow loading factors estimated using the aforementioned method. For those parameters for which there were no water quality information available at station No. 17, water quality data collected and identified through similar methods and purposes for other studies in Central and Southwest Florida were used.

Table 4-10. Baseflow Concentrations at Station No. 17 of the BCDNRP Monitoring Network.

Parameter	Concentration (mg/L)
BOD	*1.2**
COD	*7*
TSS	*5*
TDS	398
TKN	1.02
NOX	0.05
TP	0.02
DP	0.01
Cu	0.0054
Zn	0.016
Pb	*0.001*
Cd	*0*

* Concentrations in italics were identified from projects in Central and Southwest Florida.

Due to the fact of having a great variability on the baseflow estimates shown in Table 4-14, (as presented in Section 4.2.1) where high estimated baseflow occurs on the south and baseflow is greatly reduced by forced-recharge on the north of the study area, it was decided that the baseflow estimation was inconclusive for this project. Therefore, the baseflow contribution was not considered in the WMM for further analysis.

4.1.4.7 Delivery Ratio

In the WMM, estimated annual and seasonal flows and pollutant loadings are applied to the respective HU outlet. Downstream from the outlet, flows remain unaltered. However, the concentration of the pollutants may be modified due to settling of particulate material. This process may be represented in the WMM by assigning a delivery ratio to the load estimated at the outlet. The delivery ratio varies from 0 to 1, when 1 represents 100 percent delivery of the estimated load at the outlet to a downstream location. Therefore, the delivery ratio will reduce the load by a factor, which should be proportional to the expected amount of settling occurring during its transient to a downstream location.

The WMM does not address any other in-stream type of decay, attenuation or growth process, which typically affects pollutant concentrations in channel systems. Since the delivery ratio only addresses the settlement of the pollutant's particulate material, the suspended fraction, which is the fraction of the pollutant subjected to settle, of each non-dissolved species is typically identified.

Delivery ratios are generally determined using travel time as the primary criterion. It is expected that the longer the travel time, the more settling will occur during transit from the HU outlet to any point of interest downstream. Travel time is inversely proportional to velocity; therefore, slow stream-flowing systems combined with long traveling distances will greatly facilitate settling. In order to estimate delivery ratios, cross-section information throughout the channel system is needed to calculate velocities, and hence, travel times.

Delivery ratios are typically estimated during calibration for watersheds with travel times greater than 12 hours in order to match observed concentrations and loads at a downstream calibration point, where flow and water quality data is available for the calibration period. For watershed with travel times less than 12 hours, it is expected that the settlement of particulate material to be minimal as the stormwater leaves the watershed with high velocities and turbulent state. Delivery ratios were not estimated for this project since the travel time within the study area is considered to be less than 12 hours and because calibration was not performed at any location within the watershed.

4.1.4.8 Point and Non-Point Sources

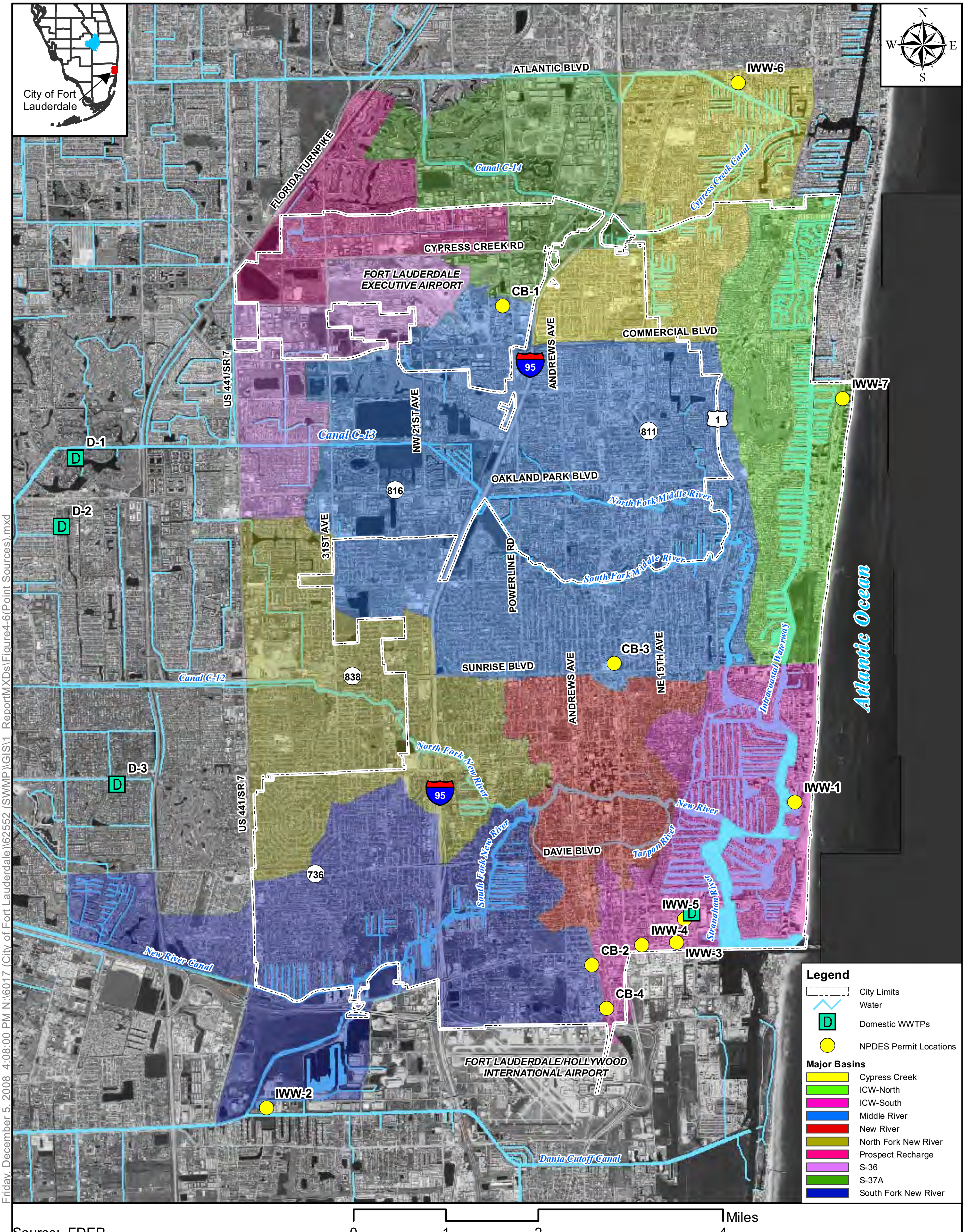
In general, pollution reaches surface waterbodies via two main sources, namely: point and non-point. Point sources correspond to direct discharges from the outfalls of industrial and municipal wastewater facilities into rivers, streams, lakes, and the ocean. Non-point sources, instead, correspond to those pollutant loadings that are indirectly discharged into surface waters from indistinctive locations within the watershed, and are generally driven by rain and consequently runoff.

Point Sources

The WMM accounts for average loadings being discharged to surface waters at any location within the HU. It adds up the incoming loading from any point source to the total estimated load from the non-point source component and applies the resulting load at the HU outlet.

Figure 4-6 shows the location of the potential point sources of pollution discharging into the surface waterbodies of the study area. Three types of point sources were identified domestic and industrial wastewater treatment plants, and concrete batch plants.

Information on the point sources shown in Figure 4-9 (as presented in Section 4.2.1) was available from the Florida Department of Environmental Protection website. Those facilities identified by a yellow dot are currently permitted by the National Pollution Discharge Elimination System (NPDES) program. NPDES permits are required by the State to any facility discharging to surface waters of the State. The domestic wastewater treatment plants (WWTPs) identified in the map with a green square transitioned during the 1980s and 1990s from NPDES to Non-NPDES. Currently, they do not hold an NPDES permit.



Source: FDEP

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 4-6
City-Wide Stormwater Master Plan
Potential Point Source Locations

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Concrete batch (CB) facility discharges occur through sporadic overflows from their land application treatment. Considering that seasonal or annual scales sporadic discharges are not significant and the fact that monitoring data is also scarce at the discharge locations, concrete batch plants were not considered for further analysis.

Table 4-11 provides a summary of the industrial point sources actively discharging to receiving waterbodies within the study area. It also includes the water quality parameters typically monitored at each point source. Based on the information received from FDEP, point sources were not included in the WMM since only few parameters of interest are monitored at these locations.

Non-Point Sources

Non-point pollution is diffuse and highly dependent of the predominant land use of the watershed. There are three major sources of non-point pollution to be considered in any watershed: i) land use-associated, ii) atmospheric deposition, iii) seepage, and iv) baseflow contribution.

Land-use associated

In the WMM, EMCs address the land use component of non-point pollution by identifying typical concentrations expected to accumulate and eventually runoff during rainfall events from specific land uses.

Atmospheric deposition

Several factors influence the expected atmospheric deposition at any geographic location, namely: weather, vegetation, predominant land use, and proximity to the ocean, among others. Although, in the WMM atmospheric deposition is not modeled as a separate source of pollution, the EMC values assigned for each land use category may implicitly incorporate an atmospheric deposition component at certain locations.

Septic Tanks

Septic tanks are considered an important source of nutrients and bacteriological pollutants when located in near proximity to ditches and canals. When properly designed, constructed, operated, and maintained, onsite sewage treatment disposal systems (OSTDS), may release an effluent as good in quality as a secondary treatment effluent. However, infrequent maintenance, high water tables, or structure failure greatly decreases the water quality of the treated sewage.

Site conditions that control septic tank system performance include: soils, water table elevation, and location with respect to a waterbody. OSTDSs utilize the natural soil's capacity to treat wastewater before discharging to the groundwater. Typically coarse sands, very fine sands, silt, loam, sandy clay loam, and silty clay are preferred soils for septic tank effluent percolation media. A minimum of 2 feet of unsaturated soil should exist between the drain fields and the water table. According to Standards for Onsite Sewage Treatment and Disposal Systems (Chapter 64E-6, F.A.C.), an OSTDS should be located laterally at least 75 feet away from any nearby surface waterbody.

Table 4-11. Identified Point Sources in the Study Area.

Permit No.	Facility Name	Facility Type	Comments	Monitored Water Quality Parameters
FL0036625	Fort Lauderdale Aquatic Complex (IWW-1)	Industrial Wastewater	0.475 MGD maximum discharge to Intracoastal Waterway through outfalls D-001 and D-003. Maximum rates are seldom achieved.	Flow, pH, Temperature, Chlorine, and TSS.
FL0001503	Fpl Lauderdale Plant (IWW-2)	Industrial Wastewater	Crushed limestone-lime lined settling basins before discharging to percolation ponds.	Cl, Flow, Fe, oil and grease, pH, TSS, Temperature, and Turbidity.
FL0039969	Coastal Terminals LLC - Port Everglades Terminal (IWW-3)	Industrial Wastewater	No treatment for hydrostatic test water unless testing indicates contamination; stormwater from containment area checked for sheen.	Organics, TOC, BOD, Cl, Cloroform, Flow, Fe, Pb, oil and grease, DO, TSS, and pH.
FL0000582	Marathon Ashland - Spangler BLVD (Fmr Motiva; Fmr Shell) (IWW-4)	Industrial Wastewater	Disposal of hydrostatic tank test water untreated, unless effluent limits are exceeded. Tank bottom water and loading rack runoff are contained and hauled off-site. Secondary containment storm water observed for sheen prior to discharge. Absorbent pads used for sheen removal.	Organics, TOC, Cl, Cloroform, Flow, Fe, Pb, oil and grease, DO, TSS, and pH.
FL0173975	Marathon Ashland Petroleum - Eisenhower BLVD (IWW-5)	Industrial Wastewater	Dual medium - surface water (after new outall) and percolation in diked area.	Organics, TOC, Cl, Cloroform, Flow, Fe, Pb, oil and grease, DO, TSS, and pH.
FL0001848	Garden Point Condominium, Inc (IWW-6)	Industrial Wastewater	Once-through non-contact air conditioning system cooling water. Discharge at a minimum of 0.31 MGD to Pine Lake (Class III Marine waters) - Contiguous to Pompano Canal.	Flow, Temperature.

Pollutants, as they travel through the unsaturated soil layers, are adsorbed and reduced by the soil before they reach the water table. Effluent nutrients and bacteria leaving the drain fields get dissolved in the water table pool and transported by the local surficial groundwater flow at different advection velocities. Both nutrients and bacteria interact with the water table and soil as the advection process transports them. However, nitrogen species, for instance, have been observed to travel faster and for longer distances than phosphorous species do. Studies have indicated, on the other hand, that bacteria does not travel either fast or long distances from the source. It has been observed that bacteria rapidly interact with soil limiting its travel path from the source. Bacteria travel distances highly depend on soil type, soil properties such as organic matter content and porosity among others, and local groundwater boundary conditions.

Locally, the source of high levels of bacteria concentration observed on monitoring location along the New River North Fork has been evaluated in several Broward County's Department of Natural Resources Protection studies (TR 93-06, 1993; TR 94-06, 1994; and TR 01-09, 2001), and in other studies financially supported by the City (Solo-Gabriele et al, 2000; Scarlatos, 2001; Desmarais et al, 2002).

The New River Water Quality study (TR 93-06, 1993) identified problem areas for bacteria (North Fork and Las Olas Isles) and nutrients (North Fork and South Fork (nitrogen)). The New River North Fork was highlighted as a highly vulnerable and characteristic area for contamination to occur, whereas, the New River South Fork was identified as a groundwater quality dominated environment. The bacteriological testing in Las Olas Isles (TR 94-06, 1994) evaluated several sources of potential sources of bacteria contamination, namely: stormwater runoff, sanitary sewers, and inhabited moored vessels (IMVs). The results of this study indicated that IMVs are the primary source of bacteria contamination in the form of fecal coliform at this site.

In order to quantify the usage of septic tank systems in the study area, two sources were consulted, namely: the Florida Department of Health (FDOH) and the City's Waterworks 2011 program. The FDOH septic tank database has been widely used in similar water quality studies around Florida, however, its usage has shown to have some disadvantages:

- Not all the existing septic tanks in a given area are included in the database; and
- Septic tanks that may have been put off-line, have not been removed from the database.

To complement the information provided by the FDOH database, GIS coverages of gravity sewers were requested from the City. In addition, Waterworks 2011 provided a list of households that have been connected to the newly installed sanitary sewer line as part of this program.

Figure 4-7 shows the septic tank coverage developed with the information listed above and **Table 4-12** provides a breakdown of this coverage per HU.

Baseflow contribution
Baseflow occurs ubiquitously throughout the study area. However, as previously discussed, according to the concentration of measured water quality parameters on surface water samples, baseflow is more dominant in the New River South Fork than in the North Fork. The baseflow water quality is, in general, influenced by rainfall water quality, soil type, and local geologic formations. The WMM applies a single baseflow value for the entire watershed which is affected by baseflow loading rates to define the baseflow load for each HU. It was decided that this feature in the WMM will not be used since the determination of baseflow was inconclusive for the watershed, and baseflow is not expected to change for future land use conditions.

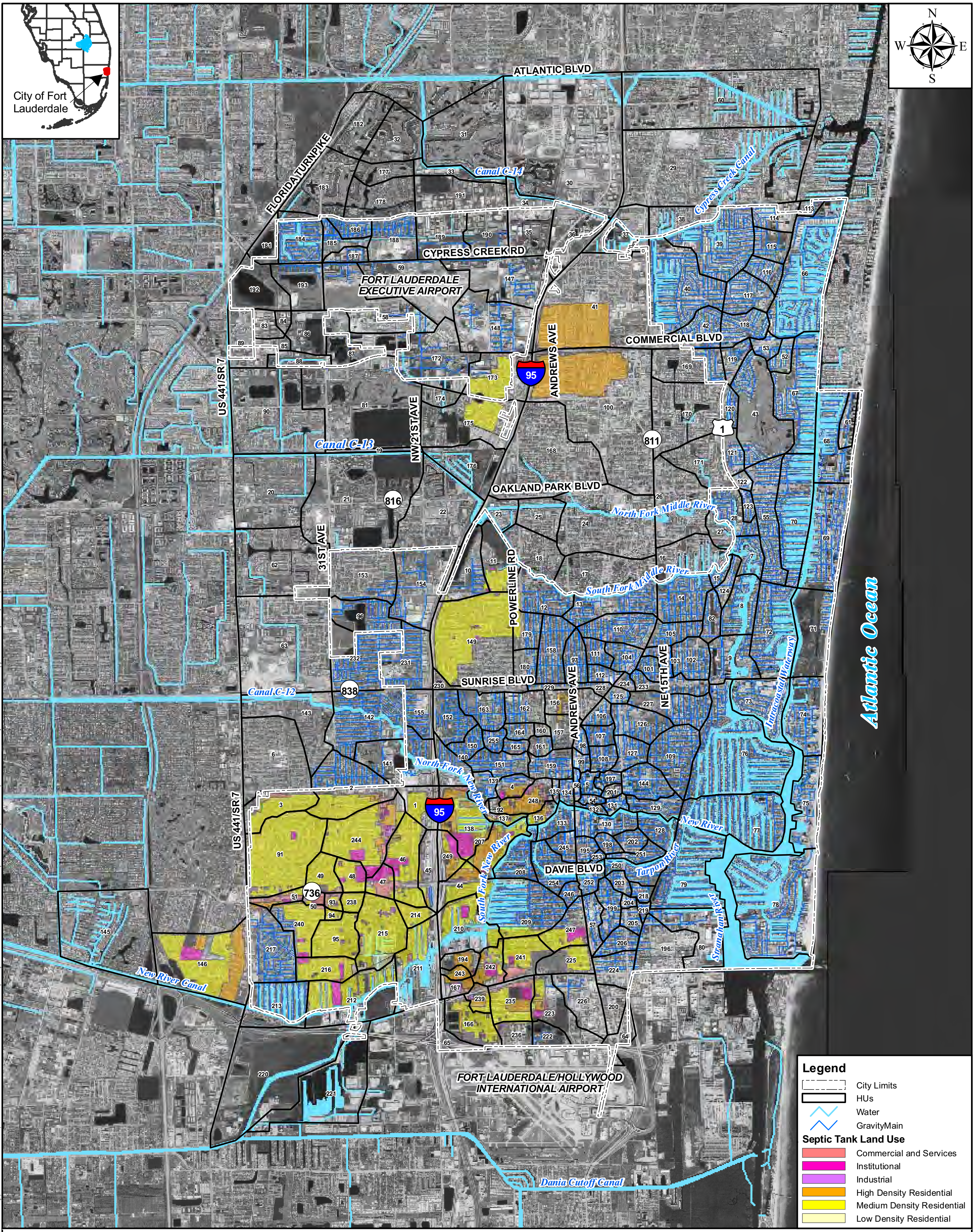
4.2 Model Results and Analysis

Typically, when streamflow and water quality data are available at a given location within the modeled watershed for a period of at least five years, loads could be estimated at this location and the WMM simulated annual flows and load calibrated to those measured loads. A candidate location for this process was the S37A structure, which was located near the coast downstream from the S37B structure and whose tributary area was large enough to evaluate the WMM estimated values. However, as it was stated earlier for the annual baseflow calculations, the annual flow measured at S37A was significantly less than that measured at S37B, which prevented the estimation of the annual flow associated to the tributary area between S37B and S37A. There were no other point locations within the watershed where measured loads could be estimated at. Therefore, calibration of WMM loads was not conducted for this project.

The input parameters outlined in Section 4-1 were applied to the WMM. Land use, septic tank, and BMP coverages were input by importing WMM-specific GIS files. EMCs, hydrology, and BMP removal efficiencies data were manually input into the WMM. Had a calibration period been identified, the rainfall used for the simulations would have been the average value observed during that period.

Instead, the average rainfall of the entire 05801 gauge's record period was used. As stated in Section 4-1, no baseflow value was defined for this project.

The WMM estimated annual flow and load are provided in an output text file in acre-feet per year (ac-ft/year) and in pounds per year (lb/year) for each HU. Results for existing and future land use conditions are provided in the following sections, as well as dry and wet season estimates for the existing condition.



Source: Florida Department of Health (FDOH)

0 1 2 4 Miles

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 4-7
City-Wide Stormwater Master Plan
Estimated Septic Tank Coverage

UPDATED 12-05-08

Table 4-12. Estimated Existing Septic Tank Coverage per Land Use Category and per Hydrologic Unit.

Map ID	Hydrologic Unit	Commercial and Services	High Density Residential	Industrial	Institutional	Low Density Residential	Medium Density Residential	Area with Septic Tanks (acres)[1]
Cypress Creek								
41	HUCCCSPUR-02	1%	47%		0%			223.1
	Total[2]	**0.1%**	**23.4%**		**0.2%**			**7.5%**
Middle River								
10	HUC13MR-01	6%		1%	16%		51%	9.5
11	HUC13MR-02	1%	0%		25%		100%	40.3
12	HUC13MR-03				7%		16%	8.5
100	HUNDIX-01	0%	52%	0%	2%			251.1
149	HUNW15A-01	0%		32%	21%		69%	320.8
172	HUOPL-01						42%	0.1
173	HUOPL-02	2%	29%	3%	7%		99%	83.1
175	HUOPL-04	0%					47%	61.9
179	HUPOWRLN-02						30%	16.5
230	HUSUNR-04				0%		87%	0.4
	Total	**0.1%**	**15.2%**	**0.2%**	**1.4%**		**14.7%**	**10.0%**
New River								
136	HUNFNR-09	100%	100%		59%		100%	17.4
156	HUNW4A-01	0%			3%			14.7
157	HUNW4A-02	1%	9%	1%				2.8
247	HUSW4A-03	22%		9%	79%		66%	59.5
	Total	**0.2%**	**2.0%**	**0.6%**	**7.7%**		**12.7%**	**5.3%**
North Fork New River								
1	HUBROWARD-01	10%		5%			99%	34.2
2	HUBROWARD-02	22%	100%	10%	0%		46%	103.4
3	HUBROWARD-03	42%	82%	29%	57%		99%	104.7
4	HUBROWARD-05	10%	97%		65%			24.1
91	HUMELROSEPK-01	52%		96%	87%		100%	362.2
92	HUMIDLST-01		19%		26%			2.3
137	HUNFNR-10		57%		100%		100%	13.9
138	HUNFNR-11	81%	100%		100%		100%	151.1
140	HUNFNR-13	1%						0.0
248	HUSW7A-01	55%	100%	56%	55%		100%	68.6
249	HUSWRIVRS-01	100%	100%		100%		100%	45.0
	Total	**6.2%**	**22.2%**	**3.2%**	**16.8%**		**35.7%**	**25.0%**
South Fork New River								
44	HUDAVIE-01	100%	100%	100%	100%		100%	63.1
45	HUDAVIE-02	11%	26%	18%	20%		100%	16.9
46	HUDAVIE-03	91%	100%	34%	100%		100%	169.2

Table 4-12. Estimated Existing Septic Tank Coverage per Land Use Category and per Hydrologic Unit (continued).

Map ID	Hydrologic Unit	Commercial and Services	High Density Residential	Industrial	Institutional	Low Density Residential	Medium Density Residential	Area with Septic Tanks (acres) [1]
47	HUDAVIE-04	100%	100%		100%		100%	49.4
48	HUDAVIE-05	100%			100%		100%	61.7
49	HUDAVIE-06	100%		100%	100%		100%	69.7
50	HUDAVIE-07	100%	100%	100%	100%		100%	21.7
51	HUDAVIE-08	100%	91%	100%	96%		100%	36.4
93	HUMLK-01	100%			100%		100%	20.1
94	HUMLK-02	100%					100%	12.5
95	HUMLK-03		100%		100%		100%	124.8
146	HUNNRC-04	1%	91%		100%		99%	276.6
166	HUOC-01	64%	57%	38%	100%		100%	79.0
167	HUOC-02	95%	100%	61%				20.1
194	HUROL-01	100%	100%		100%		100%	26.9
207	HUSFNR-01	100%	100%		100%		100%	95.4
208	HUSFNR-02						0%	0.0
209	HUSFNR-03					100%	25%	55.9
210	HUSFNR-04	100%	100%		100%	100%	96%	91.3
211	HUSFNR-05	9%		3%	33%	100%	100%	66.4
212	HUSFNR-06	4%			99%	100%	99%	127.6
213	HUSFNR-07						1%	0.8
214	HUSFNRSPUR-01			20%	100%		100%	38.9
215	HUSFNRSPUR-02	100%	100%		100%	100%	100%	215.4
216	HUSFNRSPUR-03				100%	100%	96%	95.1
217	HUSFNRSPUR-04	2%	21%	2%	2%			2.6
222	HUSNYDERPK-01			1%			100%	0.0
223	HUSNYDERPK-02	13%	100%		15%		100%	33.6
225	HUSR84-02	37%		44%	65%		100%	43.0
235	HUSW12A-01	81%	100%		100%		100%	107.0
236	HUSW12A-02	7%		4%	26%		100%	8.3
238	HUSW14ST-01	100%					100%	29.6
239	HUSW15A-01	87%	100%	90%			100%	32.4
240	HUSW15CT-01	100%	47%		78%		79%	97.8
241	HUSW20ST-01	72%			100%		100%	84.9
242	HUSW20ST-02	99%	100%		100%		100%	59.9
243	HUSW24ST-01		100%					19.4
244	HUSW27A-01	100%	100%	100%	100%		100%	256.4
	Total	**34.8%**	**66.3%**	**11.0%**	**43.8%**	**89.0%**	**69.8%**	**60.9%**
Total (Regional Model) [3]		**3.1%**	**15.9%**	**1.6%**	**11.7%**	**75.3%**	**23.9%**	**15.8%**

Notes:
1. Total amount of acres using septic tank for each subbasin.
2. Percent of septic tank usage per land use category for each Major Basin.
3. Percent of septic tank usage with respect to the total acreage of each land use category in the Regional Model Area.

4.2.1 Existing Conditions Model

Table 4-13 summarizes the WMM estimated flows and loads for the major basins. The results provided for each HU is presented in **Appendix 4B** for the existing condition model. In order to compare the estimated flow and load among major basins, they were standardized by their acreage creating unit area loads (UALs) and flow expressed in inches per year. This method of representing estimated flow and loads allows the identification of higher than average levels of concentration. **Table 4-14** lists the estimated UALs for the major basins for further analysis. **Figure 4-8** through **Figure 4-13** show the UAL estimated per HU for TN, TP, Fecal Coliform, Zn, and Pb, respectively. In these figures lower, medium, and higher levels of classification are used, which are defined as UAL values less than the 25 percentile for lower; UAL values between the 25 and 75 percentile for medium; and UAL values higher than the 75 percentile for higher.

Higher than average HU for the fecal coliform load distribution (Figure 4-11) typically overlay residential land uses and some areas using septic tank as wastewater treatment disposal. As previously stated, fecal coliform sources may be IMVs, sanitary sewers, cross contamination of sanitary sewers into stormwater sewers, domestic and wild animals, and septic tanks. The WMM via the proper assignation of EMCs to each land use category only evaluates the potential source of fecal coliform due to land use (i.e. open areas, pervious land use percentage) and septic tank usage.

EMCs for fecal coliform vary greatly from the residential land uses to undeveloped land uses by a factor of three, and the agricultural land use EMC being as high as the residential land uses.

Lead (Pb) and zinc (Zn) also share a similar distribution to that of TN, TP, and BOD. Pb, Zn, and copper (Cu) account for about 90 percent of dissolved heavy metals and are easily removed in stormwater management systems with adequate detention time for sedimentation to occur (Harper, *Stormwater Chemistry and Water Quality*, 1995).

Figure 4-14 and **Figure 4-15** show bar charts for the comparison of the major basins UALs. The flow bar chart in Figure 4-15 is directly related to the percent imperviousness presented in Table 4-1 (land use) for each major basin, which in turn, also controls the amount of load estimated for each water quality parameter. For this reason, the shape of the load variability throughout the major basins is consistent with that of flow. At a major basin scale, higher annual flows are expected within the New River, S36, S37A, and Cypress Creek basins, whereas lower flows are likely to occur within the ICW-North and South Fork New River basins. A moderate runoff is expected within the ICW-South, Middle River, North Fork New River, and Prospect Recharge basins.

Table 4-13. Average Annual WMM-Estimated Loads per Major Basin for the Regional Model Area.

Major Basin	Area (acres)	Imp. Area (%)	Imp. Area (acres)	Flow (ac-ft/yr)	BOD (lbs/yr)	Cd (lbs/yr)	COD (lbs/yr)	Cu (lbs/yr)	DP (lbs/yr)	F-Coli (counts/yr)	NO23 (lbs/yr)	Pb (lbs/yr)	TDS (lbs/yr)	TKN (lbs/yr)	TP (lbs/yr)	TSS (lbs/yr)	Zn (lbs/yr)
Cypress Creek	3,426.31	50%	1,710.6	8,083	212,475	14.1	1,501,728	218	4,608	1.7530E+15	11,298	1,379	2,071,217	37,228	7,899	1,177,321	1,917
ICW-North	3,163.84	35%	1,119.2	5,634	149,685	11.5	1,049,091	130	3,080	1.4040E+15	7,278	890	1,620,396	26,242	5,216	768,777	1,227
ICW-South	3,291.78	45%	1,485.1	7,168	208,486	15.1	1,365,110	178	3,978	1.5290E+15	9,726	1,563	2,100,154	34,490	6,794	1,144,503	1,867
Middle River	10,398.82	48%	4,950.7	23,530	629,108	49.1	4,163,116	705	12,351	4.9129E+15	32,327	4,501	6,661,902	106,405	21,820	3,405,609	5,768
New River	2,154.64	57%	1,229.2	5,802	196,191	13.4	1,193,043	161	3,688	1.1273E+15	9,169	1,530	1,733,265	29,371	6,329	1,109,231	1,821
North Fork New River	4,564.93	46%	2,119.5	10,156	268,384	19.3	1,763,892	309	5,514	2.0857E+15	14,170	1,923	2,756,927	45,897	9,659	1,477,848	2,498
South Fork New River	6,414.27	40%	2,580.2	12,609	287,137	23.6	1,981,134	416	5,912	2.8063E+15	16,093	2,051	3,558,538	55,186	10,655	1,518,501	2,687
Prospect Recharge	1,843.39	44%	815.4	3,957	90,548	5.6	642,984	117	1,557	7.5300E+14	4,309	558	1,032,811	15,444	2,930	456,075	776
S36	2,156.23	59%	1,264.2	5,810	136,584	10.8	769,816	212	2,235	1.0110E+15	6,613	1,326	1,625,045	23,564	4,263	703,366	1,326
S37A	2,794.73	59%	1,656.8	7,618	223,518	15.6	1,314,416	226	3,461	1.1680E+15	9,593	2,099	2,289,143	33,706	6,365	1,145,863	2,077
Total (Regional Model)	40,319.00	47%	18,962.7	90,367	2,402,116	178	15,744,330	2,673	46,384	1.8550E+16	120,576	17,820	25,449,398	407,533	81,930	12,907,094	21,964

Notes: 1. The total impervious area percentage is an area-weighted value.

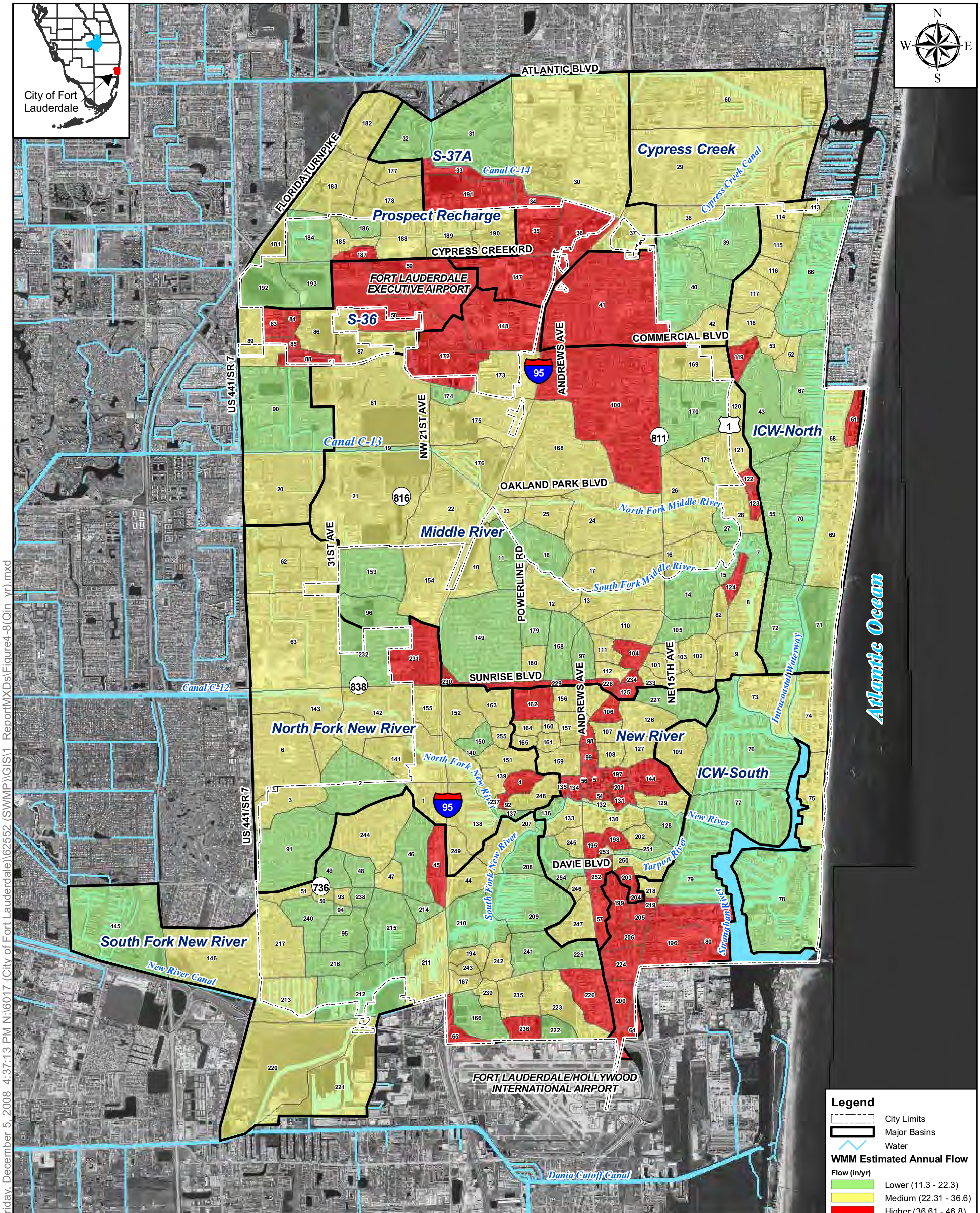
2. Existing BMPs are included

3. Flow includes septic tank flows and stormwater runoff.

4. Delivery ratios are set to 100 percent.

Table 4-14. Average Annual WMM-Estimated Unit Area Loads (UALs) per Major Basin for the Regional Model Area.

Major Basin	Area (acres)	Imp. Area (%)	Imp. Area (acres)	Flow (in/yr)	BOD (lbs/ac/yr)	Cd (lbs/ac/yr)	COD (lbs/ac/yr)	Cu (lbs/ac/yr)	DP (lbs/ac/yr)	F-Coli (counts/ac/yr)	NO23 (lbs/ac/yr)	Pb (lbs/ac/yr)	TDS (lbs/ac/yr)	TKN (lbs/ac/yr)	TP (lbs/ac/yr)	TSS (lbs/ac/yr)	Zn (lbs/ac/yr)
Cypress Creek	3,426.31	50%	1,710.6	28.3	62	4.1E-03	438	6.4E-02	1.3	5.1163E+11	3.3	0.4	605	10.9	2.3	344	0.6
ICW-North	3,163.84	35%	1,119.2	21.4	47	3.6E-03	332	4.1E-02	1.0	4.4376E+11	2.3	0.3	512	8.3	1.6	243	0.4
ICW-South	3,291.78	45%	1,485.1	26.1	63	4.6E-03	415	5.4E-02	1.2	4.6449E+11	3.0	0.5	638	10.5	2.1	348	0.6
Middle River	10,398.82	48%	4,950.7	27.2	60	4.7E-03	400	6.8E-02	1.2	4.7245E+11	3.1	0.4	641	10.2	2.1	327	0.6
New River	2,154.64	57%	1,229.2	32.3	91	6.2E-03	554	7.5E-02	1.7	5.2320E+11	4.3	0.7	804	13.6	2.9	515	0.8
North Fork New River	4,564.93	46%	2,119.5	26.7	59	4.2E-03	386	6.8E-02	1.2	4.5690E+11	3.1	0.4	604	10.1	2.1	324	0.5
South Fork New River	6,414.27	40%	2,580.2	23.6	45	3.7E-03	309	6.5E-02	0.9	4.3751E+11	2.5	0.3	555	8.6	1.7	237	0.4
Prospect Recharge	1,843.39	44%	815.4	25.8	49	3.1E-03	349	6.3E-02	0.8	4.0849E+11	2.3	0.3	560	8.4	1.6	247	0.4
S36	2,156.23	59%	1,264.2	32.3	63	5.0E-03	357	9.8E-02	1.0	4.6887E+11	3.1	0.6	754	10.9	2.0	326	0.6
S37A	2,794.73	59%	1,656.8	32.7	80	5.6E-03	470	8.1E-02	1.2	4.1793E+11	3.4	0.8	819	12.1	2.3	410	0.7
Total (Regional Model)	40,319.00	47%	18,962.7	26.9	60	4.4E-03	390	6.6E-02	1.2	4.6009E+11	3.0	0.4	631	10.1	2.0	320	0.5



0 1 2 4 Miles

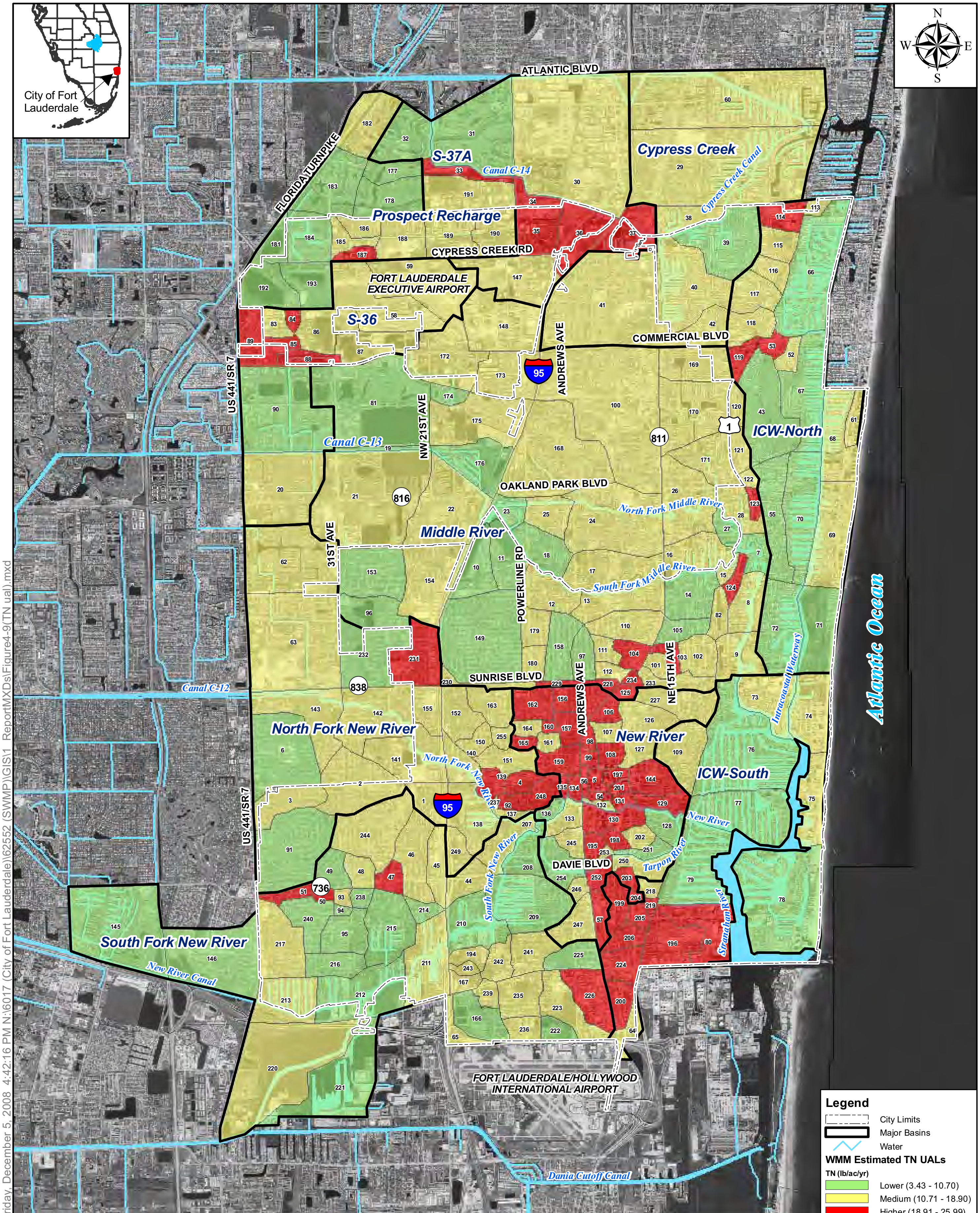
Source: WMM

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 4-8
City-Wide Stormwater Master Plan
WMM Estimated Annual Flow (in/yr)

UPDATED
12-05-08



Source: WMM

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
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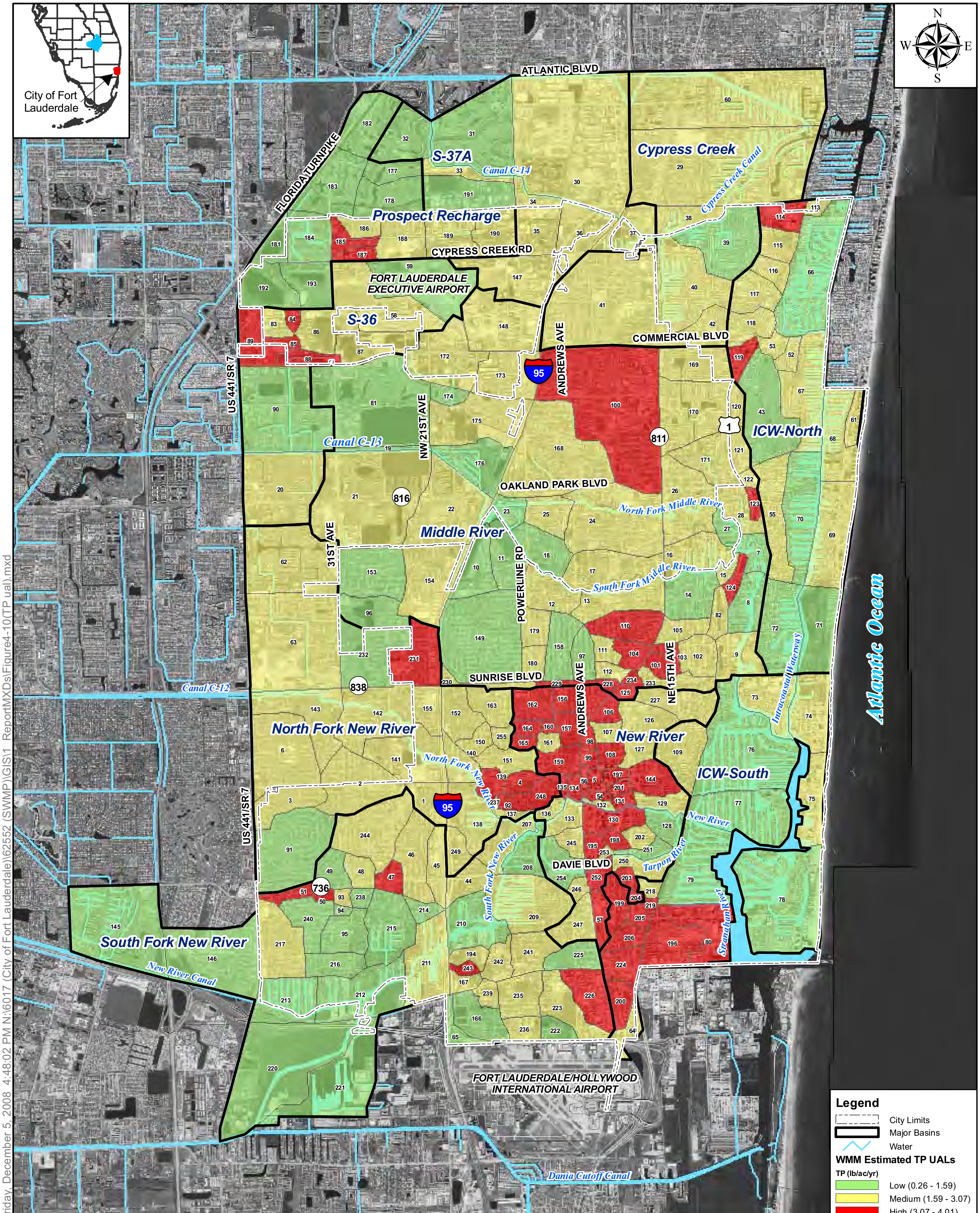
Figure 4-9
City-Wide Stormwater Master Plan
WMM Estimated TN Unit Area Loads (UALs)

UPDATED
12-05-08



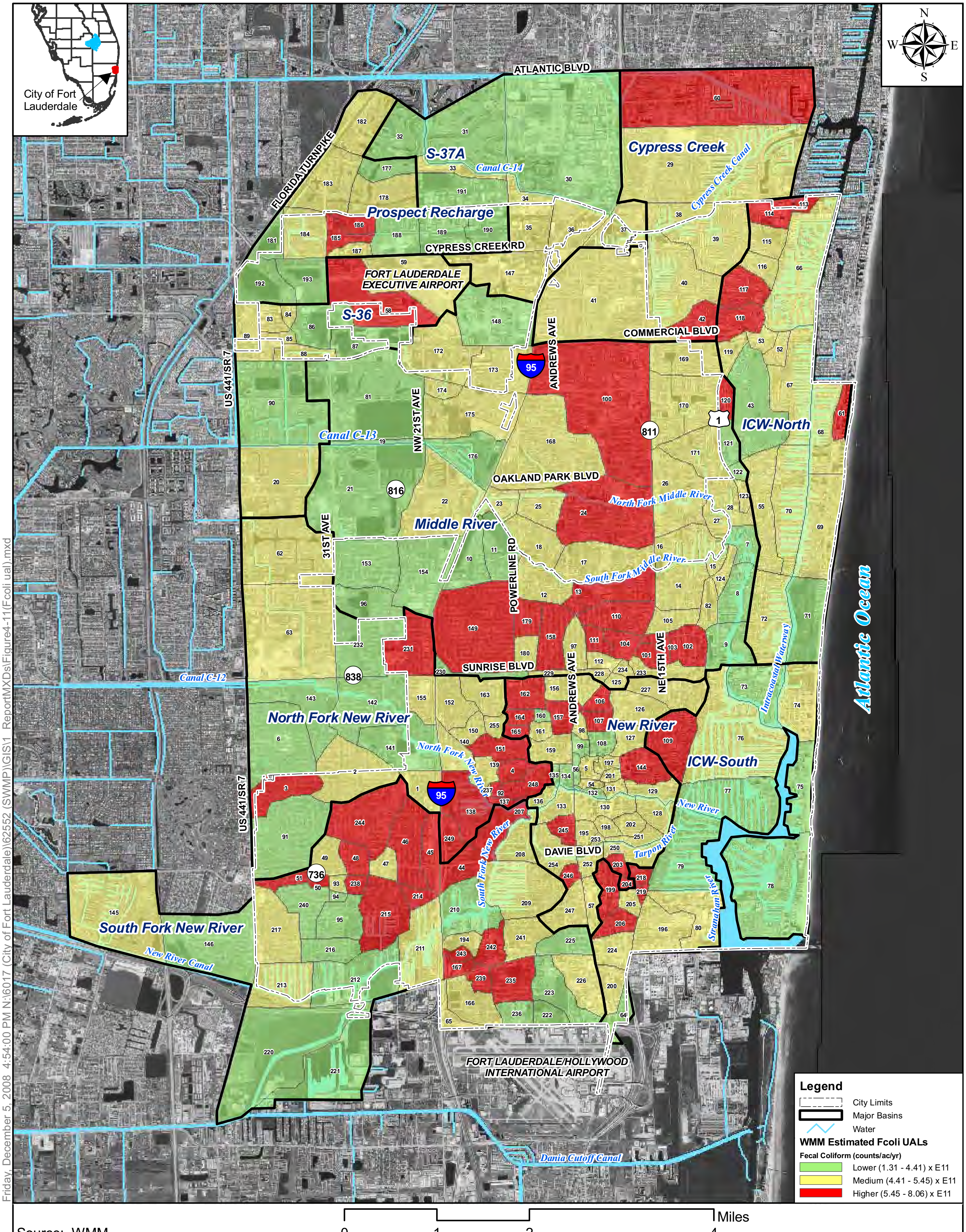
Source: WMM

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 4-10
City-Wide Stormwater Master Plan
WMM Estimated TP Unit Area Loads (UALs)

UPDATED 12-05-08



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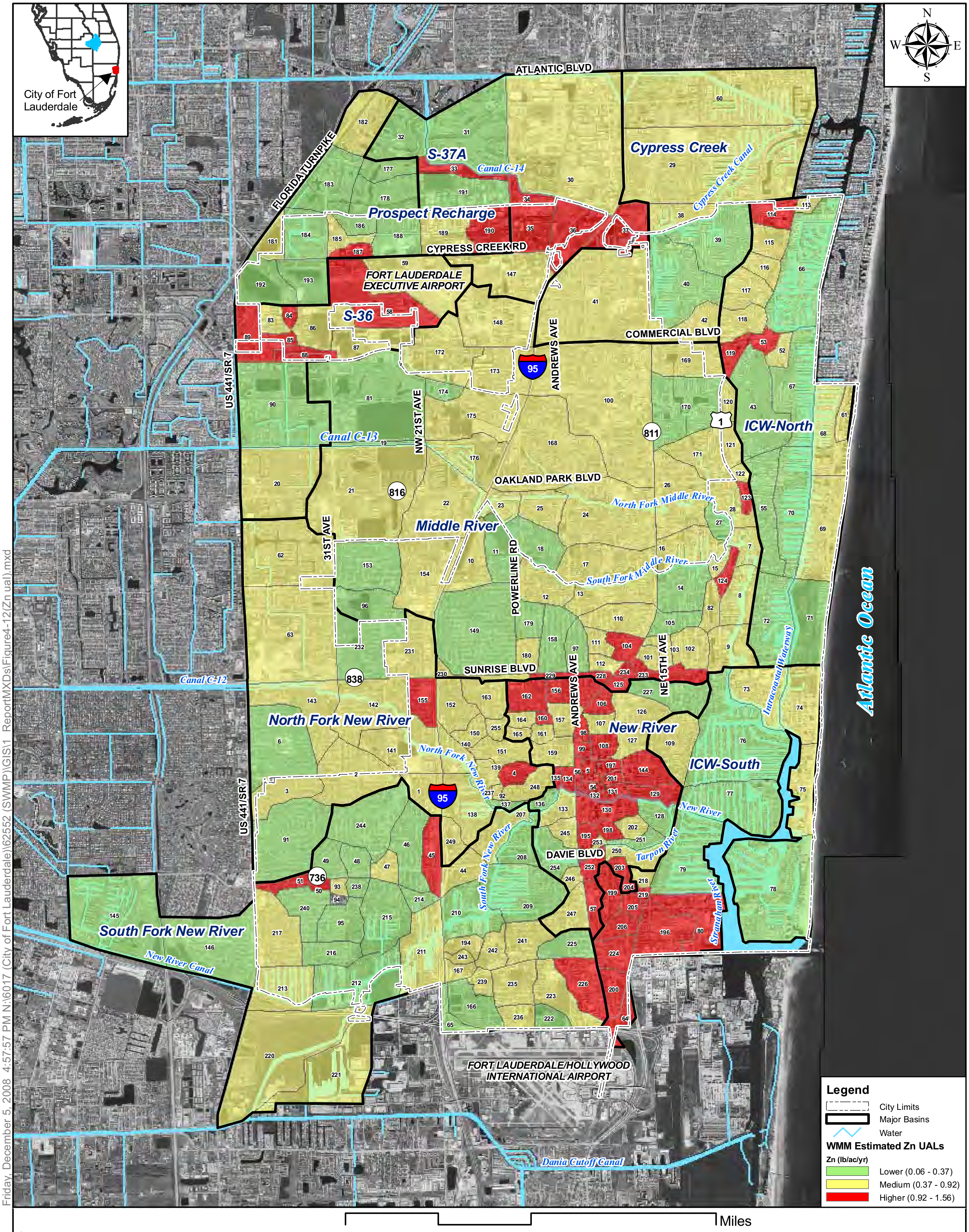
Source: WMM

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 4-11
City-Wide Stormwater Master Plan
WMM Estimated Fecal Coliform UALs

UPDATED
12-05-08



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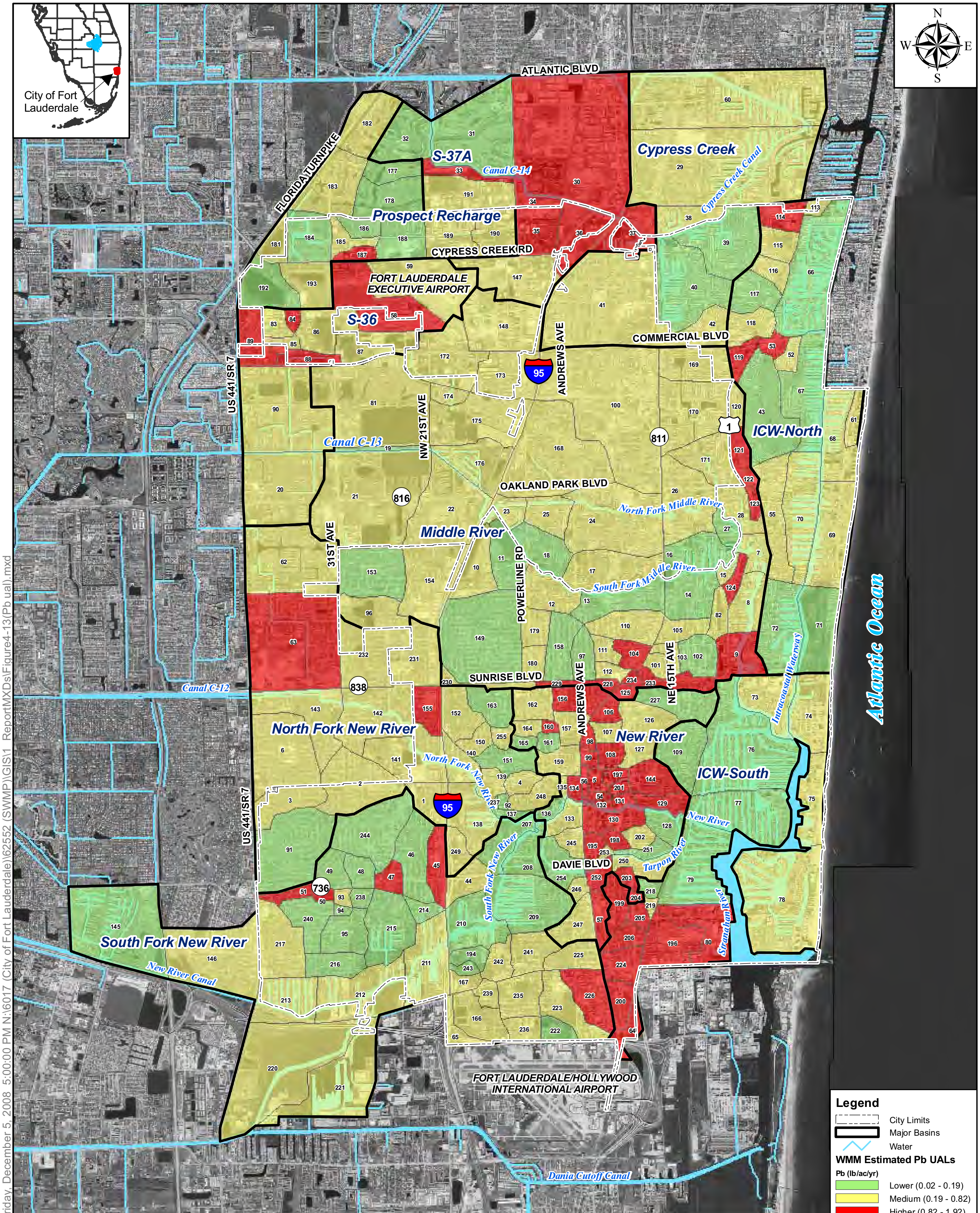
Source: WMM

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 4-12
City-Wide Stormwater Master Plan
WMM Estimated Zn Unit Area Loads (UALs)

UPDATED 12-05-08



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Source: WMM

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
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Figure 4-13
City-Wide Stormwater Master Plan
WMM Estimated Pb Unit Area Loads (UALs)

UPDATED
12-05-08

Figure 4-14. Gallery of WMM-Estimated Unit Area Loads (UALs) for Flow and Load (BOD, NOX, TKN, TP, Fecal Coliform, COD, and DP) per Major Basin.

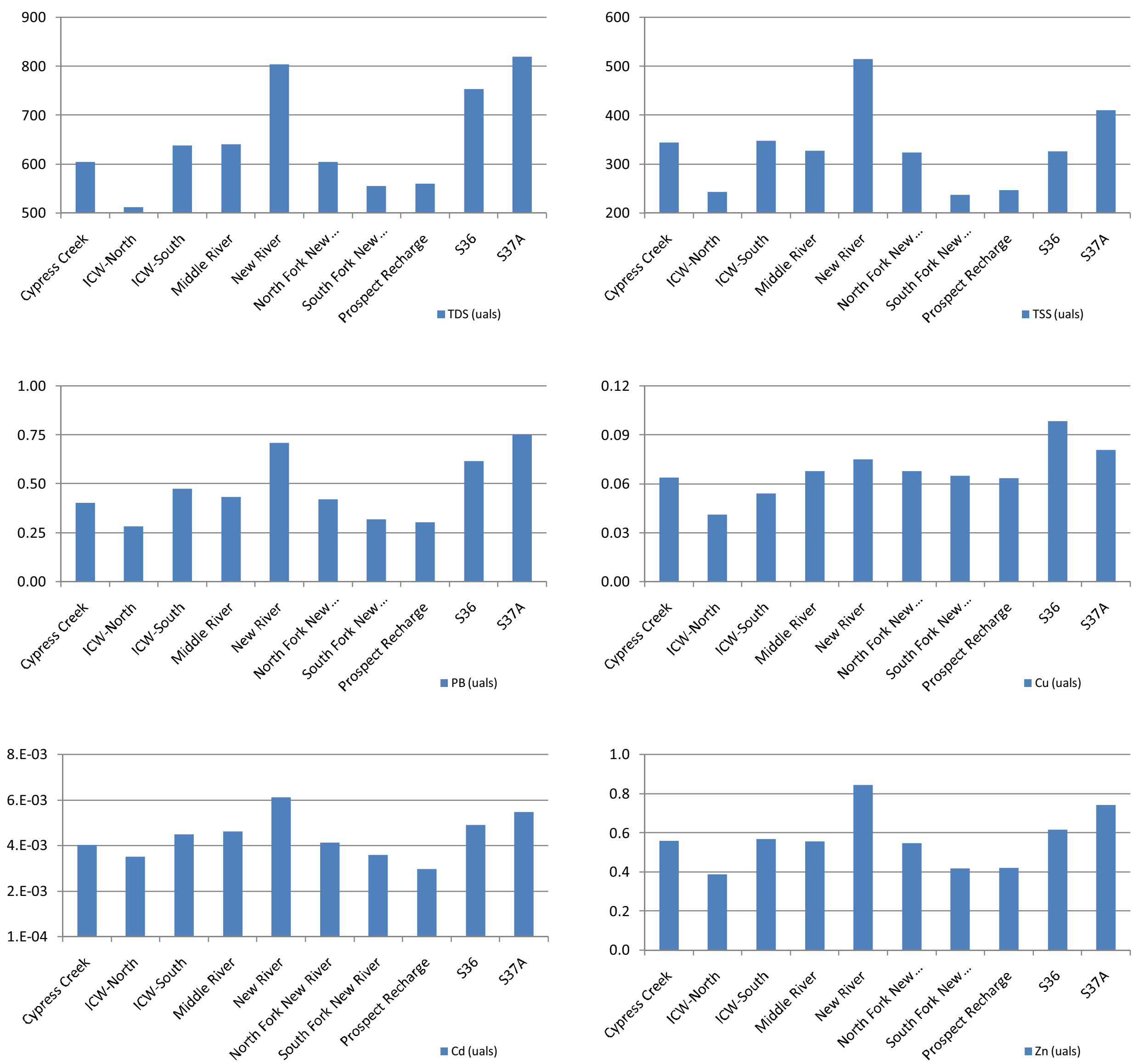


Figure 4-15. Gallery of WMM-Estimated (TDS, TSS, Pb, Cu, Cd, and Zn) Unit Area Loads (UALs) per Major Basin.

According to the WMM results the New River major basin is consistently showing the higher UALs for each water quality parameter except for TDS, Pb, and Cu, where S37A and/or S36 basins showed higher values. The lowest nutrient UALs were estimated for Prospect Recharge, ICW-North, and South Fork New River major basins, whereas, the highest values were estimated for the same major basins where runoff was also high (i.e., New River, S36, S37A, and Cypress Creek).

For those major basins located in the central area of the City, the highest nutrient UALs are the North Fork New River, the Middle River, and the ICW-South basins. The South Fork New River basin showed significantly less loading levels in this central area for nutrients as well as the other parameters. The estimated UALs at the Middle River and North Fork New River basins are comparable for all the water quality parameters, including runoff.

4.2.2 Wet and Dry Seasonal Models

Based on the average annual rainfall distribution observed at gauge 05801, the WMM was run for wet and dry periods typical of a hydrologic year. The wet season was identified for the period comprised by the months of May through October, whereas, the dry season by the months of November through April. As stated previously, the amount of rainfall occurring during the wet season accounts for 71 percent of the total annual rainfall. Flow and loads for each period distribute accordingly to the rainfall ratio with respect to the total annual rainfall.

Table 4-15 provides a summary of flow and loads for dry and wet seasons for each major basin in the study area.

4.2.3 Future Conditions Model

The future condition model was developed by incorporating the future land use coverage defined in Section 2.2.3, modifying the existing BMP coverage, and eliminating the load associated to septic tank usage.

The existing BMP coverage was modified by expecting that each vacant parcel in the existing land use coverage will implement a stormwater treatment alternative. A combination of exfiltration trenches and swales was the selected BMP in this case, which due to high densely populated areas and limited space was the more suitable alternative. The existing BMPs were evaluated as in place and operating for the future scenario as well.

For the future condition model simulation, the contribution of septic tank usage to the nutrient and bacteria loading was not considered as it is expected that they will be put off-line and connected to the local sanitary sewer network.

Table 4-16 presents the percent difference between flow and loads of the future conditions model with respect to the existing conditions estimates for each major basin. Previously when presenting the future land use coverage, it was stated

Table 4-15. WMM Seasonal Flow and Loads for Each of the Major Basins and Selected Parameters.

Major Basin	Runoff (cfs)			Total Nitrogen (tons/yr)			Total Phosphorus (tons/yr)			Fecal Coliform (counts/yr)			Biological Oxygen Demand (tons/yr)			Zinc (lb/yr)			Lead (lb/yr)		
	Wet	Dry	Total	Wet	Dry	Total	Wet	Dry	Total	Wet	Dry	Total	Wet	Dry	Total	Wet	Dry	Total	Wet	Dry	Total
Cypress Creek	2.79	1.09	3.88	17.5	6.8	24.3	2.8	1.1	3.9	1.3E+15	5.0E+14	1.8E+15	76.5	29.8	106.2	0.69	0.27	0.96	0.50	0.19	0.69
ICW-North	2.11	0.82	2.93	12.1	4.7	16.8	1.9	0.7	2.6	1.0E+15	3.9E+14	1.4E+15	53.9	21.0	74.8	0.44	0.17	0.61	0.32	0.13	0.45
ICW-South	2.58	1.00	3.58	15.9	6.2	22.1	2.4	1.0	3.4	1.1E+15	4.3E+14	1.5E+15	75.0	29.2	104.2	0.67	0.26	0.93	0.56	0.22	0.78
Middle River	2.68	1.04	3.72	49.9	19.4	69.4	7.9	3.1	10.9	3.5E+15	1.4E+15	4.9E+15	226.4	88.1	314.6	2.08	0.81	2.88	1.62	0.63	2.25
New River	3.19	1.24	4.43	13.9	5.4	19.3	2.3	0.9	3.2	8.1E+14	3.2E+14	1.1E+15	70.6	27.5	98.1	0.66	0.26	0.91	0.55	0.21	0.77
North Fork New River	2.63	1.02	3.66	21.6	8.4	30.0	3.5	1.4	4.8	1.5E+15	5.9E+14	2.1E+15	96.6	37.6	134.2	0.90	0.35	1.25	0.69	0.27	0.96
South Fork New River	2.33	0.91	3.23	25.7	10.0	35.6	3.8	1.5	5.3	2.0E+15	7.9E+14	2.8E+15	103.3	40.2	143.6	0.97	0.38	1.34	0.74	0.29	1.03
Prospect Recharge	2.54	0.99	3.53	7.1	2.8	9.9	1.1	0.4	1.5	5.4E+14	2.1E+14	7.5E+14	32.6	12.7	45.3	0.28	0.11	0.39	0.20	0.08	0.28
S36	3.19	1.24	4.43	10.9	4.2	15.1	1.5	0.6	2.1	7.3E+14	2.8E+14	1.0E+15	49.2	19.1	68.3	0.48	0.19	0.66	0.48	0.19	0.66
S37A	3.23	1.26	4.48	15.6	6.1	21.6	2.3	0.9	3.2	8.5E+14	3.4E+14	1.2E+15	81.4	31.7	111.8	0.75	0.29	1.04	0.76	0.30	1.05
Total (Regional Model)	2.65	1.03	3.68	190.1	74.0	264.1	29.5	11.5	41.0	1.3E+16	5.2E+15	1.9E+16	865.4	336.9	1,201.1	7.90	3.08	10.98	6.41	2.50	8.91

Notes: 1. Wet season comprises the months of May through October

2. Dry season comprises the months of November through April.

Table 4-16. Percent Difference of Future Condition Flow and Loads with Respect to the Existing WMM-Estimated Values per Major Basin.

Major Basin	Area (acres)	Imp. Area (%)	Imp. Area (acres)	Runoff (ac-ft/yr)	BOD (lbs/yr)	Cd (lbs/yr)	COD (lbs/yr)	Cu (lbs/yr)	DP (lbs/yr)	F-Coli (counts/yr)	NO23 (lbs/yr)	Pb (lbs/yr)	TDS (lbs/yr)	TKN (lbs/yr)	TP (lbs/yr)	TSS (lbs/yr)	Zn (lbs/yr)
Cypress Creek	3,426.31	50%	1,711.1	0.0%	0.0%	0.1%	0.0%	0.0%	-0.7%	0.1%	-0.6%	0.0%	0.0%	-0.6%	-0.7%	0.0%	0.0%
ICW-North	3,163.84	36%	1,124.4	0.4%	0.2%	0.0%	1.1%	0.0%	0.4%	0.1%	0.4%	0.0%	0.6%	0.3%	0.3%	0.3%	0.2%
ICW-South	3,291.78	46%	1,498.0	0.7%	0.3%	0.0%	0.4%	0.0%	0.7%	0.8%	0.7%	-0.1%	0.1%	0.6%	0.7%	0.4%	0.4%
Middle River	10,398.82	48%	4,995.6	0.7%	0.5%	0.0%	0.7%	0.7%	0.0%	-0.8%	0.3%	0.5%	0.4%	0.1%	0.1%	0.8%	0.6%
New River	2,154.64	59%	1,276.6	3.2%	1.9%	0.7%	3.0%	0.6%	2.6%	2.2%	2.7%	1.4%	1.3%	2.5%	2.6%	2.3%	2.0%
North Fork New River	4,564.93	48%	2,197.4	2.9%	2.4%	-0.1%	3.8%	1.6%	1.4%	0.9%	1.9%	2.9%	1.4%	1.8%	1.6%	3.0%	2.8%
South Fork New River	6,414.27	41%	2,607.1	0.8%	0.6%	0.1%	0.8%	1.0%	-2.4%	-2.2%	-1.6%	0.5%	0.5%	-1.7%	-2.2%	1.5%	0.6%
Prospect Recharge	1,843.39	44%	817.6	0.2%	0.1%	0.0%	0.2%	0.0%	0.3%	0.1%	0.3%	0.0%	1.9%	0.1%	0.2%	0.2%	0.3%
S36	2,156.23	59%	1,271.6	0.5%	0.3%	0.1%	0.2%	0.5%	0.3%	0.3%	0.5%	0.1%	0.7%	0.4%	0.5%	0.1%	0.2%
S37A	2,794.73	59%	1,658.3	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%
Total (Regional Model)	40,319.00	48%	19,157.8	1.0%	0.7%	0.1%	1.1%	0.6%	0.1%	-0.2%	0.4%	0.6%	0.6%	0.2%	0.2%	1.0%	0.8%

that no significant increase in the amount of percent imperviousness (about 1 percent) was identified with respect to the existing land use coverage. The results summarized in Table 4-16 suggest that an increase of 1 percent imperviousness generates a similar increase in the expected flow with respect to the existing land use condition. The greatest increase in flow and loads is expected in the New River and North Fork New River basins, whereas, the lowest increase is expected in the Cypress Creek, S37A, and Prospect Recharge basins.

None of the major basins is expected to have reduced runoff; however, some are expected to slightly reduce their nutrient load, namely: South Fork New River and Cypress Creek basins for TKN, NO23, TP, and DP. Fecal coliform is reduced in the South Fork New River and Middle River basins due to the removal of septic tank loadings.

4.2.4 Impaired Waterbody Identification

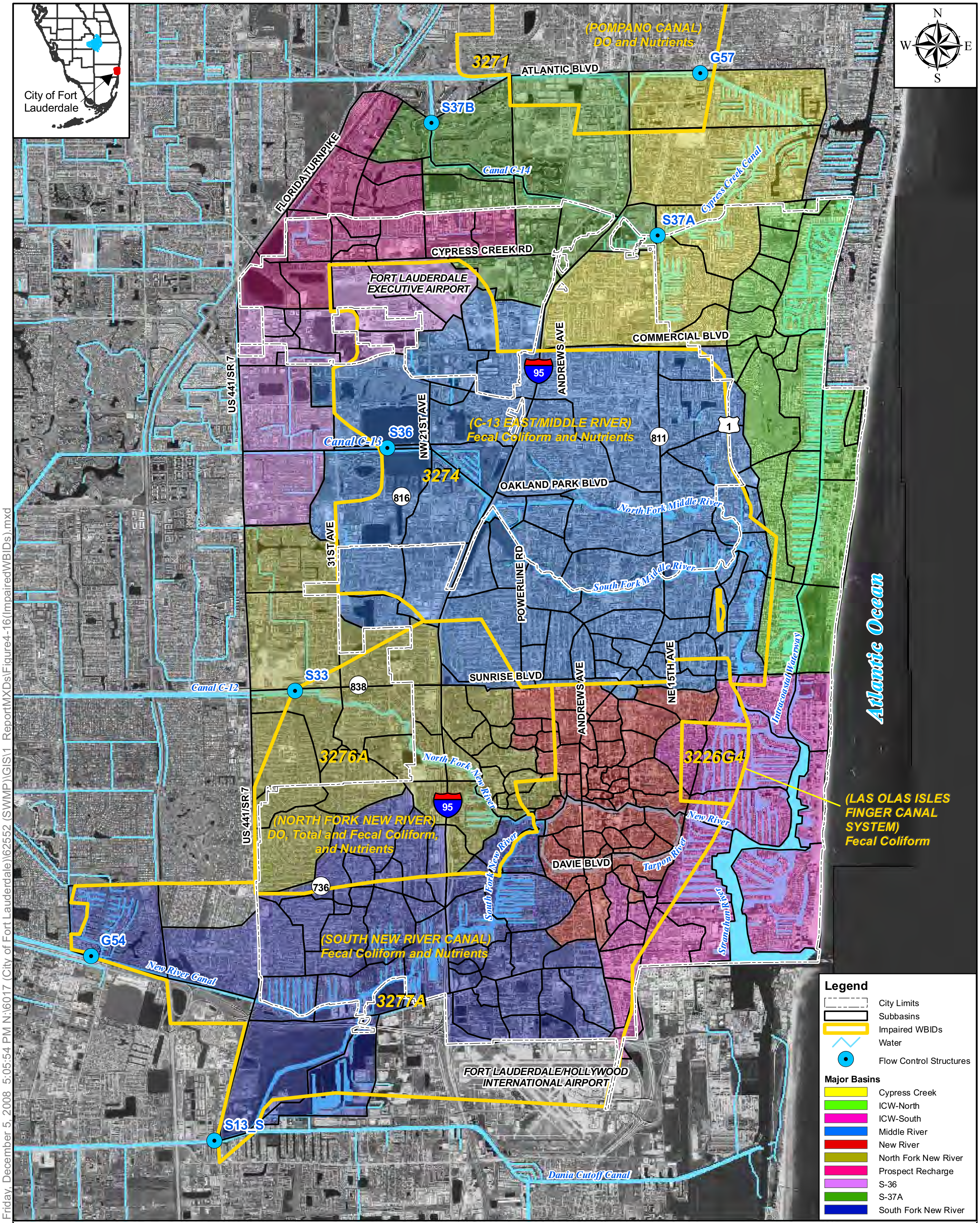
Figure 4-16 shows the impaired waterbody identification (WBIDs) segments that overlap the City's boundary, including the reason of impairment. According to Section 303 (d) list of Group 4 (adopted on May 3, 2006), developed by requirement of the eponymous section of the Clean Water Act, four WBIDs have been identified as impaired in the study area, which are presented in **Table 4-17**. In continuation of this process, FDEP will start developing Total Maximum Daily Loads (TMDLs) on these waters, which is the maximum pollutant loading discharge allowable in order to meet its designated uses. Consequently, each WBID stakeholders and DEP will develop a Basin Management Action Plan (BMAP) to address actions, schedule, and funding required to restore the impaired waterbody.

Several stakeholders will be part of the development of BMAPs for the impaired WBIDs extending over the City of Fort Lauderdale. The WBID 3274, for instance, overlays the cities of Fort Lauderdale, Wilton Manors, and Oakland Park. Likewise, the WBIDs 3276A and 3277A intersects areas of the unincorporated Broward County and the City of Plantation.

Based on the summary of average concentrations measured in the BCDNRP monitoring network provided in Table 4-13, the following observations were made with respect to the parameters of impairment of the subject WBIDs:

- At the monitoring station 64, the fecal coliform concentration is the highest of all the stations in the study area, followed by station 16, located just downstream from it; and, both located within WBID 3276A (North Fork New River basin). High concentrations have also been measured at stations 111, 112, 19, and 15 located near the outlets of WBIDs 3274 (Middle River), 3277A (South Fork New River and New River).

  The concentrations measured at the stations located on the upstream end of the South Fork and North Fork of the New River basins, that is, station 17 and 20,



Miles
0 1 2 4

Source: FDEP

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 4-16
City-Wide Stormwater Master Plan
Impaired WBIDs
Regional Model

UPDATED
12-05-08

Table 4-17. Impaired Waterbody Identifications in the Study Area.

WBID	Name	Parameters of Impairment
3226G4	Las Olas Isles Finger Canal System	Fecal Coliform
3274	C-13 East/Middle River	Fecal Coliform and Nutrients
3276A	North Fork New River	DO, Total and Fecal Coliform, and Nutrients
3277A	South New River Canal	Fecal Coliform and Nutrients

respectively, already have high levels of fecal coliform accounting for almost 51 and 87 percent of the concentration levels measured on their respective downstream stations (i.e., stations 16 and 19).

- Fecal Coliform concentrations are similar for the stations 110 and 111 located on the North and South Fork of the Middle River, respectively.

- The concentration of TKN was the highest at stations 20, 90, and 19 all located on the South Fork New River basin, followed by 7, 16, and 64, located on the S37A, and North Fork New River basins, respectively. The TKN concentration decrease from an upstream to downstream direction for the South Fork New River basin, whereas, increases in the same direction for the North Fork New River basin.

- The highest TP concentrations measured in the study area were at the stations 16 and 64, located in the North Fork New River basin. The concentrations increase at downstream locations. Total P concentrations are also high in the Middle River on both North and South Forks.

- Low DO concentrations are measured at stations 20, 90, 19, in the South Fork New River basin, at station 64 in the North Fork New River basin, and at station 112 in the North Fork Middle River basin. Dissolved oxygen concentrations decrease in an upstream-downstream direction for the Middle River and North Fork New River basins.

4.3 Best Management Practices

As mentioned previously, structural and non-structural BMPs are measures used for the protection of natural resources and to comply with established water quality regulations for new and existing developments. The following is a list of BMPs that have been widely used in Florida and can be considered for implementation in the City.

4.3.1 Potential Best Management Practices

BMPs are commonly used in new development and to retrofit existing development and are categorized as structural or non-structural, as described below:

Structural Stormwater Controls:

- Wet detention pond
- Dry detention basins
- Exfiltration trenches
- Shallow grassed swales
- Retention basins
- Water quality inlets and baffle boxes
- Porous pavement
- Underdrains and stormwater filter systems
- Alum injection
- Skimmers

Non-Structural Source Controls:

- Land use planning
- Public information programs (e.g., stakeholder meeting process)
- Stormwater management ordinance requirements
- Fertilizer application controls
- Pesticide and herbicide use controls
- Solid waste management
- Street sweeping
- DCIA minimization
- Erosion and sediment control on construction sites
- Operation and maintenance

The use of a specific BMP depends on site conditions, water quality protection, flood control, aquifer recharge, and volume control. In many cases, there are multiple treatment goals for a given project. Therefore, BMPs can be combined to develop a "treatment train". The treatment train concept maximizes the use of available site conditions from the point of runoff generation to the receiving water discharge in order to maximize flood control, pollutant load reduction, aquifer recharge, and wetlands benefits. **Figure 4-17** shows a schematic of the treatment train concept. **Appendix 4C** presents a detailed description of each potential BMP including advantages, limitations, and design criteria for implementation.

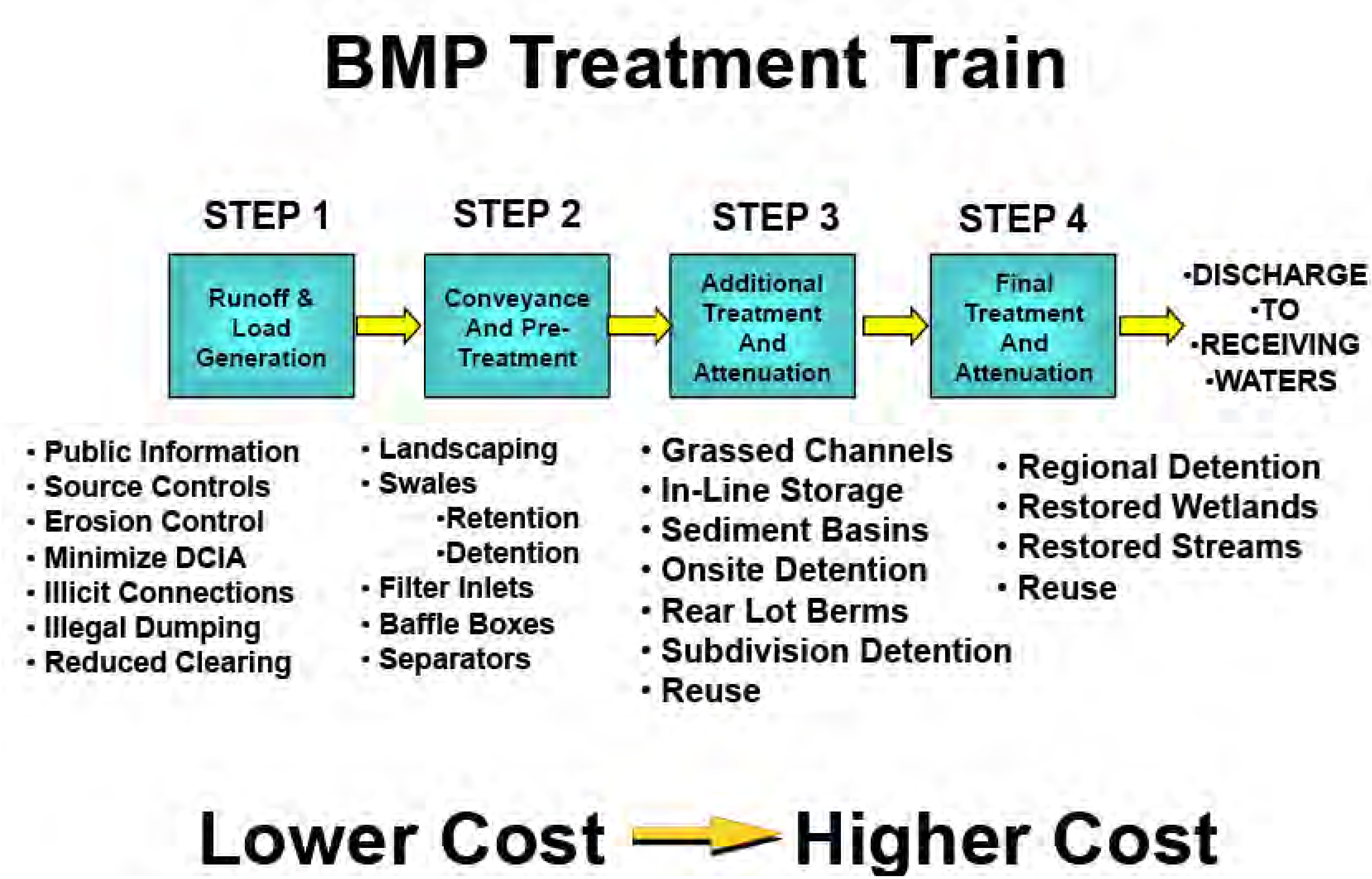


Figure 4-17. BMP Treatment Trains

Section 5
Wetland Inventory

5.1 Background

Wetlands have been documented as supporting and serving a variety of functions. These include groundwater recharge and discharge, wildlife habitat, maintaining aquatic species diversity, recreation, removal of sediments and nutrients from runoff, and flood flow alteration (*Adamus, 1987; Myers and Ewel, 1990; Miller and Gunsalus, 1997*). The effectiveness of a wetland to perform these functions is based on its physical, chemical, and biological characteristics. Wetlands that have been historically altered, drained or disturbed have reduced functions.

The value and function of altered or disturbed wetlands can be enhanced by increasing their hydroperiod (depth and duration of inundation). This can be accomplished by introducing water that has been diverted away due to human impacts. The hydroperiod and functions of some altered wetlands can be enhanced if they are incorporated into a stormwater management system. By controlling flows, filtration, nutrient removal, and settling of sediments, the historically altered wetlands can be used in the attenuation and treatment of stormwater runoff (*FDER, 1988; CDM, 1994*). The use of a wetland to provide flood attenuation and stormwater treatment or management can increase its function, value, and economic and social significance (*Ewel and Odum, 1984*).

The focus of the Stormwater Master Plan (SWMP) wetland inventory was to identify and assess wetlands located within the study area. Once these wetlands were identified, it was determined whether they could be potential candidates for hydroperiod improvements or utilization as part of alternate improvements such as incorporation into a stormwater management system. The findings of this analysis were combined in a conceptual management plan.

5.2 Preliminary Wetland Screening

A variety of digital GIS coverages were used as aides in determining the current location and extent of wetlands. These aerials and coverages included:

1. Color aerial photographs (2007) obtained from the City of Fort Lauderdale;

2. National Wetland Inventory (NWI) Map, obtained from the NWI website;

3. FLUCC coverages, Land Use (2004), obtained from the South Florida Water Management District;

4. Natural Resource Conservation Service Soil Map (Polygon), obtained from the Florida Geographic Data Library; and

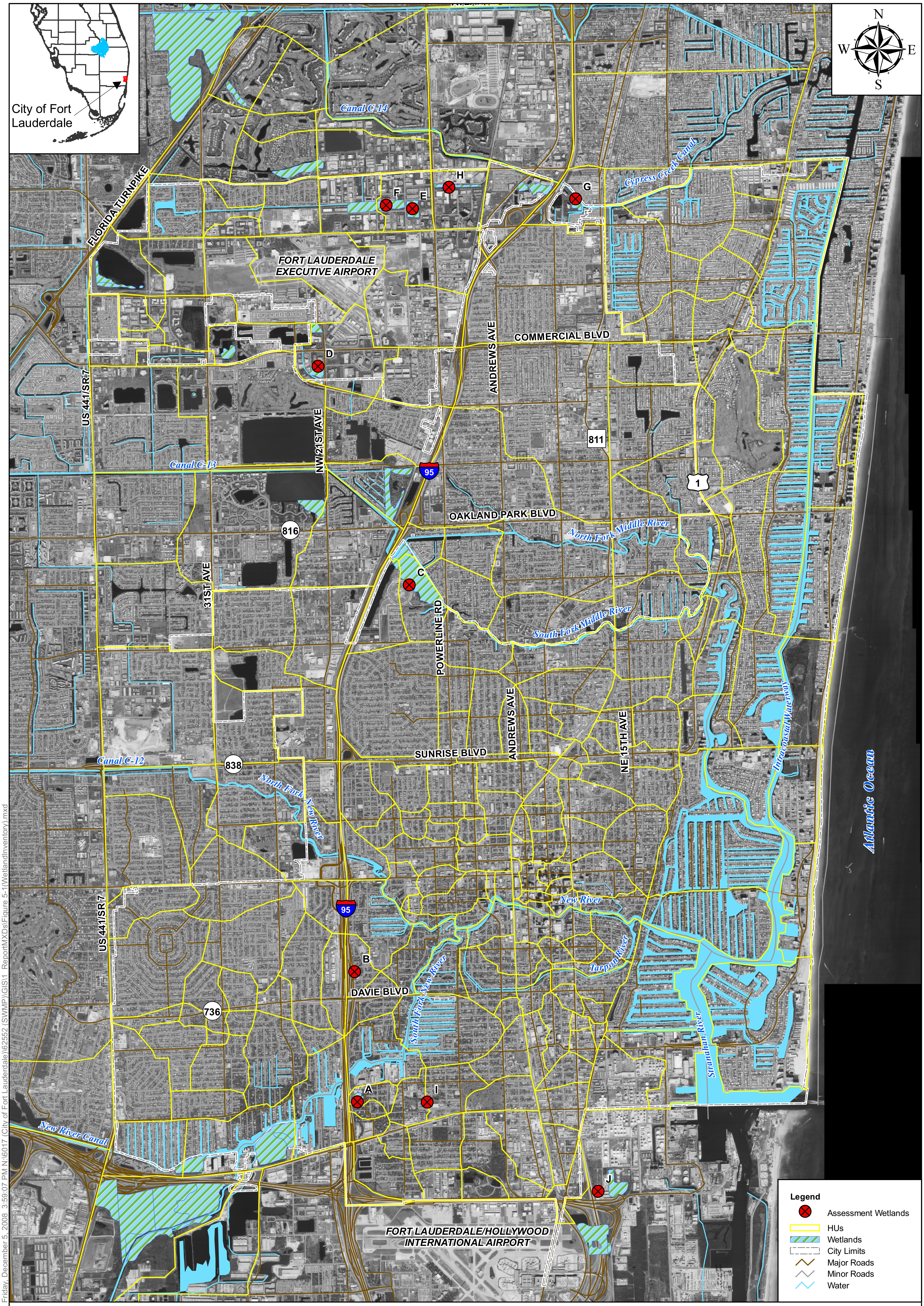
5. Broward County Wetlands coverage (2004), obtained from the Broward County Environmental Protection Department.

The study area within the City is highly developed and there are very few wetlands remaining. Only 28 NWI wetlands were located within the study area for the SWMP. Several of these wetlands had been impacted by development. Both herbaceous and forested wetlands occur within the Fort Lauderdale SWMP study area. These include numerous hydrologically isolated wetlands and wetlands adjacent to canals. The major wetland types per FLUCCS (*FDOT, 1985*) codes include: cypress wetland coniferous forests (FLUCCS 6200), wetland forested mixed (FLUCCS 6300), and freshwater marsh (FLUCCS 6410). The Broward County wetlands coverage was also used to identify potential wetlands.

Wetland limits from existing NWI coverages were modified based on FLUCCS wetland coverage, hydric soil coverage, and photo interpretation of color aerials. Ten wetlands were selected for assessments (see Section 4.1.3). The limits of these wetlands and others in adjacent areas were evaluated in the field in accessible areas wherever possible. Areas with differences were noted and the changes were digitized onto the revised NWI map layer. **Figure 5-1** is the revised map for the study area that incorporates wetland boundaries determined through both aerial interpretation with GIS coverage and field verification.

The approximate limits of wetlands in the Fort Lauderdale SWMP study area that were identified in this study were evaluated in terms of their federal and state designation. The guidelines and regulations that are used by the regulatory agencies to define the jurisdictional boundaries of wetlands include the US Army Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1 (Federal) and Chapter 62-340, F.A.C., Delineation of the Landward Extent of Wetlands and Surface Waters (State).

The wetland limits mapped from the NWI overlay, and the subsequent changes from field review and aerial photo interpretation, have not been reviewed by regulatory agency staff personnel. The wetland limits depicted on the maps included within this study are intended for planning purposes only, and are not to be used for regulatory agency permitting applications.



0 2,000 4,000 8,000 Feet

Source: City of Fort Lauderdale

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 5-1
City-Wide Stormwater Master Plan
Wetland Inventory

CREATED
12-05-08

5.3 Wetland Assessment

The potential uses for wetlands in the study area include alleviation of flooding through flow attenuation, stormwater treatment, and habitat enhancement. The purpose of this portion of the study is to identify wetlands that can be enhanced or restored and may provide stormwater management.

The ability of a wetland to be incorporated into a stormwater management system or rehydrated includes factors such as size, amount of disturbance, adjacency to other systems (hydrologic connections), and location in the landscape. Restored or rehydrated wetlands may also serve as potential mitigation areas as the function and value of these wetland systems can be improved. Additionally, using natural systems to aid in stormwater management systems, if done properly, can be more cost effective as less construction and earthwork may be required. Less maintenance may also be required for these natural systems.

The preliminary wetland screening and the characteristics presented above were used to identify wetlands in the Fort Lauderdale SWMP study area and to identify wetlands that may be managed to provide benefits. The location of these wetlands, identified as A through J, is depicted in Figure 5-1. Wetland qualitative evaluation study forms for each wetland are presented in **Appendix 5A**. A summary of the information regarding wetlands evaluated in this study is presented in **Table 5-1**. A brief description of each wetland is provided below.

Table 5-1. Wetland Assessment

Wetland ID	Name	Latitude[1]	Longitude[1]	Size (Acres)	FLUCC Code[2]	Potential Use Code[3]
A	Davie Boulevard Ramp	26.0938792	-80.16726726	3.7	6300	S, R
B	Riverside Drive	26.11021218	-80.16752475	1.4	6300	S, R
C	Mills Pond Park	26.15868188	-80.15956538	59	6410/6300	-
D	NW 23rd Avenue	26.1861746	-80.17209431	6.6	6200/6300	-
E	NW 65th Way	26.20571148	-80.15971466	9.4	6200	H, S, R
F	NW 64th Street	26.2057264	-80.16015161	11.1	6300	H, S, R
G	Corporate Drive	26.20693507	-80.1360875	4.3	6200	R
H	SW 15th Street	26.20849502	-80.15372562	3.5	6200	H, S, R
I	SW 12th Avenue	26.09347788	-80.1577911	1.6	6410	-
J	SE 9th Avenue	26.08201713	-80.13349674	1.2	6412	-

[1]Coordinates in WGS-84
[2]From Florida Land Use, Cover, and Forms Classification System Coverages, Florida Department of Transportation (1999)
[3]Use Code: R = restoration & preservation, H = rehydration, S = stormwater flood storage and attenuation
FLUCCS code determined from field observations and FLUCCS GIS Coverages

Wetland A

Davie Boulevard Ramp

Wetland A: Davie Blvd Ramp Wetland

This forested wetland is located near I-95 and SW 19th Avenue. The wetland is dominated by java wood and royal palm. Groundcover species include water primrose, air potato, and panic grasses. Exotic vegetation includes Brazilian pepper, castor bean, java wood, and *Zanthosoma sp*. Nuisance species are prevalent and could be removed to improve wetland habitat. There may be opportunities for incorporation into a stormwater management system.

Wetland B

Riverside Drive

Wetland B: Riverside Drive Wetland

This forested wetland is located west of Riverside Drive and east of I-95. The wetland is dominated by slash pine with Queensland umbrella tree also in the canopy. Understory species include Brazilian pepper, *Ficus sp.*, and seaside mahoe. There are several exotic species located throughout the wetland including *Philodendron sp*. and Brazilian pepper. Exotic species could be removed to improve wetland habitat.

Wetland C

Mills Pond Park

Wetland C: Mills Pond Park

This emergent/scrub-shrub wetland is located in Mills Pond Park off of NW 9th Avenue. Small cypress trees and royal palms are the dominant vegetation. Cabbage palm is also present throughout the wetland. Groundcover species include various sedges and leather fern. Exotic species such as Brazilian pepper and java wood are prevalent. This wetland is adjacent to a canal and is part of the Safe Parks and Land Preservation Program in association with Broward County and the City of Fort Lauderdale.

Wetland D

NW 23rd Avenue

Wetland D: NW 23rd Avenue Wetland

This forested wetland is adjacent to a canal and is located north of Prospect Drive and west of NW 21st Avenue. It has both cypress and red maple in the canopy. Along the wetland edge java plum is also present in the canopy. Understory species include cabbage palm, elderberry, red bay, and sea grape. Groundcover species include wild coffee and leather fern. This wetland is listed as an environmentally sensitive land by Broward County.

Wetland E

NW 65th Way

Wetland E: NW 65th Way Wetland

This wetland is adjacent to a canal and is located south of NW 65th Way. The wetland is dominated by bald cypress with red maple also present in the canopy. Exotic species include java plum and Brazilian pepper. This wetland could be incorporated into a stormwater management system.

Wetland F

NW 64th Street

Wetland F: NW 64th Street Wetland

This forested wetland is located north of NW 64th Street. It contains both red maple and cypress in the canopy. Cabbage palm is the predominant understory specie. Groundcover species include sword fern, lizzard's tail, and swamp fern. This wetland is adjacent to a canal and could be incorporated into a stormwater management system.

Wetland G

Corporate Drive

Wetland G: Corporate Drive Wetland

This forested wetland is connected to a canal and is located east of Corporate Drive and north of NE 62nd Street. The canopy is dominated by cypress. Understory species include Brazilian pepper, cabbage palm, and willow. Groundcover species include leather fern and cattail. Nuisance species are prevalent and could be removed to improve wetland habitat.

Wetland H

SW 15th Street

Wetland H: SW 15th Street Wetland

This forested wetland is located south of SW 15th Street and east of NW 9th Avenue. The canopy is dominated by cypress with an understory of cabbage palm. Nuisance vegetation includes Brazilian pepper, java wood, castor bean, and Queensland umbrella tree. This wetland is adjacent to a canal and could be incorporated into a stormwater management system.

Wetland I

SW 12th Avenue

Wetland I: SW 12th Avenue Wetland

This emergent wetland is located west of SW 12th Avenue and north of Marina Mile Boulevard. Royal palm and small cypress trees are present in the wetland. Groundcover is primarily blue flag. Exotic nuisance species include Brazilian pepper. Nuisance species could be removed to improve wetland habitat.

Wetland J

SE 9th Avenue

Wetland J: SE 9th Avenue Wetland

This emergent wetland is located north of Eller Drive and west of SE 9th Avenue. Wetland vegetation is primarily cattail and water primrose. Royal palms are present along the wetland boundary.

5.4 Wetland Management

Most of the historic wetlands within the Fort Lauderdale SWMP study area have been destroyed and the few remaining wetlands have been heavily impinged upon by development. These wetlands are bordered by roads and parking lots and there is little or no opportunity for the establishment of wetland buffers.

While most of the wetlands are hydrologically isolated, some are located adjacent to canals and could be incorporated into small stormwater management systems. Specifically, wetlands located next to older developments which may not have stormwater ponds may be ideal candidates which could provide water quality benefits.

All the wetlands identified in the assessment have been adversely impacted by exotic species. Wetlands A, B, C, and G, specifically, had high percentages of invasive exotic species present. Wetland habitat could be improved by removing these nuisance species and replacing them with native vegetation.

Several of the wetlands located within the Fort Lauderdale SWMP study area are currently in parks or protective easements sponsored by the City of Fort Lauderdale or Broward County. Of the ten wetlands identified in the assessment, eight are not currently associated with parks or conservation easements. Therefore, there are several opportunities for preserving these wetlands, which could be coordinated with Environmental Resource Permits (ERPs) for stormwater projects.

5.5 Conclusions

Wetlands provide many functions including flood attenuation, water quality improvement, and habitat. Wetlands in the Fort Lauderdale SWMP study area were evaluated to determine if there is opportunity to improve these functions through implementation of the stormwater master plan.

Very few wetlands occur within the Fort Lauderdale study area. Most of these wetlands are cypress wetland coniferous forests (FLUCCS 6200) and wetland forested mixed (FLUCCS 6300). There are numerous hydrologically isolated wetlands and wetlands adjacent to canals. All ten wetlands assessed had exotic species present. Of these ten wetlands, six (Wetlands A, B, E, F, G, and H) have the potential for restoration or preservation. Five of the wetlands (Wetlands A, B, E, F, and H) have potential to be incorporated into stormwater management systems. Three of the wetlands could be potential candidates for wetland rehydration (Wetlands E, F, and H).

Section 6
Regional Alternative Evaluations and Recommendations

6.1 Overview

A City-wide regional surface water hydrologic and hydraulic model was developed using the USEPA SWMM to estimate flooding and Level of Service (LOS) in the City. Section 3 provides a detailed description of the parameters, boundary conditions, and calibration of this model. This section will describe the application of this regional stormwater model to evaluate alternative solutions to existing and future water quantity (flooding) problems. The alternatives were directed towards solving serious flooding problems, but also should relieve some nuisance flooding problems in terms of depth, duration, and frequency.

The City of Fort Lauderdale is a nearly completely built-out urban area, with relatively low-lying topography that is intersected by numerous canals and rivers. Intense rainfall, limited soil storage (due to topography and a water table near land surface), high amount of impervious (paved) area, and limited available storage all contribute to severe flooding potential.

In general, City planning may include LOS such as passable roads for the 5-year storm, passable major artery roads for the 10-year storm, and no flooded buildings up to and including the 100-year storm. These goals may be achievable in some cities, but in Fort Lauderdale, due to the constraints described above, these LOS goals are not met as was shown in Section 3.

The purpose of the regional alternative evaluations is to determine if there is a regional solution or combination of solutions that may be implemented City-wide that would help achieve the aforementioned LOS goals. The evaluations in this section are necessarily aggressive with respect to cost and applicability, to try to approach the LOS goals. It is likely the City would not have the resources to apply all of these solutions to their full extent; however, it is the purpose of this document to estimate the LOS improvement that may be achieved if it could.

There is also a maintenance evaluation performed for this SWMP which is described here as Alternative No. 1. The regional model has been developed and evaluated as if all the pipes are clean, with no silting limiting either the cross-sectional area or increasing the roughness of the pipe, and no clogging of the catchments limiting inflow to the pipes. In Alternative No. 1, the regional model is evaluated with the pipes silted 10 percent, 20 percent, and 30 percent. The 5-year, 24 hour storm was further evaluated for two more conditions: (1) the 30% silted condition, with increased Manning's roughness and increased entrance losses, and (2) as if all the catchments were clogged, limiting inflow to the pipes to 10 percent of their capacity.

6.2 Regional Alternative Descriptions

6.2.1 Alternative No. 1 – Maintenance of Existing System

Alternative No. 1 is an evaluation of the existing PSMS under varying degrees of maintenance (or lack thereof) as described above. The fully maintained PSMS is the base condition that has been evaluated in Section 3 of this report. The scenarios tested for this alternative included:

- All pipes and culverts silted 10 percent. This is modeled using the "filled circular" option in SWMM for pipes, which allows for the bottom of the pipe to be silted to a specified depth. For box culverts, the height of the box was reduced by 10 percent. This test was conducted for all five design storms.

- All pipes and culverts silted 20 percent. This test was conducted as detailed above for all five design storms.

- All pipes and culverts silted 30 percent. This test was conducted as detailed above for all five design storms.

- All pipes and culverts silted 30 percent, Manning's roughness values increased from 0.015 for concrete pipes to 0.024, and entrance losses increased from K values of 0.25 to 1.0 (for most of the pipes). This test was conducted for the 5-year, 24 hour storm.

- All pipe and culvert entrances clogged. For pipes, this represents catchments clogged with leaves and/or trash. For culverts, the blockage may be silt, tree branches, or trash. This is modeled using filled circular pipes, filled to 90 percent of capacity and allowing for only 10 percent of the cross-section area of box culverts. Essentially, there is little to no flow in the PSMS, except the canals and rivers, under this scenario. Although this is close to the "worst-case" scenario, it is likely that some of the catchments in the PSMS may be blocked to this level if not maintained. This scenario estimates how severe flooding would then become for the 5-year design storm if this were to occur.

6.2.2 Alternative No. 2 - Exfiltration

For this alternative, the regional model is extensively covered with exfiltration trenches. The modeling of exfiltration is implemented more rigorously for the local models described in Section 7, where location and performance are estimated based on topography, existing exfiltration, and other factors. For the regional application, one inch of runoff, applied over the entire model area has been removed from the PSMS by initial abstraction (initial abstraction, described in more detail in Section 3, refers to the volume that is removed from the surface runoff hydrograph before it is applied to the outlet node in the hydraulic layer). The "one-inch over a given surface area" volume was chosen because it represents the commonly used treatment volume required by the SFWMD for new developments (for areas with less than 40 percent impervious area; for areas with greater than 40 percent impervious area, a higher volume is required). This test evaluates the hypothetical scenario in which this volume is applied to the entire region.

In this regional application, the exact location of each trench is not known or estimated, although it is expected that in some areas it would be difficult to locate a trench at an elevation where it would work as predicted, and where none already exists. Since exfiltration trenches need a gradient in head between the catchment and the water table, there are road surface elevations below which they become less effective or completely ineffective. Typically, in the City, the minimum road elevation (or catchment rim elevation) where the exfiltration trench remains effective ranges from 5 to 7 ft NGVD, with the lower end of this range only working when water table levels are below 2 ft NGVD. These estimations are based on using an elliptical perforated pipe and minimal cover to reduce the vertical dimensions of the structure providing adequate cover while fitting under the low elevations.

The length of trench needed to provide treatment for a given volume of runoff may be estimated using equations from the SFWMD (see the SFWMD Permit Information Manual, Volume 4). The performance of the trench, and hence the length required per a given treatment volume, is linearly dependent upon the hydraulic conductivity (K_s) of the soils. Since K_s may vary by orders of magnitude over the region, site measurements are generally needed to design trenches for given projects. For this conceptual analysis, we have used a constant one-inch per HU area as the removal volumes; therefore, the K_s values do not need to be known for the model application. However, to provide an indication of how much trench would need to be implemented to achieve this removal, a K_s value of 5.0×10^{-4} was used with the SFWMD equations to facilitate a conceptual cost estimate. Along with average catchment rim elevations at 7 ft NGVD, water table elevations at 2.5 ft NGVD and average trench width of 4 ft, the length of trench needed to implement Alternative No. 2 is estimated to be approximately 450 miles.

6.2.3 Alternative No. 3 – Recharge Wells

For this alternative evaluation, 124 recharge wells are located along the eastern portion of the City, at locations with approximately 1000 feet of separation and where there is estimated to be flooding during the smaller design storms. To construct this type of well, a permit must be obtained through the Florida Department of Environmental Protection (FDEP) for a Class V injection well. The permit application must be reviewed by the Underground Injection Control Technical Advisory Committee (UIC-TAC) of which FDEP is the lead agency. The permit requires that a recharge well be cased to protect the underground source of drinking water (USDW) which is defined by state regulations as groundwater having less than 10,000 milligrams per liter (mg/l) of total dissolved solids (TDS) content. Recharge wells are thus required to have a casing installed to a depth below the base of the USDW. In the City of Fort Lauderdale, the USDW typically occurs in the surficial aquifer east of Interstate 95.

In previous work for the City, the USDW was found at the Jacobs Landing Site, approximately 4000 feet east of Interstate 95, to be approximately 150 feet below land surface. Since this is near the practical limit of recharge wells, the wells for this evaluation were located in HUs east of a north-south line intersecting the Jacob's Landing site. Since this is a conceptual evaluation, the exact locations of the wells have not been determined. **Figure 6-1** shows the HUs that contain recharge wells for this alternative, and the number of wells modeled within each unit. In addition to the approximate USDW and necessary separation, the locations were chosen based on amount of base model flooding.

The recharge wells are also called gravity wells because the Class V injection rules do not allow pumped injection without an extensive monitoring program. These types of wells are typically designed to be gravity fed since due to surface and subsurface conditions there is adequate head for injection and to reduce equipment and electrical costs associated with pumps. As in the Jacob's Landing project, recharge wells may be serviced by an elevated stand tank, into which water may be pumped to create additional driving head. This must be considered in any final design. The costs for these components are included in the conceptual estimates.

To "recharge" the surficial aquifer, the driving head in a recharge well must be sufficient to overcome the losses in the pipe and the density difference between the fresh rainwater and the saline groundwater. This limits the wells' usefulness in low lying areas unless there are pumps and elevated stand tanks to overcome the head losses. However, the City of Key West has recharge well fields similar to this proposed alternative, where urban surface runoff flows to catchments that are directly attached to wells with no lifting by pumps. Since the groundwater table is highly influenced by tides in Key West, the well fields are less effective at high tide than at low tide. There still is a LOS improvement, even when storms arrive coincident with high tides, as the duration of flooding is lessened. For this conceptual analysis, the wells would be located and contain facilities such that the driving head requirement is met.

As with Alternative No. 2, this regional alternative uses a modeling approach that estimates the limits of the applicability of the alternative. To that end, each well was applied a flow rate of 2 cfs (900 gallons per minute). The recharge wells were implemented in the model using a pump link with constant flow to an outfall. A pump-type link with an equivalent constant pump curve above a set elevation removes water from a node at a constant rate when the node depth is above said reference elevation. Depending on location, the well may or may not require a pump and stand tank.

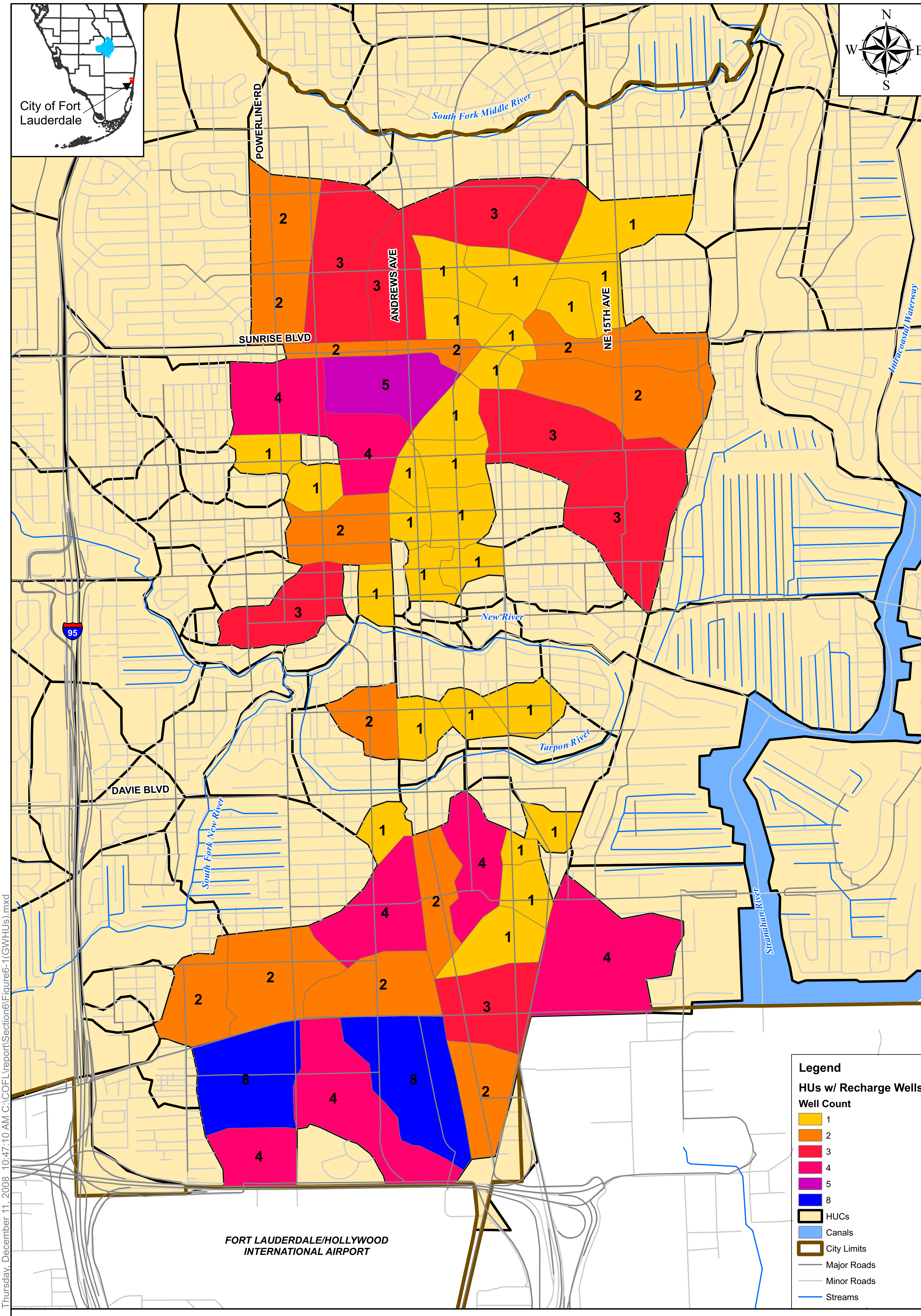


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Figure 6-1
City-Wide Stormwater Master Plan
Alternative No. 3
Approximate Locations of Recharge Wells

UPDATED 12-11-08

6.2.4 Alternative No. 4 – Maintenance Dredging

The City has implemented a dredging plan as part of this SWMP. Maintenance dredging may be defined as dredging the canals and rivers to a pre-defined or natural state. This is opposed to dredging that involves widening or significantly deepening a canal or river.

For this evaluation, the surveyed channels that are already in the regional model are considered the base case and the maintenance dredging is evaluated based on improved Manning's roughness. Dredging should remove impediments to flow including plant growth, trash, tree branches, etc.

The Manning's roughness values along the New River, the Tarpon River, and the North and South Forks of the New River were lowered from the calibrated values of 0.03 to 0.05 to a flat value of 0.03. The roughness values of the bridge links within the New River and its tributaries were similarly lowered.

The results below indicate that the dredging has caused slight increases in stage at the mouth of the New River. The model simulates that the lower roughness values cause increases in flows, which in turn cause some increases in peak stage downstream along with the desired decreases in peak stages upstream. Since this alternative evaluates maintaining the rivers at pre-existing cross-sections, it is not likely to be a regulatory problem, even with the slight increases in stage downstream. Further widening or deepening of the rivers and canals would present a permitting challenge, however, due to the stage increases. Therefore, that alternative is not evaluated.

6.3 Regional Alternative Results

6.3.1 Alternative No. 1 – Maintenance of Existing System

Alternative No. 1 was conducted as an evaluation of the existing PSMS under various levels of maintenance. The LOS was not to be improved under this alternative as the base regional model was developed as a well-maintained system. This alternative was performed to show the benefits of operation and maintenance of the system. The results show where LOS in the City is degraded when the PSMS is not well maintained. For alternative No. 1, five separate scenarios were conducted as described in Section 6.2.1. The first three scenarios (silting the pipes and culverts by 10 percent, 20 percent, and 30 percent) were modeled for all five design storms. The final two scenarios (adding roughness and entrance losses to the 30 percent silted case, and 90 percent silted or "clogged"), were modeled for only the 5-year, 24-hour design storm.

Appendix 6A includes Tables 6A-1 and 6A-2 which show the results of the five scenarios simulated as part of Alternative No. 1. All of the tables have been sorted such that the node with the highest increase in stage due to the 30 percent silted case is listed first. Positive values indicate that peak stages are increasing, while negative values indicate that they are decreasing.

The model simulations indicate that not all of the nodes would have increases in peak stage due to the poorly maintained condition. The tables show that nearly half of the nodes in the model would have no change or a slight decrease in stage. This is because the clogging of the pipes increases flooding at the upstream catchments, but also decreases flows. The decreased flows provide for lower overall stages in the rivers and some adjacent nodes. However, the increased stages at the upstream end of the pipes are much more significant, and represent serious problem areas.

Generally, the simulations indicate that the peak stages increase as the maintenance condition worsens, as expected. Another trend to note is that except for a few nodes, the difference between the base condition and the silted conditions is greater for the smaller storms than for the larger storms. This is because for the 2-year and 5-year design storms, many of the pipes in the PSMS are large enough to handle all of the runoff from the storms; therefore, reducing the size of the pipes can cause street flooding that is not expected from the base model simulations. For the larger storms, there is significant street flooding expected throughout the City, as seen in Section 3, and therefore the reduced size of pipe has less effect on the model results.

It should also be noted that the regional model does not explicitly simulate pipes that are less than 36-inches in diameter. These feeder pipes are considered secondary system and are incorporated into the surface runoff that loads to a single catchment for each hydrologic unit. If the model were refined to a detail that includes all pipes, the results of this alternative evaluation may be significantly worse. Thus, the local models detailed in the following section will be evaluated with a similar analysis.

The model nodes upstream of the Pump Station to the New River (RIVPS, SWFLAG-05, and NWFLAG-05) display peak stages that are very sensitive to inflow, but are below levels of street flooding, even for the 100-year storm. These three nodes are predicted to have some of the highest increases in stage and highest decreases in stage, depending on the scenario. Since none of the peak stages indicate street flooding, these results may be omitted as they are contained within the system.

The extra two scenarios simulated for the 5-year, 24-hour design storm are reported in Table 6A-2. Note that this table is sorted by descending stage increase for the 30 percent silted condition, to be consistent with the other tables. In the first extra scenario, the 30 percent silted condition is augmented with increased roughness in all pipes and culverts, as well as with increased entrance losses. This brings the simulation closer to the likely conditions for which pipes would show this level of neglect. This change resulted in the maximum increase in peak stage jumping from about 6 inches to about 9 inches. The second extra scenario was the clogged condition, for which the pipes, for all practical purposes, are blocked (90 percent silted). In this scenario, peak stage increases approach 2 ft in some locations above the base condition for this storm. At some nodes, the peak stages from the 5-year storm under the clogged scenario are expected to be near the peak stages experienced during the 100-year storm under maintained conditions.

Figure 6-2 displays the difference in peak flood elevations (deltas) for Alternative No. 1, under the 30 percent silted plus losses condition for the 5-year, 24-hour design storm. For model nodes in which the stage increases, the nodes are plotted in red, with increasing size based on the delta. Model nodes in which the stage is expected to decrease are plotted in blue. The three large blue nodes near the New River are the three nodes near the pump station that were described above. Other blue nodes tend to be along the rivers, such as those along the North Fork of the New River, because less stormwater flow is draining to the rivers through the PSMS.

Significant increases in flooding are expected to occur under this poorly maintained scenario at locations in Downtown Fort Lauderdale, except along the storm line feeding the pump station. Other significant increases are expected along U.S. 1, S.R. 84, Broward Blvd., Prospect Rd., Osceola Creek, and the neighborhoods of Northwest FTL, Riverland Village, Flamingo Park/Chula Vista, and Croissant Park/Poinciana Park.

6.3.2 Alternative No. 2 – Exfiltration

Alternative No. 2 was conducted as an evaluation of the regional application of exfiltration trenches as described in Section 6.2.2. The length of trench necessary to remove an inch of surface runoff over the entire project area was estimated to be approximately 450 miles.

The resulting peak flood stages and differences from the base regional model, by model node, are given in **Appendix 6B,** Table 6B-1. The differences (deltas) in peak flood stages between the base model and Alternative No. 2 for the 5-year, 24-hour storm are displayed in **Figure 6-3**. In both the table and the figure, negative values indicate that the peak stage is decreasing due to the alternative. In Figure 6-3, the size of the plotted node increases with larger decreases in peak stage (deltas that are more negative. In Table 6B-1, the model nodes are sorted by delta for the 5-year, 24-hour storm, in order from the best improvement to the worst.

The results indicate that this alternative solution does not provide the desired LOS for the City, but does locally help reduce flooding. For the 5-year, 24-hour storm, Table 3-5 in Section 3 indicated that there were estimated to be over 110 miles of roads within the City flooded more than 3 inches. Figure 3-13 from Section 3 showed that much of the flooding was well over 6 inches deep. The average improvement of 0.14 ft (less than 2 inches) for the 5-year storm would not be enough to provide the desired LOS (all roads passable) for the City. For the larger storms, exfiltration has little effect on peak stage as the volume expected to be handled by these systems is overwhelmed by the volume of the storm. Aside from the nodes near the pump station along the New River, which again are not relevant, Figure 6-3 shows that the areas that benefited the most from Alternative No. 2 include areas adjacent to the New River, the North Fork of the New River, Tarpon River, and Osceola Creek. The most improved neighborhoods include River Oaks, Northwest FTL and Melrose Park. This alternative solution should provide the most benefit for smaller storms of less than the 2-year

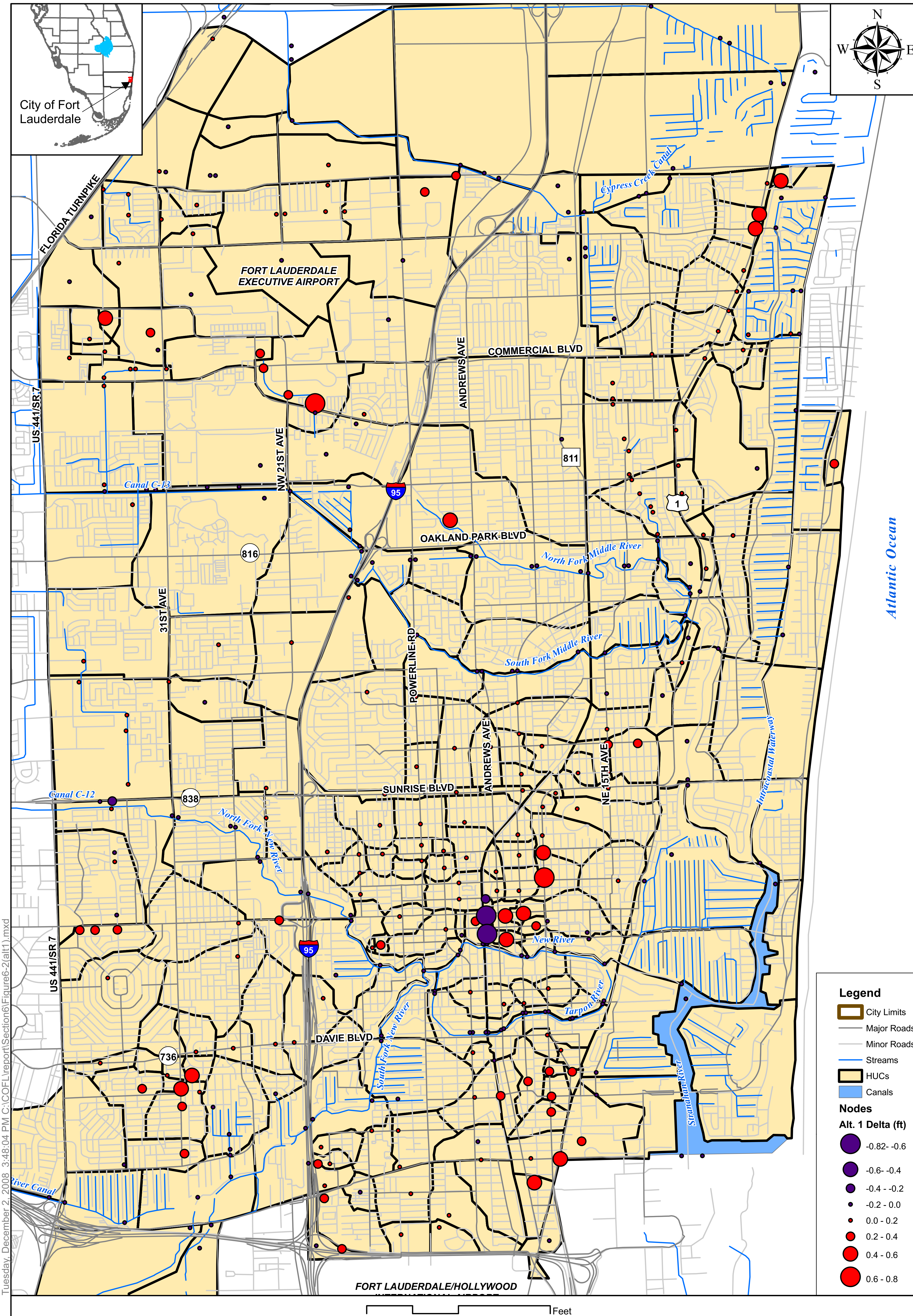

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Figure 6-2
City-Wide Stormwater Master Plan
Alternative No. 1, 30% Silted Plus Other Losses
5-Year Storm, Peak Stage Deltas

UPDATED 12-02-08

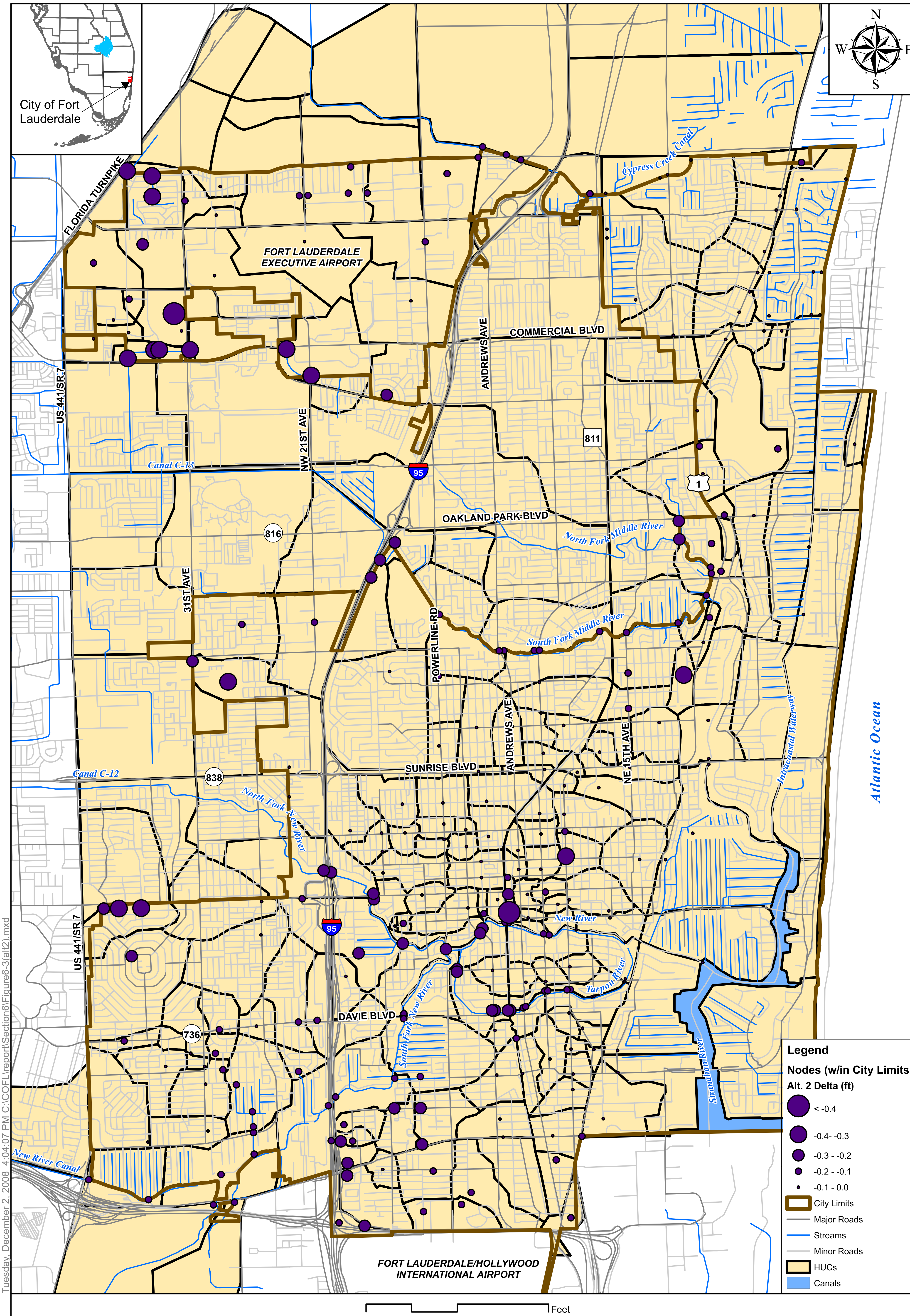

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Figure 6-3

City-Wide Stormwater Master Plan
Alternative No. 2, Exfiltration
5-Year Storm, Peak Stage Deltas

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12-02-08

return period volume. For smaller storms, most, if not all of the surface runoff will be captured by the exfiltration trenches. At times when the water table is lower, there will be more soil storage and the trenches should be more effective, both of which should help improve LOS City-wide. Exfiltration will be analyzed for the local models with a more targeted approach in the Section 7. There will be more focus on applicable topography, existing trench locations, and areas of need. The targeted areas are provided more trench than that needed to capture and treat the first inch of runoff. In this manner, localized flooding may be reduced to a desired LOS.

Exfiltration trenches should also lower the duration of the flooding for a given event. This LOS improvement will be evaluated in more detail for the local models in the next section. Exfiltration also provides treatment for TMDLs and ERPs.

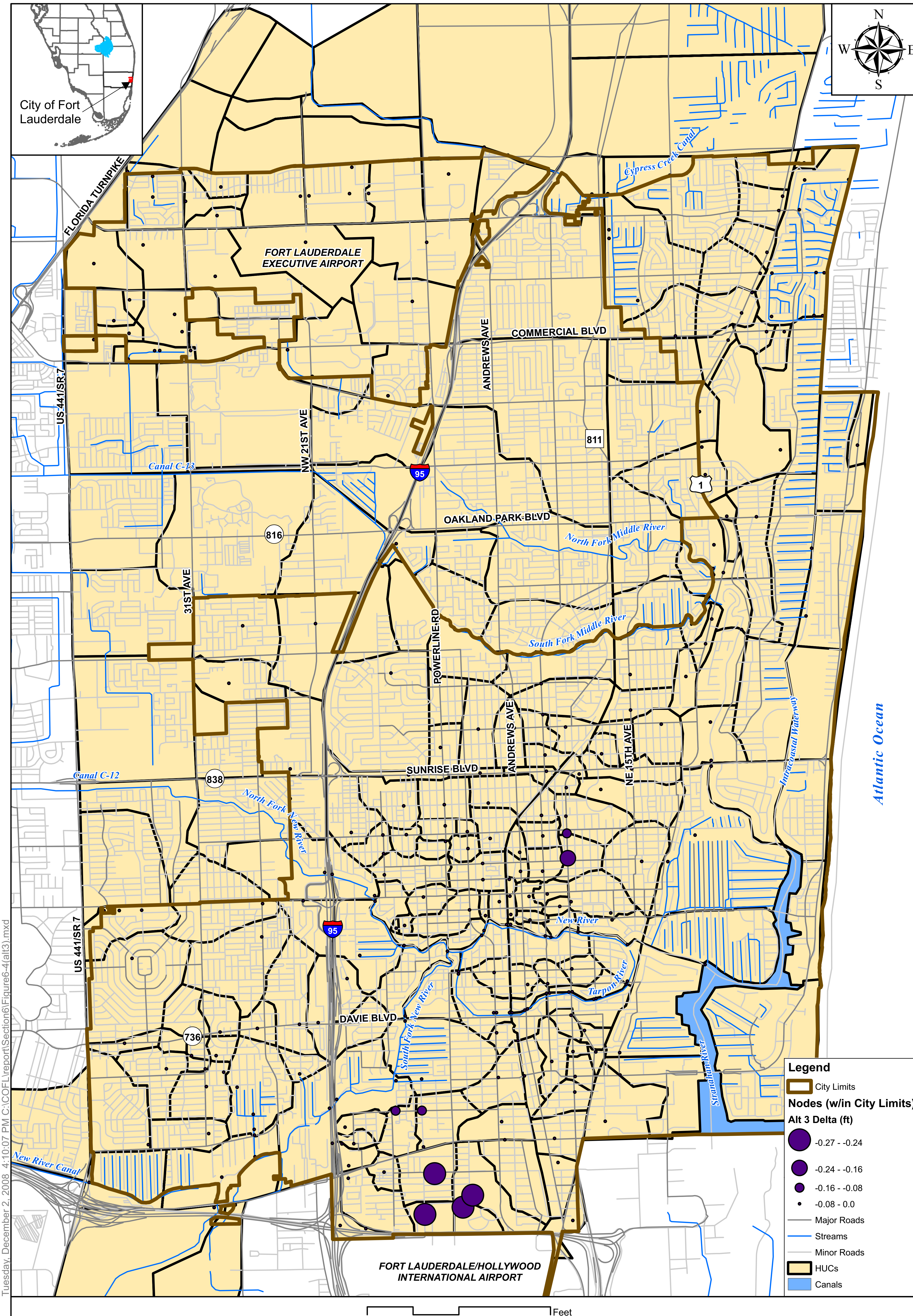
6.3.3 Alternative No. 3 – Recharge Wells

Alternative No. 3 was conducted as an evaluation of the regional application of recharge (gravity) wells as described in Section 6.2.3. This alternative includes 124 wells located in the HUs along the eastern portion of the City (see Figure 6-1) and operating at 2 cfs apiece.

The resulting peak flood stages and differences from the base regional model, by model node, are given in Appendix 6B, Table 6B-2. The differences (deltas) in peak flood stages between the base model and Alternative No. 3 for the 5-year, 24-hour storm are displayed in **Figure 6-4**. In both the table and the figure, negative values indicate that the peak stage is decreasing due to the alternative. In Figure 6-4, the size of the plotted node increases with larger decreases in peak stage (deltas that are more negative. In Table 6B-2, the model nodes are sorted by delta for the 5-year, 24-hour storm, in order from the best improvement to the worst.

The results of the alternative solution are similar to that of Alternative No. 2, in that it does not provide the desired LOS for the City, but does locally help reduce flooding (although somewhat less than in Alternative No. 2). The range of improvements for the 5-year storm (from approximately 0 to 3 inches) would not be enough to provide the desired LOS (all roads passable) for the City. For this alternative, there is again a reduction in the flood relief as the storms increase in intensity and volume. This was to be expected since the wells have a fixed peak flow rate of 2 cfs. However, the results indicate that the wells work better for the 72-hour storms than the 24-hour storms. This is due to the shape of the rainfall hydrographs. These results do indicate that recharge wells help reduce the flooding during smaller precipitation events leading up to a large storm. This is similar to the conclusions from the Jacob's Landing Modeling and Geophysical Test Project that was performed by CDM for the City to analyze the potential for recharge wells at that site.

Figure 6-4 indicates that the most improvement due to this alternative is in the Edgewood neighborhood. This is an expected result since the highest concentration of wells was also in this neighborhood. Conceptually, the wells were placed at approximately 1000 foot spacing where there was likely street flooding for the 5-year



Source: City of Fort Lauderdale

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Figure 6-4
City-Wide Stormwater Master Plan
Alternative No. 3, Recharge Wells
5-Year Storm, Peak Stage Deltas

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12-02-08

design storm. Edgewood had more area where street flooding was expected to occur than anywhere else within the City. Even within Edgewood, the 3 inches of expected flood mitigation was not enough to meet the desired LOS for the City.

As with the exfiltration alternative, local neighborhoods will be targeted with recharge wells in the following section. Recharge wells may help with local problems, such as in Jacob's Landing while helping with storms smaller than those modeled here, and also reducing the duration of flooding. Recharge Wells also provide credit for treatment, which can assist with TMDLs and ERPs.

6.3.4 Alternative No. 4 – Maintenance Dredging

Alternative No. 4 was conducted as an evaluation of the regional application of dredging as described in Section 6.2.4. Since maintenance dredging, reducing the roughness of the rivers and canals, causes slight increases in stage downstream, increased dredging to wider and/or deeper cross-sections was not tested. Dredging that causes downstream increases in stage would not be permitted, except to maintain the design cross-section. This alternative includes reducing Manning's roughness values in the center channels of the New River and its tributaries.

The resulting peak flood stages and differences from the base regional model, by model node, are given in Appendix 6B, Table 6B-3. The differences (deltas) in peak flood stages between the base model and Alternative No. 4 for the 5-year, 24-hour storm are displayed in **Figure 6-5**. In both the table and the figure, negative values indicate that the peak stage is decreasing due to the alternative. In Figure 6-5, the size of the plotted node (in blue) increases with greater reductions in peak stage (more negative deltas). Increases in peak flood stages are plotted in red. In Table 6B-3, the model nodes are sorted by delta for the 5-year, 24-hour storm, in order, from the best improvement to the worst.

The results indicate that improvements occur along the upstream reaches of the river, particularly along the North Fork of the New River, and at nodes representing canals immediately adjacent to these reaches. There is little to no improvement in most of the City where LOS improvements are needed. There are expected to be increases in peak flood stage in the New River downstream of Downtown Fort Lauderdale due to the increased flows from upstream.

6.4 Estimates of Conceptual Costs

The costs of the components for each alternative were quantified to allow for a cost-based comparison. The costs are based on bid tabs available for recent construction projects throughout South Florida. Projects local to Fort Lauderdale were given much greater consideration in the development of the conceptual cost estimations.

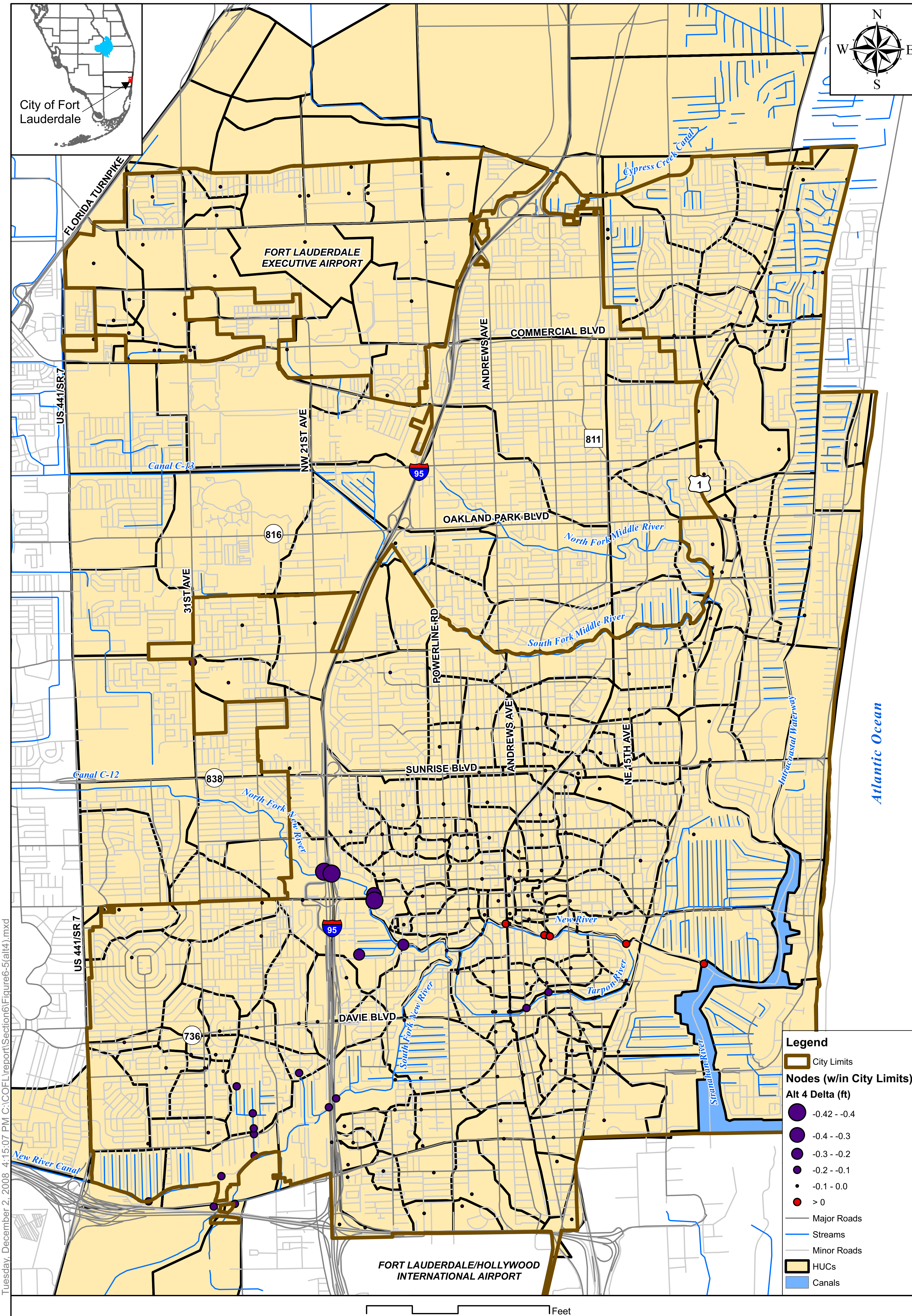

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Figure 6-5
City-Wide Stormwater Master Plan
Alternative No. 4, Dredging
5-Year Storm, Peak Stage Deltas

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6.4.1 Alternative No. 1 - System Maintenance

The first alternative analyzed was general maintenance of the collection and conveyance system. The costs associated with cleaning the system, most likely utilizing vacuum trucks and high pressure water jetting, was derived based on unit costs made available by the FDOT. The cost was per linear foot (lf) and varied based on pipe size as follows:

- Pipe diameter zero to twenty-four inches: $7/lf;
- Pipe diameter twenty-five to thirty-six inches: $12/lf;
- Pipe diameter thirty-seven to forty-eight inches: $16/lf; and
- Pipe diameter forty-nine to sixty inches: $20.5/lf.

The City-supplied GIS stormline layer was used to estimate the conceptual costs of maintaining the system. For lengths of pipe where there was no diameter, information were added to the total of pipes 24-inches and smaller, since they most likely are in this size range. Maintenance of the approximately 240 miles of pipe located within the City is a very cost effective means of helping to mitigate peak flood stages. It is estimated that maintenance of the conveyance system serving the City would cost approximately $10.6 million (see Section 6.4.5 for a conceptual cost comparison). Some of the costs associated with this alternative are for pipes along state roads. The analysis was also completed for the pipes in the GIS layer with pipes along and immediately adjacent to state roads removed. Under these conditions, the conceptual cost would be approximately $8.9 million. These costs would not be incurred in a single year as a multi-year maintenance plan could be adopted which would result in cleaning a given system every five years, for example. In that case, the yearly cost would conceptually be approximately $1.8 million.

6.4.2 Alternative No. 2 - Exfiltration

The second alternative analyzed was the installation of exfiltration trench regionally, throughout the project area. In Section 6.2.2, the length of trench necessary to remove an inch of surface runoff over the entire project area was estimated to be approximately 450 miles using the SFWMD formula. This analysis estimates that catch basins would be placed at 200 ft intervals.

The conceptual cost estimate developed for installation of exfiltration trench was based off recent FDOT projects in the area, and accounts for installation of the system, but does not take into consideration the operation and maintenance (O&M) costs associated with the exfiltration trenches. It should be noted that annual O&M costs associated with exfiltration trench are often significant, ranging from 3 to 20 percent of the capital cost as stated in the SFWMD publication “BMPs for South Florida Urban Stormwater Management Systems”, SFWMD, 2002. It is also important to note that the typical effective operational duration ranges from five to ten years for most systems due to clogging by fine particulates, and total replacement may be the only effective means of restoring the original design treatment capacity.

Capital costs associated with exfiltration trench were based on the following:

- Cost of materials, installation, and repair of roadway: $195/lf; and
- Cost of catch basins: $2,500 per.

Based on these conceptual costs it is estimated that the installation of approximately 450 miles of exfiltration trench along with nearly 12,000 catch basins and will cost approximately $490 million (see Table 6-1 for a conceptual cost comparison).

6.4.3 Alternative No. 3 - Recharge Wells

Alternative No. 3 analyzed the effects of installing 124 gravity recharge wells throughout the eastern portion of the City, in areas that are expected to flood during the 5-year, 24-hour design storm. Wells were placed at about 1000 ft intervals. The cost of the recharge wells was based on local experience with drillers and accounts for all materials and labor required to install the wells. Capital costs associated with recharge wells were based on the following:

- Cost of materials, labor, and installation of 12” well: $150,000/per well.

Based on these conceptual costs, it is estimated that the installation of approximately 124 gravity recharge wells will cost approximately $18.6 million (see Table 6-1 for a conceptual cost comparison).

For Alternative No. 3, the lump sum cost was estimated for a 12-inch diameter well to 200 ft below surface. For this conceptual analysis, the gravity well consists of a catchment attached to the well casing. If it is determined that additional driving head is needed, it can be provided by using a small pump to lift water into an elevated stand tank, thereby artificially generating the head required to overcome the density differential of the fluids and the losses in the well. The costs associated with this option typically preclude it from widespread applicability. Additionally, locating the pump stations and stand tanks may be problematic in some neighborhoods. Approximate costs associated with generating additional head, exclusive of the cost of the well, are as follows:

- Cost of pump and fittings: $150,000 per;
- Cost of elevated Storage Distribution Structure: $75,000 per; and
- Standby Power, Fuel, Level Controls, Building, Conduit, P/I&C: $100,000 per.

This raises the potential cost of implementing Alternative No. 3 to $58.9 million.

6.4.4 Alternative No. 4 - Maintenance Dredging

Alternative No. 4 did not provide improvement to the LOS for the City and therefore the conceptual costs are not examined in this section. For further discussion of the dredging program, and associated costs, see Section 2.1.4.

6.4.5 Cost Comparisons

A summary of the total estimated cost for each evaluated alternative is provided below in **Table 6-1**.

Table 6-1. Estimated Total Conceptual Cost of Evaluated Alternatives.

Alternative	Estimated Cost
Alternative No. 1	$8,900,000
Alternative No. 2	$493,000,000
Alternative No. 3 (without/with PS Facilities)	$18,600,000/$58,900,000
Alternative No. 4	N/A

6.5 Conclusions and Recommendations

The regional stormwater model that was developed for this City-wide SWMP, as described in Section 3, was applied for four alternatives to evaluate potential LOS improvements. Alternative No.1 evaluated multiple conditions where the existing PSMS was not maintained, to show how the LOS degrades with neglect. The remaining three alternatives evaluated potential solutions to flooding problems using:

- Exfiltration Trenches;
- Recharge Wells; and
- Maintenance Dredging.

Due to the built-out nature of the City, storage options were not evaluated within the regional model. This type of solution is investigated in the Section 7 with the detailed local scale models.

The results of the regional alternative modeling indicate that there are no cost effective regional solutions that would provide a desirable LOS for the City, such as all roads passable for the 5-year storm, major roads passable for the 10-year storm, and no buildings flooded for the 100-year storm. Exfiltration trenches and recharge wells do provide reduced peak flood stages at many locations in the City; in addition it would likely work well for smaller storms, would reduce the duration of flooding, and would provide water quality treatment. These are all improvements to LOS but fall short of the goals outlined as part of this analysis. The dredging may help reduce flood stages in upstream reaches immediately adjacent to the river, but in general, is more useful for navigation and to maintain the outfalls of the PSMS than to reduce flooding in and of itself.

Based on the regional alternatives analysis the following recommendations are offered:

- The City's stormwater system should be regularly maintained. Catchments should be cleaned of trash and debris to allow full access to stormwater pipes. The pipes should be cleared of silt and other debris to maintain full cross-sectional areas and low roughness values. The model indicates significant increases in peak flood stage when the catchments are clogged. Although the regional model may be underestimating the loss of LOS when the pipes are silted, because the secondary system is not explicitly modeled, there still are significant increases in flood stage that warrant regular maintenance.

- Exfiltration and recharge wells may be implemented to reduce peak flood stages and improve LOS, but targeted local implementation will be more cost effective than a regional application.

- There may be an opportunity for the City to use excess stormwater runoff and the regional baseflow from the canal system to augment potable water supplies and/or support ecosystem restoration. Although out of scope for this project, there may be benefits to working with Broward County in its ongoing water resource conservation planning to consider storage of stormwater west of the City or to redirect stormwater west into the Water Conservation Areas within hydraulic constraints. This would potentially:

    1. Reduce flooding duration in the City and County;

    2. Recharge the regional aquifer system;

    3. Provide a source of potable and/or supplemental reuse water supply; and

    4. Provide additional water for ecosystem restoration, including reduction of volume and pollutant loads to the receiving waters to assist the City with compliance for pending total maximum daily loads (TMDLs) and associated pollutant load reduction goals (PLRGs).

Section 7
Local Alternative Evaluations and Recommendations

7.1 Overview

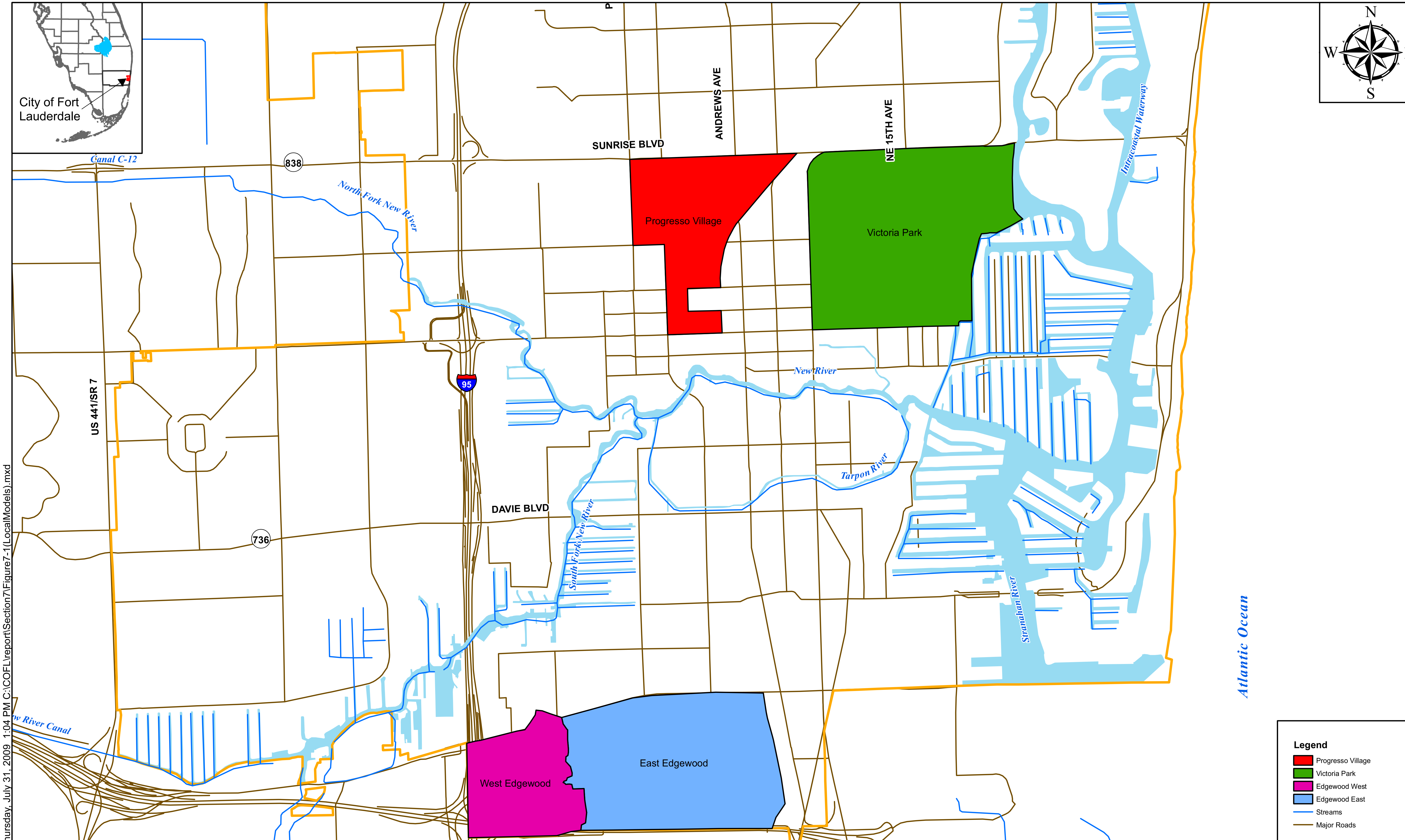
A City-wide regional surface water hydrologic and hydraulic model was developed using the USEPA SWMM to estimate flooding and LOS in the City. Section 3 provides a detailed description of the parameters, boundary conditions, and calibration of this model. In Section 6, the regional stormwater model was applied to evaluate alternative solutions to existing water quantity (flooding) problems. In this section, four neighborhood-scale local models have been developed, using the regional model as a base, to evaluate alternative solutions in finer detail. The four problem areas modeled include East Edgewood, West Edgewood, Progresso, and Victoria Park (see **Figure 7-1** for neighborhood locations). These neighborhoods were chosen due to the severity of flooding as determined in Section 3 as described below.

CDM ranked the neighborhoods based on the criteria set in Section 3 (Section 3.8.2 and Tables 3-5 through 3-7), and selected neighborhoods for which the more detailed, local models would be created. It was determined that some of the neighborhoods that are listed high in the model rankings did not have observed flooding as severe as other neighborhoods that are ranked lower. This is not completely unexpected since the regional model is only an approximation of the actual flooding and depends on the stormwater system survey supplied by the City, some of which is incomplete, especially in neighborhoods that are newly added to the City of Fort Lauderdale. Neighborhoods that were excluded due to the uncertainty of the analysis include Twin Lakes North Homeowners Association and Melrose Park.

The conclusions from the neighborhood ranking analysis were that:

1. The neighborhood defined by the Edgewood Civic Association was to be divided into two parts, East Edgewood and West Edgewood, due to the size of the neighborhood and the significant flooding problems in the area. These are two of the areas modeled in detail in Section 7.

2. The neighborhood defined as Victoria Park Civic Association was identified as the third local model described in Section 7. Although Victoria Park was ranked as the 16th worst flooded neighborhood by length of road flooded during the 5-year storm and 7th in number of buildings flooded during the 100-year storm, it had received the most complaints. Additionally, there is anecdotal evidence that there is significant flooding close to the Intracoastal Waterway that the regional model would not be able to simulate, but that the local model would due to the higher level of refinement. The high instances of observed flooding, combined with the relatively high model ranking were sufficient cause to include this neighborhood in the local modeling task.



Source: City of Fort Lauderdale

CDM

0 2,000 4,000 8,000 Feet

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 7-1
City-Wide Stormwater Master Plan
Neighborhoods for
Local Model Development

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3. The final neighborhood to be modeled in detail was Progresso Village. This neighborhood ranked second in feet of flooded road during the 5-year storm when normalized by neighborhood area. Since this neighborhood is much smaller than some of the others on the list, this is a reasonable metric to use.

The regional model was used to determine boundary conditions for the local models; however, the local models have been constructed to a much finer level of detail as described below.

As discussed in previous sections, there is potential for severe flooding in the City of Fort Lauderdale. This is because the City is a nearly completely built-out urban area, with relatively low-lying topography that is intersected by numerous canals and rivers. Intense rainfall, limited soil storage (due to topography and a water table near land surface), high amount of impervious (paved) area, and limited available storage all contribute to the severe flooding potential.

The flood control LOS goals discussed in previous sections are evaluated in this section as well. These include passable roads for the 5-year storm, passable major arterial roads for the 10-year storm, and no flooded buildings up to and including the 100-year storm. The purpose of the local alternative evaluations is to determine if there is a solution, or combination of solutions, that may be implemented at locations of severe flooding which would help the areas meet or approach these LOS goals.

This section of the report is arranged by the four project neighborhoods, ordered alphabetically. Since the types of alternative solutions that are evaluated are used in all four projects, they are discussed globally below in Section 7.3, and then referred back to in the following sections. The type of solution evaluated is numbered consistently for each project location. For example, Alternative No. 2 is an analysis of exfiltration trenches within each of the project locations. After the four project locations are discussed, CDM's previous modeling work for the City at River Oaks will be described in Section 7.8. Additionally, tidally induced flooding that has been experienced in several neighborhoods in the City will be discussed in Section 7.9.

7.2 Local Model Setup

The four neighborhood-scale models were developed from the regional model using consistent methodologies. Details of the model extents, boundary conditions, and local model parameters will be provided within each model's subsection. This section provides a general description of model setup. After the models were developed, the base condition simulations were performed for the 2-year, 24-hour; 5-year, 24-hour; 10-year, 24-hour; 25-year, 72-hour; and 100-year, 72-hour SFWMD design storms. The base model results were compared, where possible, to the regional model to confirm that there were no anomalies. Once the base models were developed successfully, the alternative models were built and evaluated for the five design storms, as described below.

7.2.1 Determination of Model Extents

For each of the local models, the regional model was examined to find hydraulic boundaries that are near or outside the boundaries of the problem areas. The HU boundaries from the regional model were thus used as model extent boundaries for the local model, where applicable.

7.2.2 Development of Boundary Conditions

In general, the hydraulic boundaries at the edges of the model were not sufficient to provide "no flow" boundaries for all of the design storms. Often, there was overland flow across these boundaries that needed to be addressed. In some instances, there was pipe flow to and from areas outside the model extents. If the regional model simulations indicated that the overland and/or pipe flows were directed into the project area, these flows were treated as inflow boundary conditions in the local models. This type of boundary condition uses an inflow hydrograph (time series of flows) at a node on the edge of the model. There are five sets of time series that come from regional model simulations, one for each of the five design storms. Often, flows from more than one link in the regional model were combined to form the inflow hydrographs for use in the local models.

For simulated flows in the regional model which are directed out of the project area, inflow hydrographs (which would need to be negative to simulate outflows) are not used because they may cause errors in continuity. For outflows, model outfalls are used as boundary conditions. The outfalls use a time series of stages that are taken from the downstream nodes in the regional model. The links to these outfalls are copied from the regional model, whether overland conduits, or pipes. In SWMM, only one link is allowed to each outfall; therefore, if there is both an overflow and a pipe to the downstream node in the regional model, two identical outfalls are used, one for each of the links. Again, there are five sets of time series that come from regional model simulations, one for each of the five design storms.

7.2.3 Development of the Digital Elevation Map

The topographic surface developed for the regional model was necessarily coarse in order to encompass the entire City. For each of the local models, the digital elevation map (DEM) was rebuilt at a finer scale that incorporated the survey provided by the City of Fort Lauderdale (see Section 2).

As with the regional model (Section 3.6.1), the survey data provided by the City does not cover the entire project area as surveys tend to be located in or adjacent to streets. The LiDAR data of Broward County was used to augment the survey data at 20-ft by 20-ft grid spacing. The survey data is typically more accurate than the LiDAR data; therefore, the LiDAR grid was adjusted by finding deltas between a surface generated by the LiDAR grid and all survey points. The LiDAR grid points were then corrected by weighted averages (by distance to survey points) of these deltas. Once the adjustments to the LiDAR grid were made, LiDAR grid points that overlap with survey points were removed and the grid was merged with the survey. This formed a new, non-uniform grid of elevation points in space. This grid was used to produce the local DEMs (topographic surfaces) for each model.

7.2.4 Refinement of Hydrologic Units

Once the detailed DEM had been developed, it was used to help determine the local models' hydrologic units (HUs). In refining the details of these models, hydrologic boundaries were developed at a multi-block scale. In the regional model, existing storm pipes were modeled for pipes with diameters of 36-inches and greater. For the local models, all pipes with diameters of 12-inches and greater were modeled. In order to not have "dry" pipes in the model, surface runoff from a HU must flow to the upstream end of each of these storm lines. Since each HU may only load to a single junction in SWMM, each storm line of 12-inch diameter and larger had a designated HU loading runoff to the upstream end. Site specific details of the HU refinement are discussed in the following subsections, where applicable.

7.2.5 Hydrologic Parameters

The hydrologic parameters for each of the four local models are provided in **Appendix 7A**, Tables 7A-1 through 7A-4.

7.2.5.1 Soil Parameters

As with the regional model, Horton soil parameters for the local models were developed using the NRCS soils map, the (new) HU boundaries, and GIS. The composite soil make-up within each HU was used to determine weighted Horton soil characteristics including maximum and minimum infiltration rates, and soil storage (see Section 3, Section 3.6.1.4 and Table 3-3 for the global soil parameters used in this project). The percent (by area) of each soil type within a HU is combined with the global parameters to calculate each HUs' specific infiltration parameters.

7.2.5.2 Groundwater Parameters

For design storm simulations, groundwater baseflow is generally insignificant versus the surface runoff. Therefore, the groundwater parameters were estimated from previous modeling experience and as expected, baseflows were negligible for the design storm simulations for these local models.

7.2.5.3 Directly Connected Impervious Area

The directly connected impervious area (DCIA) represents impervious areas for which there is no infiltration and where all precipitation runs off to the primary stormwater management system (PSMS). As an initial approximation, land use data was used to estimate HU imperviousness. As for the regional model, the land uses were grouped into nine categories of relatively homogeneous geophysical parameters (see Section 3.6.1.6).

The impervious areas, overland Manning's roughness (n), and initial abstraction (IA) (depression ponding depth) for each HU were calculated in GIS using percentages of homogenous, or nearly homogenous, land use obtained from the City and SFWMD (see Section 2), then applying guideline parameter percentages (see Table 3-4 in Section 3).

Once the initial approximations were made, the imperviousness of each HU was inspected using aerial photography. In instances where the initial percentages varied significantly with the inspected percentages, the DCIA was measured in GIS directly from the aerial photo. Typical instances where the direct measurements were needed included areas described a "Commercial" or "High Density Residential" having significant open space as part of the property.

7.2.5.4 Other Hydrologic Parameters

The other parameters that were determined by land use, including overland Manning's roughness values and initial abstractions were not corrected using the aerial photography as the models are not sensitive to slight variations in these values. Overland flow widths and slopes were found for the new HUs using the refined DEM developed for each model as described above.

7.2.6 Hydraulic Parameters

The hydraulic parameters for each of the four local models are provided in **Appendix 7B**. Tables 7B-1 through 7B-8 give the hydraulic link data and the hydraulic node data, respectively for each model.

7.2.6.1 Stage-Area Relationships

Stage-storage area relationships are necessary in relatively flat models where flood waters may overflow the PSMS and fill low-lying areas. An accounting of the volume of these areas is needed for both accurate flood elevation predictions as well as peak flow estimates.

However, it is also important to not "double-count" storage in order to provide an accurate estimate of peak flood elevations. For the local models, because the HU areas are much smaller, the storage at each junction is generally much less than for the regional model. Multiple overland flow links are often necessary in these models. Even with the relatively short length of these links (see below) they may provide significant storage relative to the storage in the junction, especially during the larger storms. Therefore, an equivalent amount of storage was removed from the stage-area relationship in the adjacent storage junctions to compensate for this.

Stage-storage area relationships were computed for each HU from the DEM developed from the combined LiDAR and survey, using ESRI ArcGIS with 3D Analyst. The plan areas for stages at 0.5 foot intervals (of depth above node invert) were calculated from the surface as appropriate.

7.2.6.2 Culverts and Pipes

The City provided CDM with a GIS layer of storm drains as discussed in Section 2. Site specific data for areas in West Edgewood, Progresso, and Victoria Park were supplied by the City as an addendum to this layer and will be discussed, where appropriate in the following subsections. Numerous site visits were also made to determine pipe and culvert sizes and approximate inverts.

For this type of planning model, the pipes are evaluated in a clean condition; therefore, all reinforced concrete pipes were set to a Manning's roughness value of 0.015 unless the pipe was known to be a corrugated metal pipe (CMP), then the roughness was set to 0.024. The pipe lengths were determined using GIS if the information was not provided in the GIS layer. Entrance losses were set to 0.25 unless there were special circumstances. Exit losses ranged from 0.25 for straight sections of pipe to 1.0 for outfalls to lakes, ponds, or the Intracoastal Waterway.

In SWMM, pipes and culverts may be lengthened to ensure computational stability where necessary. For the local models, the time step has been reduced to 5 seconds so that this would not be necessary.

7.2.6.3 Hydraulic Overland Flow

The overland flow link is a natural cross-section which is a profile representative of the topographic ridge along the boundary between two HUs. The length of these channels is relatively short, typically 100 feet, while the widths are often quite large (on the order of hundreds of feet). The links act similar to a broad crested weir, which only begins to flow when the ponding on either side of the link reaches the height of the topographic ridge boundary and stage equalization occurs. During high intensity events, surface ponding is prevalent and transfer will occur from one HU to another. It is desirable to keep these lengths relatively short (to approximate a weir), but some length is needed for computational stability. Road overflows, as parallel conduits to culverts and bridges, are modeled with these types of links as well to simulate over-topping the road.

7.2.6.4 Existing Exfiltration

Estimates of existing exfiltration trenches were made using methods similar to those described in Section 7.3.2, below. The locations of the existing trenches were approximated using data provided by the City and CDM experience with the City's facilities, where applicable. In some instances, feedback was not provided by the City, and judgments were made as to probable locations of exfiltration trench (such as when there are pipes in the storm line GIS layer that do not appear to attach to any outfalls). Since local detailed soil conditions were not known (or provided) for the existing exfiltration trenches, a constant hydraulic conductivity (K_s) value of 5.0×10^{-4} $cfs/ft^2/ft$ of head was used to determine the effectiveness of the system based on previous experience in the City.

7.3 Flooding Control Measures

The control measures used in these alternative evaluations include maintenance, exfiltration, recharge (gravity) wells, and wet and dry detention facilities which may include pump stations. The control measures were directed towards solving serious flooding problems, but should also relieve some nuisance flooding problems in terms of depth, duration, and frequency.

7.3.1 Alternative No. 1 – Maintenance of Existing System

Alternative No. 1 is an evaluation of the existing PSMS under varying degrees of maintenance (or lack thereof). These local models have been developed with a base condition where all pipes are expected to be clean. There is no silting limiting either the cross-sectional area or increasing the roughness of the pipe, and no clogging of the catchments limiting inflow to the pipes. A fully maintained PSMS is the base condition that has been evaluated for the regional model as well.

This alternative is an extension of the work performed in the regional alternative evaluations in Section 6. Since the regional model did not explicitly model pipes which are smaller than 36-inches in diameter, it was possible that the evaluations were not providing accurate estimations of increases in local area flooding due to the blockages. This analysis is to determine if the smaller pipes at the end of the system are the controlling factor for peak stages if the system were to not be well maintained.

An envelope of silted conditions is evaluated because actual conditions are not known, except for portions of the West Edgewood neighborhood. For this neighborhood, site visits have determined that the culverts along Osceola Creek are severely silted. The measured amounts of blockages are modeled for this project, along with the most severe siltation condition for pipes where conditions are unknown.

For the remainder of the local models the maintenance scenarios tested for this alternative included:

- All pipes and culverts silted 10%. This is modeled using the "filled circular" option in SWMM for pipes, which allows for the bottom of the pipe to be blocked to a specified depth. For box culverts, the height of the box was reduced by 10%. Manning's roughness values were increased to 0.018 for concrete pipes and culverts and entrance and exit loss K values were increased by 0.25.

- All pipes and culverts silted 20%. Manning's roughness values were increased to 0.021 for concrete pipes and culverts and entrance and exit loss K values were increased by 0.50.

- All pipes and culverts silted 30%. Manning's roughness values were increased to 0.024 for concrete pipes and culverts and entrance and exit loss K values were increased by 0.75.

7.3.2 Alternative No. 2 - Exfiltration

For this alternative, exfiltration trenches are added to the model where flooding is expected to occur, where there is no existing exfiltration, and where the street elevations are high enough for the systems to be effective.

For the local models, the methods used to simulate exfiltration differ from the regional model (which used a basic method of an initial abstraction volume, see Section 6). For both existing and proposed exfiltration trenches, it was desirable to model exfiltration as a flow out of the hydraulic system as opposed to a volume captured in the hydrologic portion of the model (see Section 3 for details on model setup). Analyzing exfiltration as flows improves the estimates of exfiltration trench effectiveness, and also allows for more accurate estimates of the reduction in flooding duration.

Exfiltration trenches work better when the water table is low so that there is an effective gradient between the catchment and the groundwater. However, during storms in South Florida, the water table rises and this gradient is reduced as the storm progresses. It was therefore necessary build the models to mimic this response. This was accomplished by developing rating curves that reduce the expected flows as the water table rises. The rating curves are designed using the SFWMD methodology to determine the appropriate length of trench needed to provide a given treatment volume for a set of trench parameters as listed in SFWMD Permit Information Manual [PIM], Volume 4. In this case, the rating curve is calculated per unit length of trench, and the treatment volume and associated flow rate vary for a given set of trench parameters.

The flow rate may be calculated as:

$$\delta = K_s H_2 W + 2K_s[D_u(H_2 - 0.5D_u) + D_s H_2]$$

Where:

δ = flow rate per foot of trench (cfs/ft);

K_s = Hydraulic Conductivity of the soils in cfs/ft^2/ft of head (note that the SFWMD PIM simply uses$K$, where K_s is used here to differentiate from other K values such as hydraulic losses);

H_2 = depth to water (ft), which varies in time based on the expected water table elevation;

W = width of the trench (4 ft for these calculations);

D_u = unsaturated trench depth (ft); and

D_s = saturated trench depth (ft).

Figure 7-2 shows estimated water table elevations as determined by the groundwater routines of SWMM, for an example basin in South Florida for 24-hour and 72-hour duration design storms, respectively.

The water table may not behave as such for all areas as the rise will be site specific and be dependent upon geological factors such as porosity and permeability; however, this is the shape that would generally be expected. The water table rise becomes sharper as the intensity of the storm increases, but lags the peak of the rainfall (rainfall peak intensities are at 12 hours and 60 hours, respectively for the 24-hour and 72-hour design storms). The water table rises near or to the land surface and then gradually recedes after the storms pass. **Figure 7-3** shows the expected flow rate for a 1,000-ft long exfiltration trench, with a K_s value of 5.0×10^{-4} cfs/ft^2/ft of head, a width of 4 ft, and H_2, D_u, and D_s terms generated from the water table elevations in Figure 7-2. By allowing the flow rates to fall as the water table rises, this method is more representative than using a constant rate, and will more closely approximate actual conditions.

These calculations of exfiltration performance are linearly dependent upon hydraulic conductivity, which may vary significantly within the study areas. For the regional model and for existing exfiltration, K_s values of 5.0×10^{-4} were used in the estimates. In twelve site tests performed for prior projects in River Oaks and Progresso, measured hydraulic conductivities ranged from 6.8×10^{-5} to 9.8×10^{-4}, with a mean of 2.5×10^{-4} cfs/ft^2/ft of head. Therefore, the values used for the regional model and for existing exfiltration are near the high end of encountered values. For the proposed exfiltration in the local models an envelope of hydraulic conductivities from 1.0×10^{-4} to 5.0×10^{-4} cfs/ft^2/ft of head have been used to estimate performance of the systems.

The proposed exfiltration alternatives are evaluated at locations where the road surface (proposed catchment rim elevation) are at 6.0 ft NGVD or higher. The minimum road elevation where exfiltration is expected to function properly ranges from about 5.0 ft NGVD to 7.0 ft NGVD based on where the water table is located; however, the 6.0 ft NGVD minimum is conservatively used in this report. This does not indicate that exfiltration would not work at lower elevations, or that all exfiltration trenches would work at 6.0 ft NGVD, since local site conditions vary (and are extremely important for trench effectiveness). Site specific saturated vertical and lateral hydraulic conductivity tests are recommended for each location. As a comparison, in the Keith & Schnars Report for the City (City of Fort Lauderdale – River Oaks/Edgewood Stormwater Management Analysis, March 2002), the minimum elevation evaluated for potential exfiltration was 6.5 ft NGVD.

By replacing the 24-inch diameter circular perforated pipe in their design with an equivalent elliptical perforated pipe 19 inches in height, similar pipe inverts and cover may be achieved at the lower road elevations. This will be important in some of the City's low-lying problem areas.

Figure 7-2. Predicted Water Table Elevations

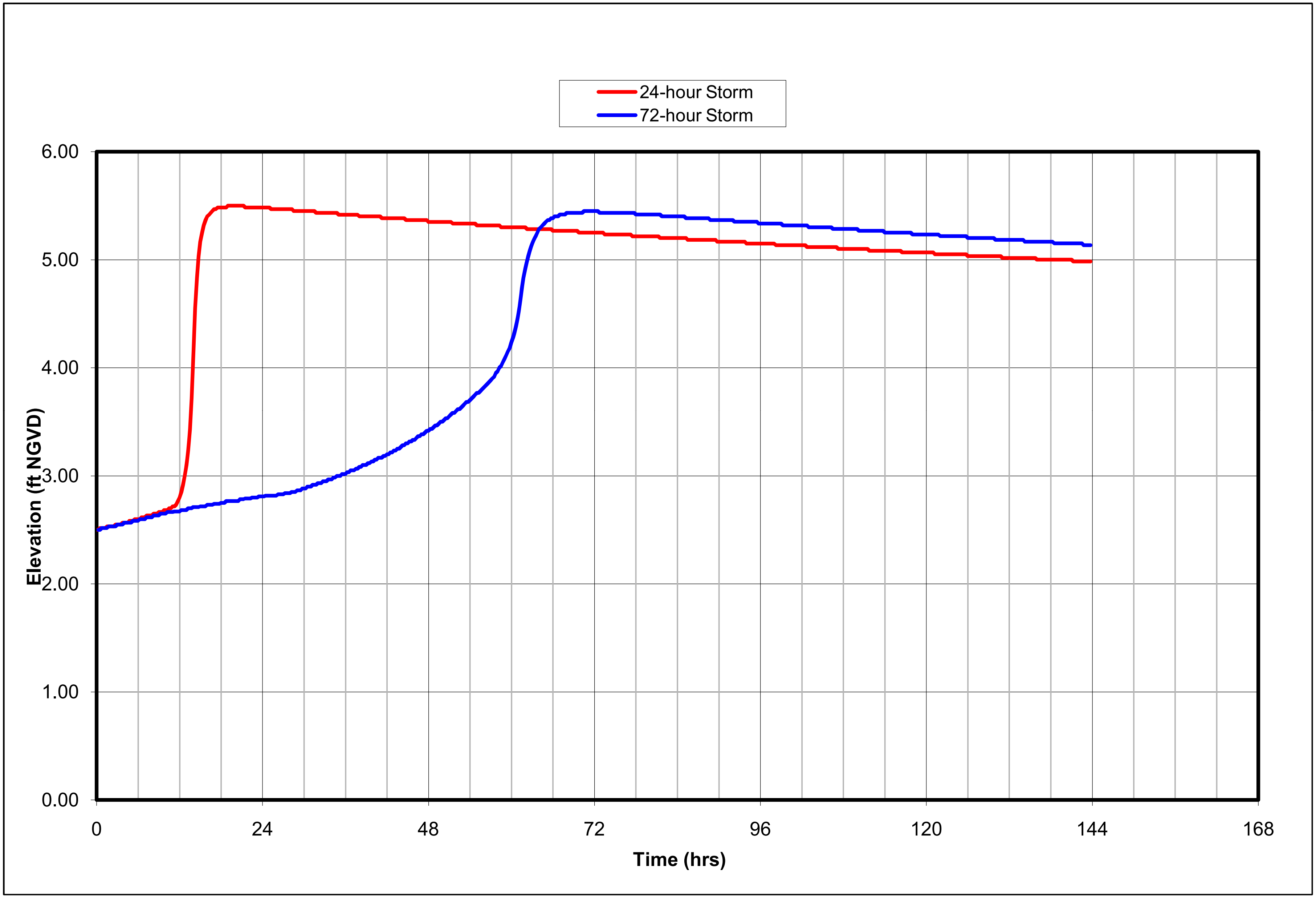
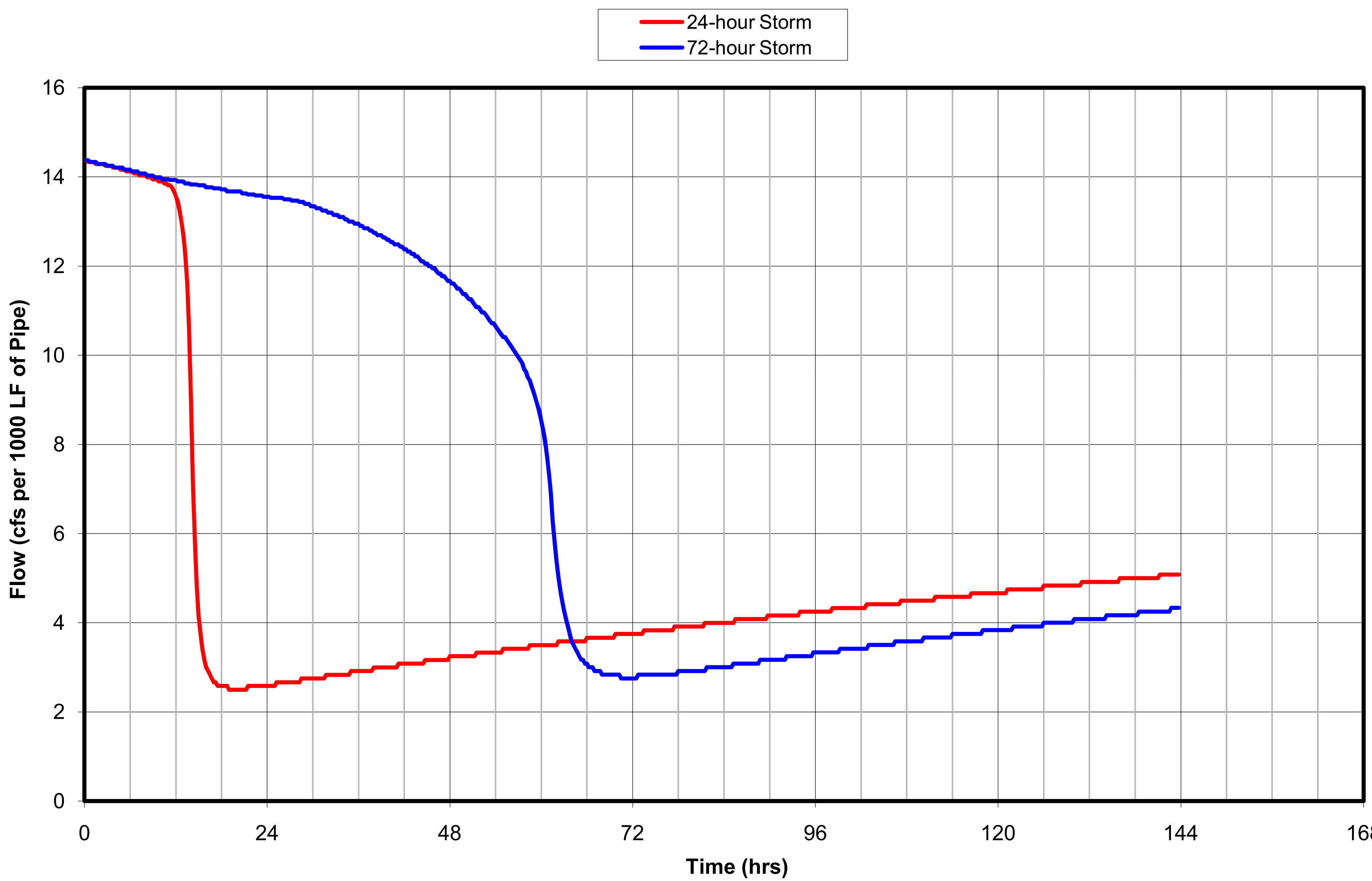


Figure 7-3. Estimated Exfiltration Flow Rates per 1000 Feet of Pipe



The exfiltration systems are modeled using the pump-type of SWMM link from a node in the model representing one end of the system, to an outfall representing groundwater table (flow out of the surface water model). The pump-type of link was used because it can be manipulated with control rules within SWMM which contain the time history of the flow rates normalized per 1,000 linear feet of trench (as calculated above and shown in Figure 7-3). The control rule multiplies the pump-type link's flow rate (from the pump's rating curve) with a multiplier from the underlying time series at all times in the simulation. The time series of multipliers is the calculated exfiltration per 1,000 feet of exfiltration trench. Therefore, if the "dummy" pump's rating curve is set to a constant value equal to the length of trench divided by 1,000, the resultant values equal the calculated flow rate for the given trench at any given time in the simulation.

7.3.3 Alternative No. 3 – Recharge Wells

As discussed in Section 6, recharge wells may be constructed to directly convey surface runoff to the surficial aquifer via gravity. To construct this type of well, a permit must be obtained through the Florida Department of Environmental Protection (FDEP) for a Class V injection well. The permit application must be reviewed by the Underground Injection Control Technical Advisory Committee (UIC-TAC) of which FDEP is the lead agency. The permit requires that a recharge well be cased to protect the underground source of drinking water (USDW) which is defined by state regulations as groundwater having less than 10,000 milligrams per liter (mg/l) of total dissolved solids (TDS) content. Recharge wells are thus required to have a casing installed to a depth below the base of the USDW. In the City of Fort Lauderdale, the USDW typically occurs in the surficial aquifer east of Interstate 95.

In previous work for the City, the USDW was found to be approximately 150 feet below land surface at the Jacobs Landing Site, which is approximately 4000 feet east of Interstate 95. Since this is near the practical limit of recharge wells, this alternative was not evaluated for the neighborhood of West Edgewood.

The recharge wells are also called gravity wells because the Class V injection well does not allow pumped injection, therefore the wells must drain by gravity. As in the Jacob's Landing project, recharge wells may be serviced by an elevated stand tank, into which water may be pumped to create additional driving head (2 to 3 ft above grade). Geological testing is recommended at each location to determine whether these components are necessary. This must be considered in any final design. The costs for these potential components are included in the conceptual probable capital cost estimates.

To "recharge" the surficial aquifer, the driving head in a recharge well must be sufficient to overcome the losses in the pipe and the density differential between the fresh rainwater and the saline groundwater. This limits the wells' usefulness in low lying areas unless there are means to overcome the head losses, such as the aforementioned pumps and stand tanks. However, the City of Key West has recharge well fields similar to this proposed alternative, where urban surface runoff flows to catchments which are directly attached to wells with no lifting by pumps. Since the groundwater table is highly influenced by tides in Key West, the well fields are less effective at high tide than at low tide. There still is a LOS improvement, even when storms arrive coincident with high tides, as the duration of flooding is lessened. For this conceptual analysis, the wells are modeled such that the driving head requirement is met, which may require the additional facilities in some locations.

The wells evaluated in this alternative are spaced approximately 1,000 ft apart and each well was applied a flow rate of approximately 2 cfs (900 gallons per minute). The recharge wells were implemented in the model using a pump-type link with constant flow to an outfall. A pump-type link with an equivalent constant pump curve above a set elevation removes water from a node at a constant rate when the node depth is above said reference elevation. This flow rate and spacing may be overly optimistic as site specific conditions may result in lower flow rates. Each site should be tested for this alternative's applicability before implementation (e.g., pilot recharge wells with falling and static head flow testing).

7.3.4 Alternative No. 4 – Storage

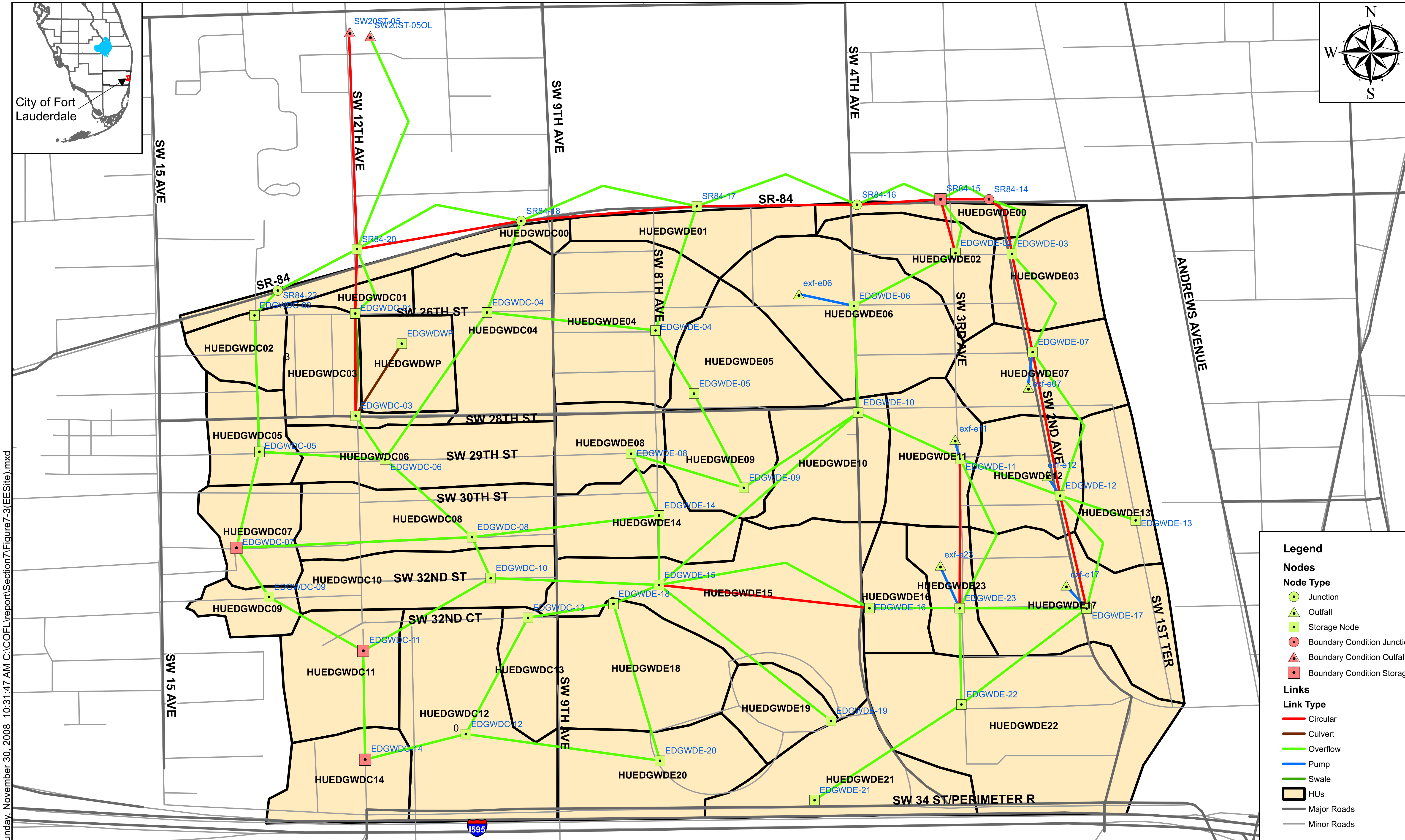
For this alternative, detention storage facilities are evaluated in each neighborhood. There are fewer generalizations that may be made for this alternative; therefore, specific details are supplied in the following sections. The analyses are based on using existing open space in the neighborhoods as storage facilities into which stormwater is conveyed by gravity or lifted by pump station.

7.4 East Edgewood Alternative Evaluations

The neighborhoods of East Edgewood and West Edgewood were divided based on the relatively large size of the neighborhood, and because the flooding problems are rooted in different underlying causes and therefore the potential solutions needed to be separated.

The first local model evaluated was in the neighborhood of East Edgewood. This neighborhood covers approximately 550 acres (0.85 square miles) of the City, east of Interstate 95 (I-95) between State Route 84 (S.R. 84) and Interstate 595 (I-595) north of Fort Lauderdale–Hollywood International Airport. The eastern portion of the Edgewood neighborhood is bounded by S.R. 84 to the north, SW 1st Terrace to the east, I-595 and Perimeter Road to the south and by a relative topographic high between 200 and 700 feet east of SW 15th Avenue to the west as shown in **Figure 7-4**. Figure 7-4 displays the site map and local model schematic for the East Edgewood Neighborhood.

The land use within the project area is primarily single family residential to the west of SW 4th Avenue, and industrial and commercial to the east. The residential portion of Edgewood presents severe flooding potential due to low-lying topography, relatively high groundwater table, a lack of positive outfalls, and no existing exfiltration systems or other types of flood relief.



Source: City of Fort Lauderdale

0 250 500 1,000 1,500 2,000 Feet

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 858-5000

Figure 7-4
City-Wide Stormwater Master Plan
East Edgewood Site Map

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The Edgewood Neighborhood had the greatest number of repetitive loss claims (see Table 3-7) and the largest count of flooded buildings from the 100-year design storm simulation (see Table 3-6).

Boundary Conditions

Three boundary conditions were necessary along the western boundary with the neighborhood of West Edgewood because the topographic high is expected to be overtopped during most of the design storms. The two models were combined in the base condition to estimate flows between basins. The HU EDGWDC-14 overflowed to West Edgewood HU EDGWDW-09, the HU EDGWDC-11 overflowed to West Edgewood HU EDGWDW-09, and the HU EDGWDC-07 overflowed to West Edgewood HU EDGWDW-17. The boundary conditions for nodes EDGWDC-07, HU EDGWDC-11, and EDGWDC-14 were developed using inflow hydrographs based on these combined model simulations, for each of the design storms.

The major outlet for the neighborhood is through the PSMS along S.R. 84 that intersects with a 6-ft diameter pipe along SW 12th Ave which eventually outfalls into the South Fork of the New River to the north of the project area. This boundary condition to the north of S.R. 84 is modeled with an outfall that represents the regional model at node SW20ST-05 which is approximately 1,600 ft north of the local model boundary. The time series of simulated stages at this node, for each of the design storms, are set as the boundary conditions for this outfall.

In general, S.R. 84 represents a topographic divide and therefore a “no-flow” boundary. However, at the northeast corner, near the intersection of S.R. 84 with SW 3rd Terrace, the regional model indicates some overland flow occurs into the model extents. Thus, boundary conditions were set using inflow hydrographs based on the regional model flows in this link, for each of the design storms.

Along the eastern edge of the model, SW 1st Terrace represents a topographic divide and therefore a “no-flow” boundary. At the northeast corner along S.R. 84, there is a 30-inch diameter pipe that connects to the PSMS east of the project area. Although this is below the 36-inch threshold for regional model pipes, it was added to the regional model to provide this boundary condition. Again, boundary conditions were set using inflow hydrographs based on the regional model flows in this link, for each of the design storms.

Along the southern edge of the model, I-595 and Perimeter Road represent a topographic divide and therefore a “no-flow” boundary. This was also used as the boundary for the regional model and is at the edge of the City.

Model Setup

The base condition of the East Edgewood Neighborhood Model consists of 40 HUs, 44 nodes of which 40 are storage nodes, 8 outfalls of which 6 are used to represent existing exfiltration, and 81 links of which 6 are pump-type links also used in representing existing exfiltration (see Section 7.3.2 for a description of how pump-type links are used to model exfiltration). The East Edgewood site map, Figure 7-4, also displays the model schematic of these features.

The HU divisions are based on topography, streets with relatively high centerlines, lakes, and existing PSMS catchments along SW 2nd Ave and SW 3rd Ave. There is also a walled property (henceforth called the Barrett Property) between SW 26th St and SW 28th St, next to the Archdiocese of Miami's St. Jerome's Church near SW 12th Terrace, that although it is not completely closed off to outside flows, it is separated enough to warrant its own HU.

Since the neighborhood is generally flat and low-lying, the boundaries of the HUs do not inhibit flow during the design storms and therefore many of the links represent overland flows. The stormline layer in GIS that was supplied by the City was used to estimate pipes along S.R. 84, and NW 2nd and 3rd Aves. As discussed in previous sections, some inverts have been estimated based on the topography and engineering judgment as this information was not supplied in the GIS layer. Some pipe sizes were estimated as well, where the GIS layer had missing information. Because the connections from SW 2nd and 3rd Aves to the PSMS along S.R. 84 are so small (15-inch diameter) or missing, and because the lines run for about one-half of a mile each, it was determined that these were likely exfiltration pipes as opposed to simply conveyance pipes (more information was not supplied by the City regarding these pipes). Exfiltration was therefore added along these streets in the base model, as described in Section 7.3.2.

One other hydraulic conveyance of note is the swale and pipe adjacent to the Barrett Property and SW 12th Terrace, between SW 26th and SW 28th Streets. Site visits, GIS, and the Keith & Schnars Report were used to aid in the modeling of this feature.

Model Objectives

Although the base models (and the regional model) indicate significant flooding potential in the eastern portion of this neighborhood as well, most of the alternatives were proposed to reduce the severe flooding in the residential neighborhoods between SW 26th St and SW 32nd Ct from north to south, and SW 8th Ave and SW 14th Ave from east to west.

Base Model Results

Simulations of the base model for East Edgewood were run for the 2-year, 24-hour; 5-year, 24-hour; 10-year, 24-hour; 25-year, 72-hour; and 100-year, 72-hour SFWMD design storms. The results of these simulations are in **Appendix 7C** in Table 7C-1. The model nodes in this table are ordered by severity of flooding above the reference elevation for the peak stage of the 5-year, 24-hour design storm. The reference elevations were found from the survey data or LiDAR data where survey was unavailable, for local road centerlines near each model node. In the base condition, there is severe flooding expected for many roads and intersections in East Edgewood, even for the 2-year design storm.

Figure 7-5 displays the approximate extents of flooding in East Edgewood for the 5-yr, 24-hour design storm event. This map shows approximately where the simulated peak stages intersect the topography for problem area verification and identification. The figure also shows the locations of repetitive loss claims and complaints that were provided by the City of Fort Lauderdale and discussed in Section 2 of this report.

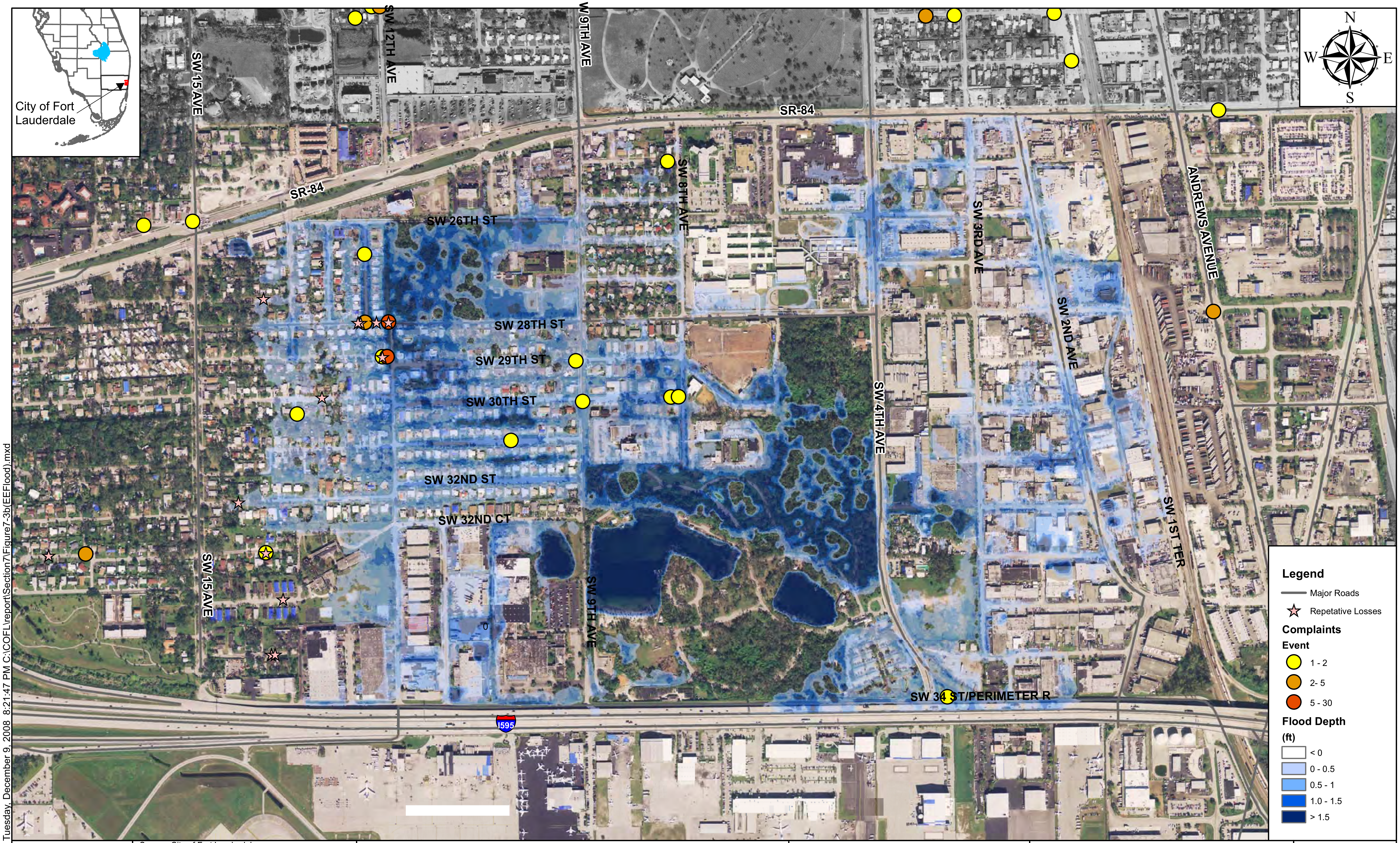
7.4.1 Alternative No. 1 – Maintenance of Existing System

Alternative No. 1 is an evaluation of the existing PSMS under varying degrees of maintenance as described in Section 7.3.1. This alternative was performed to show the benefits of operation and maintenance of the system. The East Edgewood Model provides no exceptions to the general methodology discussed in Section 7.3.1. Tables of peak stage per model junction, and differences from the base model are provided in Appendix 7C in Tables 7C-2 through 7C-4. The model node description/reference elevation location may be found in Table 7C-1 in Appendix 7C. The tables indicate that the results of not maintaining the system may cause increases in peak stage of up to one foot above the already severe flooding problems in the neighborhood. Nodes EDGWDE-18 and EDGWDE-19 represent lakes in Snyder Park. For the smaller design storm scenarios, simulations indicate that flooding from areas north of the lakes is close to overtopping the lake rims and significantly increasing the lakes' stages. Since the lake volume is small compared to the surface flow volumes, small differences in peak stages in node EDGWDE-15 for example may cause much larger differences in these lake nodes. If these two nodes are removed from consideration, the maximum increase in peak flood stage for this alternative is about 0.7 feet for the 2-year storm along S.R. 84 for the worst case 30% silted condition.

In this neighborhood, maintenance of the PSMS provides greater flood control LOS benefit for the smaller design storms, by these model estimates. This is because for the larger storms, there is much more street flooding and overland flow, and therefore the peak stage is more dependent upon above ground storage and street conveyance.

7.4.2 Alternative No. 2 – Exfiltration

This alternative evaluates adding exfiltration trenches along SW 26th St, SW 9th Ave, SW 8th Ave, and the streets between SW 8th Ave and SW 9th Ave including SW 25th St, SW 26th St, SW 26th Ct, SW 27th St, and SW 28th St. These streets are located in the following HUs as shown in **Figure 7-6**: HUEDGWDC04, HUEDGWDE04 and HUEDGWDE08.



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CDM

Source: City of Fort Lauderdale

0 250 500 1,000 1,500 2,000 Feet

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 858-5000

Figure 7-5
City-Wide Stormwater Master Plan
East Edgewood 5-Year, 24-hour Storm
Flood Map and Complaints

UPDATED 12-09-08

Source: City of Fort Lauderdale

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 858-5000

Figure 7-6
City-Wide Stormwater Master Plan
East Edgewood
Alternative No. 2 Site Map

UPDATED 11-30-08

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7.4.2.1 Alternative No. 2 Implementation

Section 7.3.2 describes in general the exfiltration trench methodology utilized in the local models for this SWMP. The following notes are site specific:

- This alternative covers the northern portion of the neighborhood where exfiltration is not already in use.
- The exfiltration trenches cannot be placed at the lowest elevations where flooding is most severe because the catchment rim elevations would likely be too low for the systems to be effective; therefore, the alternative has been limited to roads where elevations are greater than 6 ft NGVD.
- The proposed trenches are designed to collect sheet flow along streets at higher elevations before flows settle at the lower elevations. Therefore, detailed street survey and construction plans are necessary to ensure that the sheet flow enters the catchments.
- The proposed alternative is designed to connect to the existing PSMS along S.R. 84 at the north end of 9th Ave. A control structures (weir) has been added to keep heads at high enough levels inside the trenches for them to work properly, and to not increase peak offsite stages and flows along S.R. 84 per SFWMD regulations.

This alternative consists of:

- 1,300 ft of 19-inch by 30-inch elliptical pipe along SW 9th Ave between the control structure at S.R. 84 and SW 28th St;
- 1,300 ft of 19-inch by 30-inch elliptical pipe along SW 8th Ave between S.R. 84 and SW 28th St;
- 650 ft of 19-inch by 30-inch elliptical pipe along SW 25th St between SW 8th Ave and SW 9th Ave;
- 650 ft of 19-inch by 30-inch elliptical pipe along SW 26th St between SW 8th Ave and SW 9th Ave;
- 650 ft of 19-inch by 30-inch elliptical pipe along SW 26th Ct between SW 8th Ave and SW 9th Ave;
- 650 ft of 19-inch by 30-inch elliptical pipe along SW 27th St between SW 8th Ave and SW 9th Ave;
- 650 ft of 19-inch by 30-inch elliptical pipe along SW 28th St between SW 8th Ave and SW 9th Ave; and

- A control structure consisting of a 5-ft long weir at an elevation of 4.5 ft-NGVD between the proposed trench system along 9th Ave and the existing PSMS along S.R. 84.

This represents a total of 5,850 linear feet (lf) of exfiltration trench: 1,300 lf in HUEDGWDC04, 3,900 lf in HUEDGWDE04 and 650 lf in HUEDGWDE08. The alternative was modeled with and without the connection to the existing S.R. 84 PSMS. This connection improves LOS within the neighborhood; therefore, the connection remained part of the alternative. The control structure was added to keep a minimum head on the trenches, to keep simulated peak stages and flow in the existing system at or below the existing conditions, and to allow for treatment for waters that eventually outfall to the New River. Since the DCIA of this neighborhood is high, the SFWMD may require treatment of the first 2.5 inches over the impervious area that this system serves. Since this is a retrofit, the District may allow treatment that can be achieved within the limited space. This area, as measured with GIS using the model's topography, is approximately 37 acres with an average DCIA of 47%. The resultant impervious area is about 17 acres and the treatment volume needed would be approximately 43 acre-inches. Using the SFWMD exfiltration trench length calculations with the weir height at 4.5 ft NGVD (2 feet above the high water table), a K_s value of 5.0×10^{-4} cfs/ft^2/ft of head and the trench dimensions discussed in Section 7.3.2, the trench length needed to provide full water quality treatment is estimated to be 5,480 feet, which is less than the proposed length of 5,850 ft. Note that the higher end of the envelope of K_s values that were tested in this alternative is used for this calculation. If the site conditions indicate that the lower end (K_s value of 1.0×10^{-4}) predominates, the trenches may not be effective enough to provide probable LOS improvements, as shown below, and thus may be reconsidered.

There is potential for additional exfiltration trench adjacent to this proposed system in the Archdiocese of Miami's St Jerome's Church parking lot. The additional trench would most likely benefit the Church itself, including the road in front, the parking lots, and the grounds. Additional simulations were performed in which there was a connection to north end of swale along SW 12th Ave. This scenario did not perform significantly better than the proposed system, thus it was removed from consideration due to the extra costs. The proposed system cannot be connected to the problem areas with more severe flooding (such as with a solid pipe) because the lower elevations in these areas would cause problems that would likely degrade the whole system.

7.4.2.2 Alternative No. 2 Results

As noted above, two sets of simulations were conducted for this alternative to provide an envelope of results for the unknown, site specific hydraulic conductivity values. In the first set of simulations, a K_s value of 1.0×10^{-4} cfs/ft^2/ft of head was used for the five design storms. These results are presented as tables of peak stage per model junction, and differences from the base model in Appendix 7C, in Table 7C-5. The model node description/reference elevation location may be found in Table 7C-1 in Appendix 7C.

As in the previous subsection, the lake at Snyder Park, depicted as node EDGWDE-19, was not considered in the peak stage comparisons. Neglecting this node, the LOS improvements due to this alternative are minor, if the site conditions result in hydraulic conductivities at the lower end of the tested envelope. Even the improvement for the 2-year design storm is estimated to be a matter of a few inches. In the base condition for the 5-year design storm (Table 7C-1), the peak flood stages were estimated as much as 2 feet higher than the reference elevations. Although this alternative should result in shorter durations of flooding in these areas, the level of service for peak flood stages would likely not improve significantly if the hydraulic conductivities are low.

In the second set of simulations, a K_s value of 5.0 x 10^{-4} cfs/ft^2/ft of head was used for the five design storms. This represents the higher end of the envelope of the hydraulic conductivities that were tested, although some sites may vary significantly from these values. The results of this test are presented in Appendix 7C, in Table 7C-6. Again, the lake at Snyder Park (node EDGWDE-19) was not considered in the peak stage comparisons. Neglecting this node, the LOS improvements due to this alternative ranged from nearly one foot of improvement for the 2-year storm to only a few inches for the larger storms. Again, there is not enough improvement in the reduction of peak stage during the 5-year storm, for example, to meet LOS goals. However, the results for the 2-year storm indicate that there would likely be passable roads for smaller storms if the site specific hydraulic conductivities were in the tested range. Additionally, the duration of the flooding was shortened significantly with this alternative for all the design storms. **Table 7-1** below shows the four primary nodes near the proposed system for this Alternative. The peak stages and approximate flooding duration are given for the 5-year design storm. The flooding duration is measured using a set stage for each node. This stage is based on (but higher than) the nodes' reference elevations.

Table 7-1. Flood Stages and Durations for Alternative No. 2, 5-Year, 24-Hour Storm

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 2 K_s=5x10^{-4} (ft NGVD)	Peak Stage Delta (ft)	Flood Duration* Base (hrs)	Flood Duration* Alt. No. 2 K_s=5x10^{-4} (hrs)	Flood Duration Delta (hrs)
EDGWDE-04	6.1	6.5	6.4	0.1	6.5	0.25	6.25
EDGWDE-08	5.3	6.4	6.2	0.2	45	24	21
EDGWDC-04	5.0	6.5	6.1	0.4	60	21	39
EDGWDC-06	4.2	6.4	6.2	0.2	40	27	13

* Approximate flood duration based on LOS depths above Reference Elevations

This table indicates that although the proposed alternative helps improve LOS somewhat, there would still likely be severe flooding during the 5-year, 24-hour design storm and that in many areas the flooding would last approximately one day.

7.4.2.3 Additional Exfiltration Tests

For the eastern half of Edgewood, although the LOS is not met, exfiltration already exists, and most of the area is industrial. Therefore, more exfiltration was not evaluated there.

Another area that was tested was the parking lot of Snyder Park at the intersection of Perimeter Road and SW 4th Ave. A total of 1,250 ft of exfiltration was placed under the parking lot stalls, but even for the higher hydraulic conductivity test case, there was only 0.1 ft of decrease in peak stage for the 5-year storm and a reduction in flood duration from 15.5 hours to 13.5 hours at an elevation 3 inches above the reference elevation of the lot (7.1 ft NGVD). This was not deemed sufficient improvement to LOS to pursue the alternative further.

For most of the residential area that floods, between 8th Ave and 14th Ave, and between SW 26th St and SW 32nd Ct, the topography is too low to implement effective exfiltration trenches. Even for smaller storms, exfiltration trenches would likely not work very well in this neighborhood. Recharge well systems may be needed in these areas.

7.4.3 Alternative No. 3 – Recharge Wells

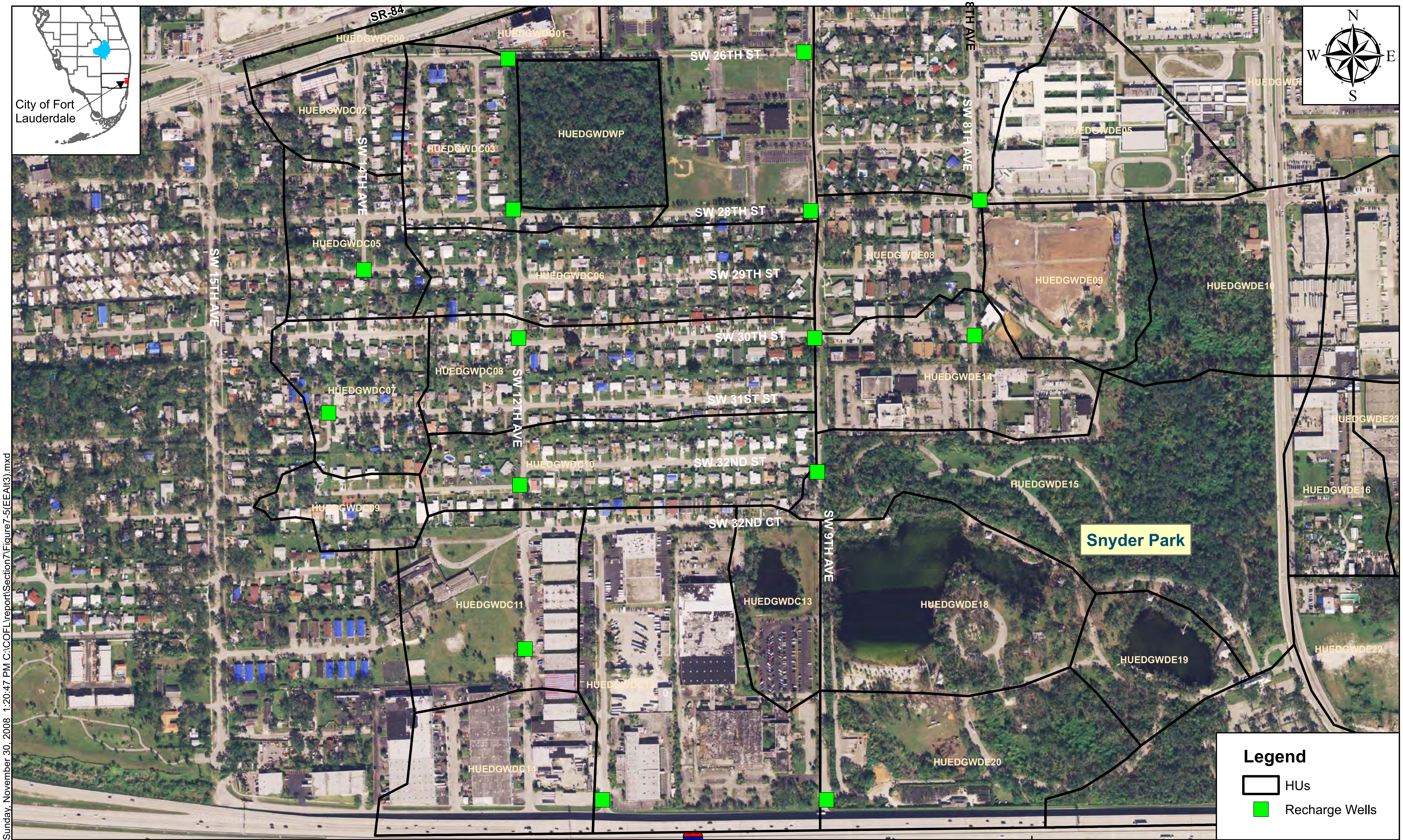
This alternative evaluates the construction of 15 recharge wells at intersections throughout the residential neighborhoods of central Edgewood as shown in **Figure 7-7**.

7.4.3.1 Alternative No. 3 Implementation

Section 7.3.3 describes how recharge wells were implemented in this SWMP for the four local models. The wells have been located approximately 1,000 feet apart, but tend to be closer in the north-south direction than in the east-west direction due to the layout of the streets in this neighborhood. The wells are located in areas where flooding is expected to occur, even for the smaller storms. As discussed in Section 7.3.3, there are no stand tanks or pump stations explicitly modeled in this alternative. These wells will require conductive geologic conditions to function as expected. As recommended for final design, the sites should be tested to ensure the density differences and losses in the well may be overcome, or those additional components would be necessary.

This alternative consists of wells at the following intersections:

1. SW 26th St & SW 12th Ave;
2. SW 28th St & SW 12th Ave;
3. SW 30th St & SW 12th Ave;
4. SW 32nd Ct & SW 12th Ave;



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City of Fort Lauderdale
100 North Andrews Ave
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Figure 7-7
City-Wide Stormwater Master Plan
East Edgewood
Alternative No. 3 Site Map

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5. SW 12th Ave between Perimeter Road and SW 32nd Ct;
6. SW 26th St & SW 9th Ave;
7. SW 28th St & SW 9th Ave;
8. SW 30th St & SW 9th Ave;
9. SW 32nd Ct & SW 9th Ave;
10. SW 9th Ave near Perimeter Rd;
11. SW 28th St & SW 8th Ave;
12. SW 30th St & SW 8th Ave;
13. SW 29th St & SW 14th Ave;
14. SW 31st St & SW 14th Ave; and
15. SW 11th Ave near Perimeter Rd.

7.4.3.2 Alternative No. 3 Results

The results of this alternative are presented as tables of peak stage per model junction, and differences from the base model in Appendix 7C, in Table 7C-7. The model node description/reference elevation location may be found in Table 7C-1 in Appendix 7C. As in the previous subsections, the lake at Snyder Park, node EDGWDE-19, was not considered in the peak stage comparisons. The results from this set of simulations are similar to the results from the regional model results for this area. This was to be expected since both sets of models simulate similar numbers of recharge wells. The results are similar to the results from Alternative No. 2, but with slightly less improvement. For the 5-year, 24-hour storm, peak reduction in flood stage is in the neighborhood of 3 inches.

The reduction in the duration of flooding is expected to occur for similar magnitudes as Alternative No. 2, as flood durations with the wells in place are expected to last approximately 24 hours, as opposed to 40 hours in the existing condition, for the neighborhoods with the worst flooding. Since the recharge wells were targeted more to the streets with the most severe flooding, as opposed to the exfiltration in Alternative No. 2, they do tend to help the neighborhoods with the greatest needs. **Table 7-2** below shows six primary nodes near the proposed system for this alternative. The peak stages and approximate flooding duration are given. The flooding duration is measured using a set stage for each node. This stage is based on (but higher than) the nodes' reference elevations.

Table 7-2. Flood Stages and Durations for Alternative No. 3, 5-Year, 24-Hour Storm

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 3 Recharge (ft NGVD)	Peak Stage Delta (ft)	Flood Duration * Base (hrs)	Flood Duration* Alt. No. 3 Recharge (hrs)	Flood Duration Delta (hrs)
EDGWDE-04	6.1	6.5	6.4	0.1	6.5	1.5	4
EDGWDE-08	5.3	6.4	6.2	0.2	45	25	20
EDGWDC-04	5.0	6.5	6.1	0.4	60	43	17
EDGWDC-06	4.2	6.4	6.2	0.2	40	22	18
EDGWDC-08	5.0	6.4	6.2	0.2	40	24	16
EDGWDC-10	5.1	6.4	6.2	0.2	40	26	14

* Approximate flood duration based on LOS depths above Reference Elevations

This table indicates that although the proposed alternative helps improve LOS somewhat, there would still likely be severe flooding during the 5-year, 24-hour design storm and that in many areas the flooding would last approximately 4 to 20 hours (as opposed to 6 to 60 hours).

7.4.3.3 Additional Recharge Well Tests

Additional testing of recharge wells was conducted for the eastern section of Edgewood, east of SW 4th Ave. The 10 wells tested for this scenario were at the following intersections:

1. SW 25th St & SW 3rd Ave;
2. SW 26th St & SW 4th Ave;
3. SW 26th St & SW 2nd Ave;
4. SW 28th St & SW 2nd Ave;
5. SW 30th St & SW 2nd Ave;
6. SW 30th St & SW 3rd Ave;
7. SW 32nd St & SW 2nd Ave;
8. SW 32nd St & SW 3rd Ave;
9. SW 33rd St & SW 3rd Ave; and
10. Perimeter Rd & 4th Ave.

The results of this test demonstrated that the additional wells did not provide significant LOS improvements as there was approximately 0.1 ft decrease in peak stage for the 5-year, 24-hour design storm. Therefore, this alternative location was not evaluated further.

7.4.4 Alternative No. 4 – Storage Facility and Pump Station

This alternative evaluates the construction of a 6.2 acre dry detention stormwater storage facility and a 75 cfs pump station in Snyder Park as shown in **Figure 7-8**. This storage could be configured into the park in a variety of methods consistent with park use.

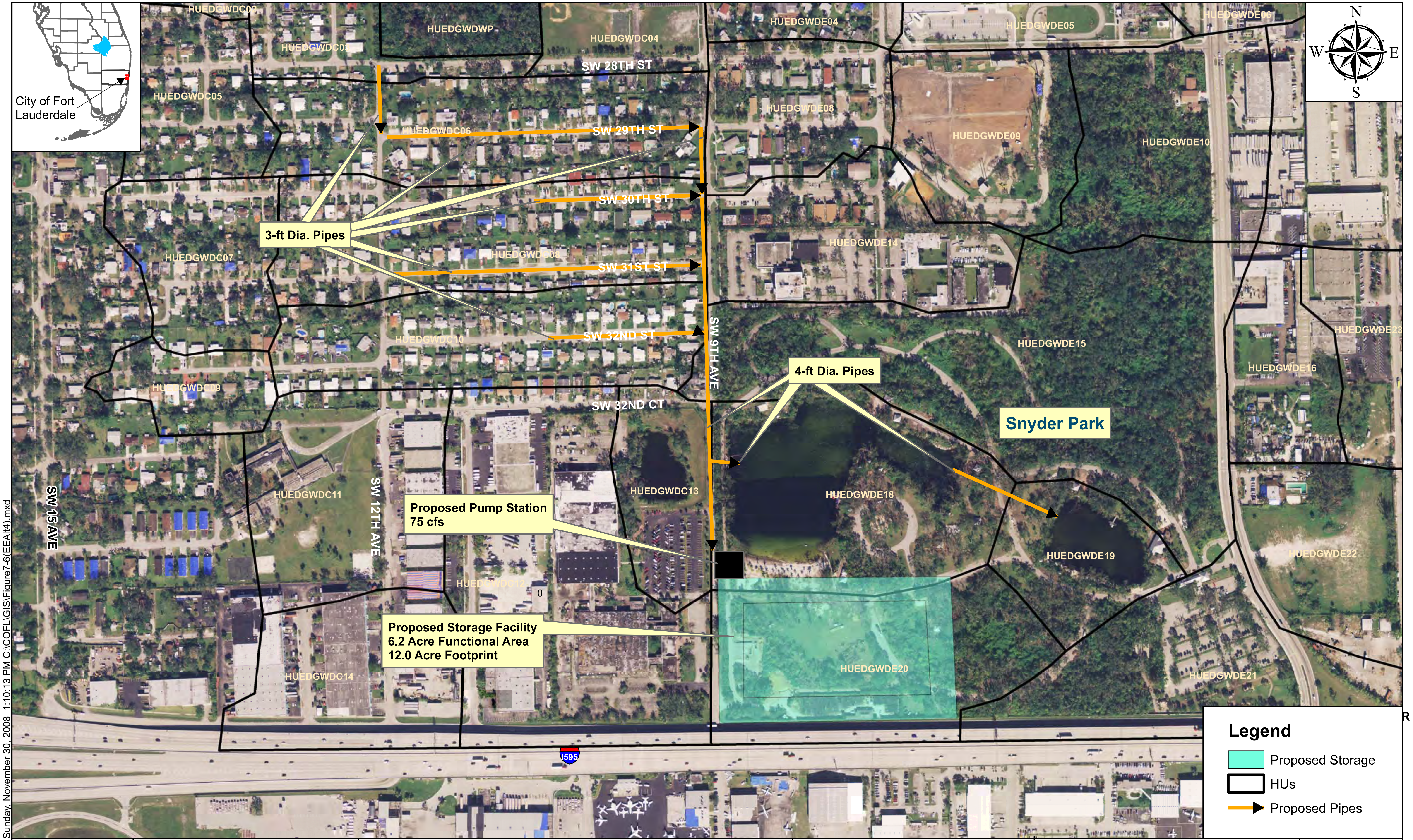
In this alternative, the residential neighborhood in central Edgewood would be connected to the pump station and storage facility by approximately 4,700 lf of 3-ft diameter pipe and 1,600 lf of 4-ft diameter pipe. The larger of the existing lakes in Snyder Park (the western lake) has a relatively low berm along its northern edge between the lake and the wetlands to the north. Under existing conditions, there is expected to be significant flows (over 100 cfs) from the north into the lake during the larger design storms.

Therefore, this lake could not be bermed to higher elevations in order to store stormwater without cutting off this flow. This would limit the effectiveness of this alternative if the storage facility were to be located in this existing lake. Therefore, the facility has been located to the south of this lake within an open area of the park. A gravity pipe has been added between the inflow pipes to the pump station and both existing lakes in order to utilize existing storage in the lakes for smaller storms.

7.4.4.1 Alternative No. 4 Implementation

The storage facility has been proposed as a dry detention facility because of the close proximity to Fort Lauderdale – Hollywood International Airport. Although the Federal Aviation Administrations' (FAA) regulations concerning setbacks for constructed water bodies may not apply here, with a dry facility there would be no issue for concern. The facility also requires less cut than a deeper facility and the cut and fill costs will already be substantial. The bottom of this facility is designed to be at 3.5 feet NGVD which is one foot above the high water table elevation (2.5 ft NGVD). Since the models simulations start at the high water table elevation for all nodes, including proposed wet facilities, the differential between a dry and wet facility is one foot of storage over approximately 6.2 acres, or 6.2 acre-ft. Model simulations indicate that this additional storage does not provide a significant improvement in LOS versus the dry facility to warrant the additional costs and possible regulatory issues associated with the development of a wet facility.

The proposed storage facility is 6.2 acres in area at 3.5 ft NGVD. The facility is designed to be bermed to an elevation of 13 ft NGVD. This elevation is approximately 6 ft above the lowest land surface in the surrounding area and therefore the facility should be classified as a low-hazard structure. The maximum design height of water storage is 10 ft NGVD. This leaves 3 feet of freeboard for potential wave run-up to prevent overtopping, which should be sufficient for a facility of this size. The maximum design height would be achieved using a cutoff for the pumps and an emergency spillway to the existing Snyder Park Lake.



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CDM

Source: City of Fort Lauderdale

0 100 200 400 600 800 Feet

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 858-5000

Figure 7-8
City-Wide Stormwater Master Plan
East Edgewood
Alternative No. 4 Site Map

UPDATED 11-30-08

The proposed berm is 15-ft wide, with 5:1 side slopes. Along the east side of the proposed facility, the existing topography is already high enough so that the berm would only be needed for approximately 1,200 feet of the perimeter. The proposed cut is approximately 45, 000 cubic yards and the proposed fill is approximately 16,000 cubic yards. The difference may possibly be retained on site at the park, or be sold to offset costs.

The pump station is proposed to be approximately 75 cfs and is located at the northwest corner of the facility. It is beyond the scope of this SWMP to design the pump station, but because it will be used for flood control, diesel backup generators should be included to allow for operations during power outages.

The piping from the neighborhood to the pump station is significant in both size and length in order to attempt to move as much water as possible from the severely flooded streets to the storage facility. The alternative calls for approximately 4,700 lf of 3-ft diameter pipe along SW 12th Ave, SW 29th St, SW 30th St, SW 31 St, SW 32nd Ct and for one block along SW 9th Ave. The rest of the piping along SW 9th Ave is proposed to be 4-ft in diameter. This length, and the sections to the existing lakes, combine for another 1,600 lf of 4-ft diameter pipe (see Figure 7-8 for more exact locations).

This proposed dry detention system uses approximately 12 acres of Snyder Park and may impinge on neighboring parts of the park, including the small beach. Recreational use would still be available during dry seasons and along the slopes. Some retention and associated infiltration would be provided by this dry system. This may –provide additional clean baseflow to the existing lakes. There would likely need to be community involvement and acceptance of such a project; however, this is the only area of sufficient size that is not a wetland in which to try this alternative.

7.4.4.2 Alternative No. 4 Results

Table 7C-8 in Appendix 7C gives the results of this alternative in peak stage per model junction, and differences from the base model for the five design storms. The model node description/reference elevation location may be found in Table 7C-1 in Appendix 7C.

The results indicate that this alternative improves the LOS for this neighborhood better than the previous alternatives, but that LOS goals are not met and that significant flooding would still be expected throughout the neighborhood for most of the design storms. The LOS goals would be met for storms up to and including the 2-year design storm for all but the lowest points in the neighborhood. Flooding would still be expected under these conditions along SW 29th St (node EDGWDC-06).

The reduction in the duration of flooding is significant, although not as pronounced as for the previous alternatives because once the storage facility is full the alternative is no longer effective. Flood durations above the LOS goals for the 5-year, 24-hour design storm are expected to persist for well over a day.

Table 7-3 below shows four primary nodes near the proposed system for this alternative. The peak stages and approximate flooding duration are given. The flooding duration is measured using a set stage for each node. This stage is based on (but higher than) the nodes' reference elevations.

Table 7-3. Flood Stages and Durations for Alternative No. 4, 5-Year, 24-Hour Storm

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 4 Storage (ft NGVD)	Peak Stag e Delta (ft)	Flood Duration* Base (hrs)	Flood Duration* Alt. No. 4 Storage (hrs)	Flood Duration Delta (hrs)
EDGWDC-03	4.9	6.4	6.1	0.3	38	26	12
EDGWDC-06	4.2	6.4	6.1	0.3	40	27	13
EDGWDC-08	5.0	6.4	6.1	0.3	40	33	7
EDGWDC-10	5.1	6.4	6.1	0.3	40	33	7

* Approximate flood duration based on LOS depths above Reference Elevations

7.4.4.3 Additional Storage Tests

After performing these alternatives and not finding a solution to the severe flooding in this neighborhood that would meet LOS goals for the 5-year, 24-hour design storms, some additional tests were performed to develop an area-wide solution. One test was to put a second larger facility north of S.R. 84. This proposed facility would have a functional area of 12 acres and a 120 cfs pump station. This alternative also called for large pipes under S.R. 84 (7-ft diameter, or dual 5-ft diameter) as well as large pipes to the neighborhood with the flooding. The site was located at Lauderdale Memorial Park Cemetery; therefore, the cemetery would have to be moved to allow for development of this facility.

Modeling indicated that the 5-year, 24-hour LOS goals would likely be met with both this facility and the one described above working together for all but the lowest elevations in the neighborhood (SW 29th St). Of course, moving a cemetery is not a likely scenario, and the extra costs involved would be significant even if it were.

This test was not pursued further, although it did indicate the approximate size of project that would be needed to reduce flooding in Edgewood for the smaller storms. For the 100-year storm, even these facilities working together were not sufficient to reduce the flooding significantly. For the 5-year, 24-hour design storm, the flooding in just the neighborhood from SW 28th St to SW 32nd Ct between SW 9th Ave and SW 12th Ave is expected to flood to a volume of approximately 30 acre-ft. However, if adjacent areas are added that connect to this neighborhood via overland flows and therefore would need to be pumped away as well, the volume increases to over 100 acre-ft. Since the available storage should range from 4 to 8 feet above the water table based on topography and the berm and freeboard restraints, a storage facility of approximately 25 acres may be necessary to provide the 5-year LOS. The pump station and pipes would likely need to be bigger than in this alternative as well.

7.4.5 Alternative No. 5 – Combination of Alternative Nos. 2, 3, and 4

This alternative evaluates the combination of Alternative No. 2, 5850 lf of exfiltration with a control weir to the existing PSMS, with Alternative No. 3, the 15 recharge wells, and Alternative No. 4, the 6.2 acre dry detention facility and 75 cfs pump station.

7.4.5.1 Alternative No. 5 Implementation

See Sections 7.4.2.1, 7.4.3.1, and 7.4.4.1 for alternative details and figures.

7.4.5.2 Alternative No. 5 Results

Table 7C-9 in Appendix 7C gives the results of this combined alternative in peak stage per model junction, and differences from the base model for each of the five design storms. The model node description/reference elevation location may be found in Table 7C-1 in Appendix 7C.

The results indicate that this alternative improves the LOS for this neighborhood better than the previous alternatives as expected, but that LOS goals are still not met for even the 5-year, 24-hour design storm. The improvements are substantial, such as at node EDGWDC-08 (along SW 31st St) where the depth above the reference elevation is reduced from 1.4 ft to 0.6 ft; however, 0.6 ft still leaves the road impassable for many vehicles. As with the previous alternative, the LOS goals would be met for the 2-year design storm and smaller, for all but the lowest points in the neighborhood. Flooding would still be expected under these conditions along SW 29th St (node EDGWDC-06).

The reduction in the duration of flooding is significantly better than any of the alternatives as separate projects. The duration of flooding above the LOS goals is expected to last approximately 6-8 hours for most of the neighborhood, which is a significant improvement compared to the base condition.

Table 7-4 below shows seven primary nodes near the proposed systems for this combined alternative. The peak stages and approximate flooding duration are given. The flooding duration is measured using a set stage for each node. This stage is based on (but higher than) the nodes’ reference elevations.

For the combined alternative, the caveats from each of the individual alternatives apply (see Section 7.3 and Sections 7.4.2, 7.4.3, and 7.4.4). Additionally, the recharge wells may reduce the effectiveness of the exfiltration trenches if they cause groundwater mounding. The storage facility may also create groundwater mounding that could affect the other two alternatives.

Table 7-4. Flood Stages and Durations for Alternative No. 5, 5-Year, 24-Hour Storm

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 5 (ft NGVD)	Peak Stage Delta (ft)	Flood Duration* Base (hrs)	Flood Duration* Alt. No. 5 (hrs)	Flood Duration Delta (hrs)
EDGWDC-03	4.9	6.4	5.4	0.9	38	6	32
EDGWDC-04	5.0	6.5	6.0	0.5	60	7	53
EDGWDC-06	4.2	6.4	5.4	0.9	40	6.5	33.5
EDGWDC-08	5.0	6.4	5.6	0.8	40	5.5	34.5
EDGWDC-10	5.1	6.4	5.8	0.6	40	8.5	31.5
EDGWDE-04	6.1	6.5	6.4	0.1	6.5	0.25	6.25
EDGWDE-08	5.3	6.4	5.9	0.4	45	17	28

* Approximate flood duration based on LOS depths above Reference Elevations

7.4.6 Conceptual Probable Capital Costs

The costs of the required components for each alternative were quantified to allow for a cost based comparison. The costs are based on bid tabs available for recent construction projects throughout south Florida. Projects local to Fort Lauderdale were given much greater consideration in the development of the conceptual cost estimations.

7.4.6.1 Alternative No. 1 - System Maintenance

The first alternative analyzed was general maintenance of the collection and conveyance system. The costs associated with cleaning the system, most likely utilizing vacuum trucks and high pressure water jetting, was derived based on unit costs made available by the FDOT. The cost was per linear foot (lf) and varied based on pipe size as follows:

- Pipe diameter zero to twenty-four inches: $7/lf;
- Pipe diameter twenty-five to thirty-six inches: $12/lf;
- Pipe diameter thirty-seven to forty-eight inches: $16/lf; and
- Pipe diameter forty-nine to sixty inches: $20.5/lf.

Maintenance of the approximately 8120 linear feet of pipe located within the East Edgewood neighborhood is a very cost effective means of helping to mitigate peak flood stages. Diameter information was not available from the GIS layer for existing pipes east of SW 4th Ave and south of S.R. 84; therefore, it was estimated that their diameters were less than 24 inches, which share the same unit cost for cleaning. It is estimated that maintenance of the conveyance system serving East Edgewood would cost approximately $121,000, which is by far the least expensive alternative analyzed (see Section 7.4.6.4 for a conceptual cost comparison). Most of the costs associated with this alternative in East Edgewood are for pipes along S.R. 84. There is approximately 5300 lf of pipe south of S.R. 84 in East Edgewood. It is estimated that maintenance of the conveyance system in this area only, would cost approximately $37,000.

7.4.6.2 Alternative No. 2 - Exfiltration

The second alternative analyzed was the installation of exfiltration trench in north-central Edgewood between 8th Ave and 9th Avenues, and between SW 26th St and SW 28th St, in areas that were determined to have the appropriate topographic relief between the road surface and the groundwater table. The conceptual cost estimate developed for installation of exfiltration trench was based off recent FDOT projects in the area, and accounts for installation of the system, but does not take into consideration the operation and maintenance (O&M) costs associated with the exfiltration trenches. It should be noted that annual O&M costs associated with exfiltration trench are often significant, ranging from 3-20 percent of the capital cost as stated in the SFWMD publication "BMPs for South Florida Urban Stormwater Management Systems", SFWMD, 2002. It is also important to note that the typical effective operational duration ranges from five to ten years for most systems due to clogging by fine particulates, and total replacement may be the only effective means of restoring the original design treatment capacity.

Capital costs associated with exfiltration trench were based on the following:

- Cost of materials, installation, and repair of roadway: $195/lf;
- Cost of catch basins: $2,500 per; and
- Cost of control weir: $5,000 per.

Based on these conceptual costs it is estimated that the installation of approximately 5,850 lf of exfiltration trench along with 30 catch basins and one control structure will cost approximately 1.2 million dollars, the third most expensive alternative analyzed for East Edgewood (see Section 7.4.6.4 for a conceptual cost comparison).

7.4.6.3 Alternative No. 3 - Recharge Wells

Alternative No. 3 analyzed the affects of installing 15 gravity recharge wells throughout the residential area that floods, between 8th Ave and 14th Ave, and between SW 26th St and SW 32nd Ct. The cost of the recharge wells was based on local experience with drillers and accounts for all materials and labor required to install the wells. Capital costs associated with recharge wells were based on the following:

- Cost of materials, labor, and installation of 12-inch diameter well: $100,000/per well.

Based on these conceptual costs it is estimated that the installation of approximately 15 gravity recharge wells will cost approximately 1.5 million dollars, the second most cost effective alternative analyzed for East Edgewood (see Section 7.4.6.4 for a conceptual cost comparison).

For Alternative No. 3, the lump sum cost was estimated for a 12-inch diameter well to 200 ft below surface. For this conceptual analysis, the gravity well consists of a catchment attached to the well casing. If it is determined that additional driving head is needed, it can be provided by using a small pump to lift water into an elevated stand tank, thereby artificially generating the head required to overcome the density differential of the fluids and the losses in the well. The costs associated with this option typically preclude it from wide-spread applicability. Additionally, locating the pump stations and stand tanks may be problematic in some neighborhoods. Approximate costs associated with generating additional head, exclusive of the cost of the well, are as follows:

- Cost of pump and fittings: $150,000 per;
- Cost of elevated Storage Distribution Structure: $75,000 per; and
- Standby Power, Fuel, Level Controls, Conduit, P/I&C: $100,000 per.

This raises the potential cost of implementing Alternative No. 3 to 6.4 million dollars, which would make this alternative the most expensive alternative for East Edgewood.

7.4.6.4 Alternative No. 4 - Storage Facility

The development of a regional stormwater treatment facility was analyzed as Alternative No. 4. The conceptual cost analyses took into account excavation, control structures, pump stations and associated backup power (if necessary), the collection and conveyance system, as well as any necessary earth work associated with developing facility berms. This alternative is located in the City-owned Snyder Park so there would not be any direct land acquisition costs; however, the City may be required to purchase land elsewhere to mitigate the loss of public park space. It is important to note that the cost estimate did not include the cost associated with land acquisition. Capital costs associated with development of a regional stormwater facility were based on the following:

- Cost of excavation: $9/CY;
- Cost of Control Structure: $7,000 per;
- Cost of 75 cfs Pump Station: $1,000,000 per;
- Cost of Standby Power: $250,000 per;
- Cost of piping was based on pipe size: 36-inch RCP = $150/lf; 48-inch RCP = $215/lf;

- Cost of catch basins: $2,500 per; and

- Cost of earthwork associated with berm: $7/CY.

The dry detention facility to be developed as part of this alternative consists of a cut volume of 45,000 CY, 16,000 CY of berm, and the installation of a collection system consisting of approximately 4,700 lf of 36-inch diameter pipe, 1,600 lf of 48-inch diameter pipe and approximately 30 catch basins. The conceptual cost associated with development of these facilities is approximately 4.1 million dollars, the most expensive of the four alternatives examined (see Table 7-5 for a conceptual cost comparison). This cost is associated with the development of the stormwater storage facilities and collection system shown in Figure 7-8. It should again be noted that this cost does not include the acquisition of the land that may be required to mitigate for the loss of park space.

A summary of the total estimated cost for each evaluated alternative is provided below in **Table 7-5**.

Table 7-5. Conceptual Probable Capital Costs of Evaluated Alternatives for East Edgewood.

Alternative	Estimated Cost
Alternative No. 1 – Maintenance	$121,000
Alternative No. 2 – Exfiltration	$1,200,000
Alternative No. 3 –Recharge Wells (without/with PS Facilities)	$1,500,000/$6,400,000
Alternative No. 4* - Additional Storage at Snyder Park	$4,100,000
Alternative No. 5* - Combined (without/with PS Facilities)	$6,800,000/$11,700,000

* Cost of storage facilities does not account for land acquisition

7.4.7 East Edgewood Conclusions and Recommendations

After evaluating the five alternatives to reduce peak stages and flooding duration in the identified problem areas, the following conclusions/recommendations are offered:

- Although not as pronounced as for the neighborhoods of Progresso and Victoria Park, not maintaining the existing PSMS results in increased flood stages. Therefore, routine maintenance of the existing system is recommended to prevent further deterioration of the currently provided LOS. Results indicated that the effect of siltation is more pronounced in frequent storms (i.e., 2-year storms and smaller), which could constitute in a periodic nuisance for local residential neighborhoods.

- The results showed that exfiltration trenches placed upstream of the lowest-lying areas (in low-lying areas they would not be expected to perform well), may catch some surface sheet flows and slightly reduce peak stages for the design storms. If the site conditions provide highly conductive soils, the reductions in durations of flooding may be significant. The results improve with smaller design storms in both peak stage and duration of flooding, indicating that the trenches should work as proposed for smaller storms, given good soil conditions.

- It is possible that the hydraulic conductivities of the soils in Edgewood may be closer to the lower end of the tested envelope, in which case the alternative may not be as cost effective. Site specific hydraulic conductivity values need to be confirmed at each location to determine the effectiveness of individual trenches.

- Recharge (gravity) wells provided a similar reduction in peak stage and duration of flooding as the exfiltration alternative for site soil conditions with the higher hydraulic conductivity. However, the expected costs associated with implementing this alternative are significantly higher, especially if it is determined from site-specific analysis that pump stations and stand tanks are needed. The recharge wells would target the lowest-lying flood-prone areas better than the exfiltration trenches, however. The application of recharge wells is subject to suitable local subsurface geological conditions associated with discharge capacity and TDS content.

- For Alternative No. 4, the proposed dry detention system and 75 cfs pump station, the results indicate that there is similar reduction in peak stage as the other two alternatives; however, the reduction in the duration of flooding is significantly better. Also, Alternative No. 4 targets the most flood-prone areas within East Edgewood.

- None of the evaluated alternatives provided enough peak stage reduction to fully meet the desired LOS. They do, however, reduce the duration of flooding in the neighborhood.

- Alternative No. 5, the combination of Alternative Nos. 2-4, provided significant improvement over any of the single alternatives. However, potential groundwater mounding may cause interference between these control measures and should be analyzed further before implementing.

- The volume of flooding for the 5-year, 24-hour design storm in the central portion of Edgewood is approximately 100 acre-ft. Given the vertical limitations to stormwater storage, a facility would need to be about 25 acres in order to meet the 5-year LOS goal. This likely would require a much larger pump station and bigger pipes to convey the flow as well. This would require significant condemnation of houses for the construction of storage facilities, and would not be practicable.

Recommendations based on cost analysis and conclusions:

- Routine maintenance of the existing stormwater network is recommended as a cost effective alternative to reduce the level of nuisance flooding due to frequent storms.

- Although none of the solutions provide reductions in flooding that meet the LOS goals that have been set, the recharge wells would provide the most cost-effective solution in the neighborhoods that most need it most, provided suitable local subsurface geological conditions which do not require pump stations.

- The most effective solution to providing flood relief, in stage, duration, and frequency would be to implement Alternative No. 5, which is the combination of three systems: exfiltration trench where there is sufficient topographic elevation to catch a portion of the runoff as it sheet flows down the streets to the low-lying areas, recharge wells in the low-lying areas, and a dry detention facility in Snyder Park.

7.5 West Edgewood Alternative Evaluations

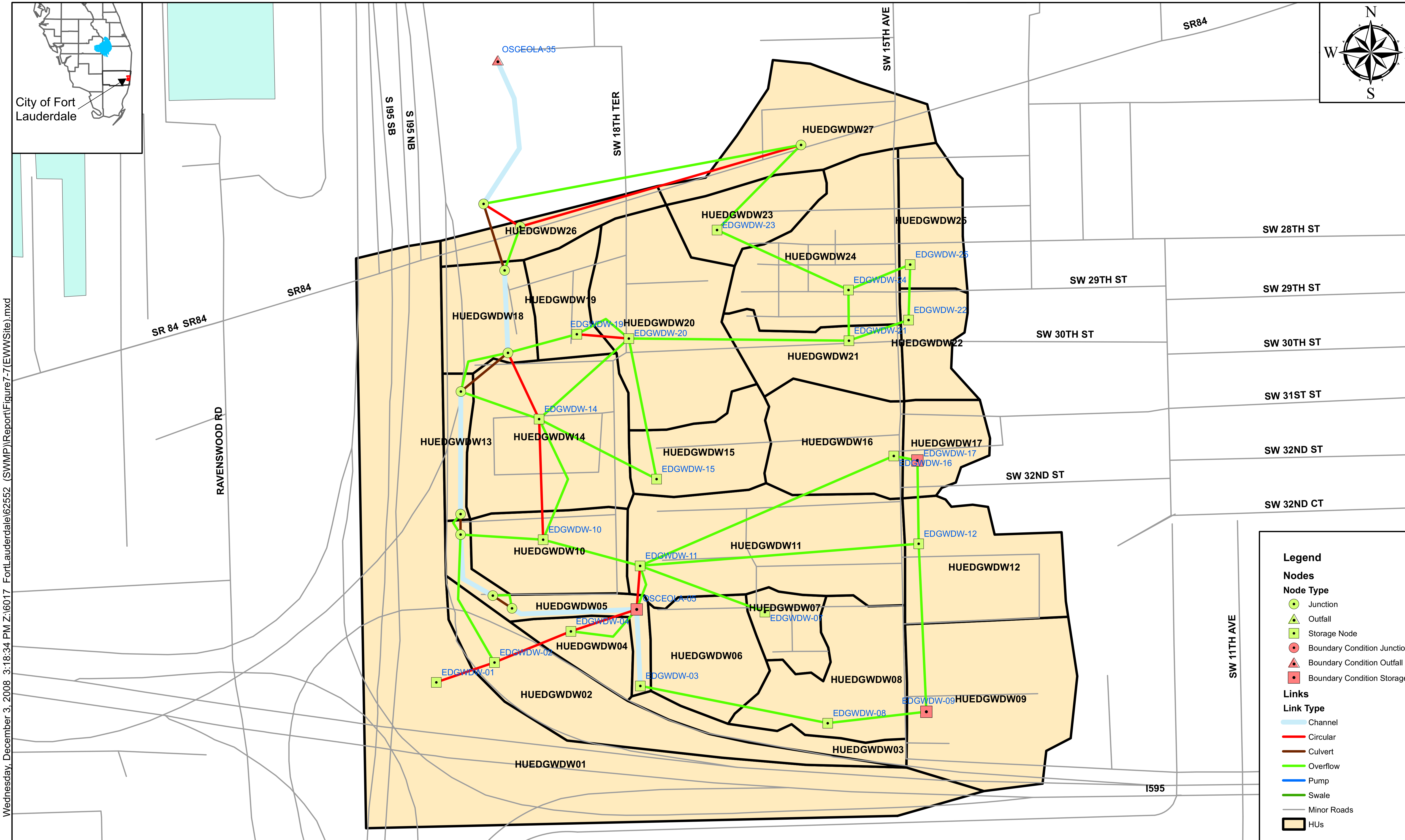
The second local model evaluated was in the neighborhood of West Edgewood. This neighborhood covers approximately 238 acres (0.37 square miles) of the City, east of I-95 between S.R. 84 and I-595 north of Fort Lauderdale–Hollywood International Airport. The western portion of the Edgewood neighborhood is bounded by S.R. 84 to the north, I-95 to the west, I-595 to the south and by a relative topographic high between 200 and 700 feet east of SW 15th Ave to the east as shown in **Figure 7-9**. Figure 7-9 displays the site map and local model schematic for the West Edgewood model.

The land use within the project area is primarily single family residential. The residential portion of Edgewood presents severe flooding potential due to low-lying topography, a lack of positive outfalls, and no existing exfiltration systems or other types of flood relief.

Boundary Conditions

The neighborhoods of East Edgewood and West Edgewood were divided based on the relatively large size of the neighborhood, and because the flooding problems are rooted in different underlying causes. Therefore, the potential solutions needed to be separated.

Three boundary conditions were necessary along the eastern boundary with the neighborhood of East Edgewood because the topographic high is expected to be overtopped during most of the design storms. The two models were combined in the base condition to estimate flows between basins. The East Edgewood HUs EDGWDC-11 and EDGWDC-14 overflowed to West Edgewood HU EDGWDW-09, and East Edgewood HU EDGWDC-07 overflowed to West Edgewood HU EDGWDW-17. The boundary conditions for node EDGWDW-09 were developed by combining the two overflows into inflow hydrographs, one for each of the design storms. For node EDGWDW-17, the overflows from the combined model simulations were used as inflow hydrographs, one for each of the design storms.



Source: City of Fort Lauderdale

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Figure 7-9
City-Wide Stormwater Master Plan
West Edgewood Site Map

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Along the southern edge of the model, I-595 represents a topographic divide and therefore a "no-flow" boundary, with the exception of inflows to Osceola Creek. This was also used as the boundary for the regional model and is at the edge of the City. To account for flows into Osceola Creek, an additional boundary condition was necessary in the southwestern portion of the model. Runoff from Fort Lauderdale – Hollywood International Airport (FLL) and the surrounding area enters into Osceola Creek which is conveyed to the north under I-595 via twin 66-inch reinforced concrete pipes. CDM has previously developed a model (in an earlier version of SWMM) of FLL from work provided to the Broward County Aviation Department (BCAD). The BCAD model was run for the various design storms to provide the inflow time series to local model node OSCEOLA-05.

The major outlet for the neighborhood is north via Osceola Creek which eventually outfalls into the South Fork of the New River to the north of the project area. The boundary condition to the north of S.R. 84 is modeled with an outfall that represents the average of the two regional model nodes, OCO15 and OCO20, which represents a point in the creek approximately 800 ft north of the local model boundary. The time series of simulated stages at this node, for each of the design storms, are set as the boundary conditions for this outfall.

In general, S.R. 84 represents a topographic divide and therefore a "no-flow" boundary. Portions of S.R. 84 were included in the local model, particularly the eastbound lanes and an area extending to the north of S.R. 84 along the eastern side of SW 15th Avenue. There is a small collection and conveyance system that transports this water west to Osceola Creek via S.R. 84, but during larger events there is some interaction via overland flow.

Along the western edge of the model, I-95 represents a topographic divide and therefore a "no-flow" boundary. The vast majority of I-95 and I-595 east of I-95 were included in the West Edgewood local model. This is due to the fact that runoff from these portions of the Interstate system enters into stormwater treatment facilities that ultimately discharge to Osceola Creek, being conveyed through the model en route to the South Fork of the New River.

Model Setup

The base condition of the West Edgewood Neighborhood Model consists of 27 HUs, 51 links, and 33 nodes of which 22 are storage nodes, 10 are junction nodes, and one is an outfall node. The West Edgewood site map, Figure 7-9, also displays the model schematic of these features.

The HU divisions are based on topography, streets with relatively high centerlines, lakes, and existing PSMS catchments along S.R. 84. Osceola Creek, representing the major hydraulic conveyance system in the area, is separated into unique HUs based on the existing culverts in order to allow for an accurate analysis of the flow capacity of the system.

Since the neighborhood east of the creek is generally flat, low-lying, and lacking a collection and conveyance system, the boundaries of the HUs do not inhibit flow during the designs storms and therefore many of the links represent overland flows. The stormline layer in GIS that was supplied by the City was used to estimate pipes along S.R. 84. Some inverts have been estimated based on the topography and engineering judgment as this information was not supplied in the GIS layer. Some pipe sizes were estimated as well, where the GIS layer had missing information. A connection from Edgewood Estates to Osceola Creek was also included in the model based on historic information provided by the City. A pipe running from the western end of SW 32nd Court to the Creek was detailed via an easement shown in the Plat Book from the 1960s and more recent photographic evidence of maintenance activities.

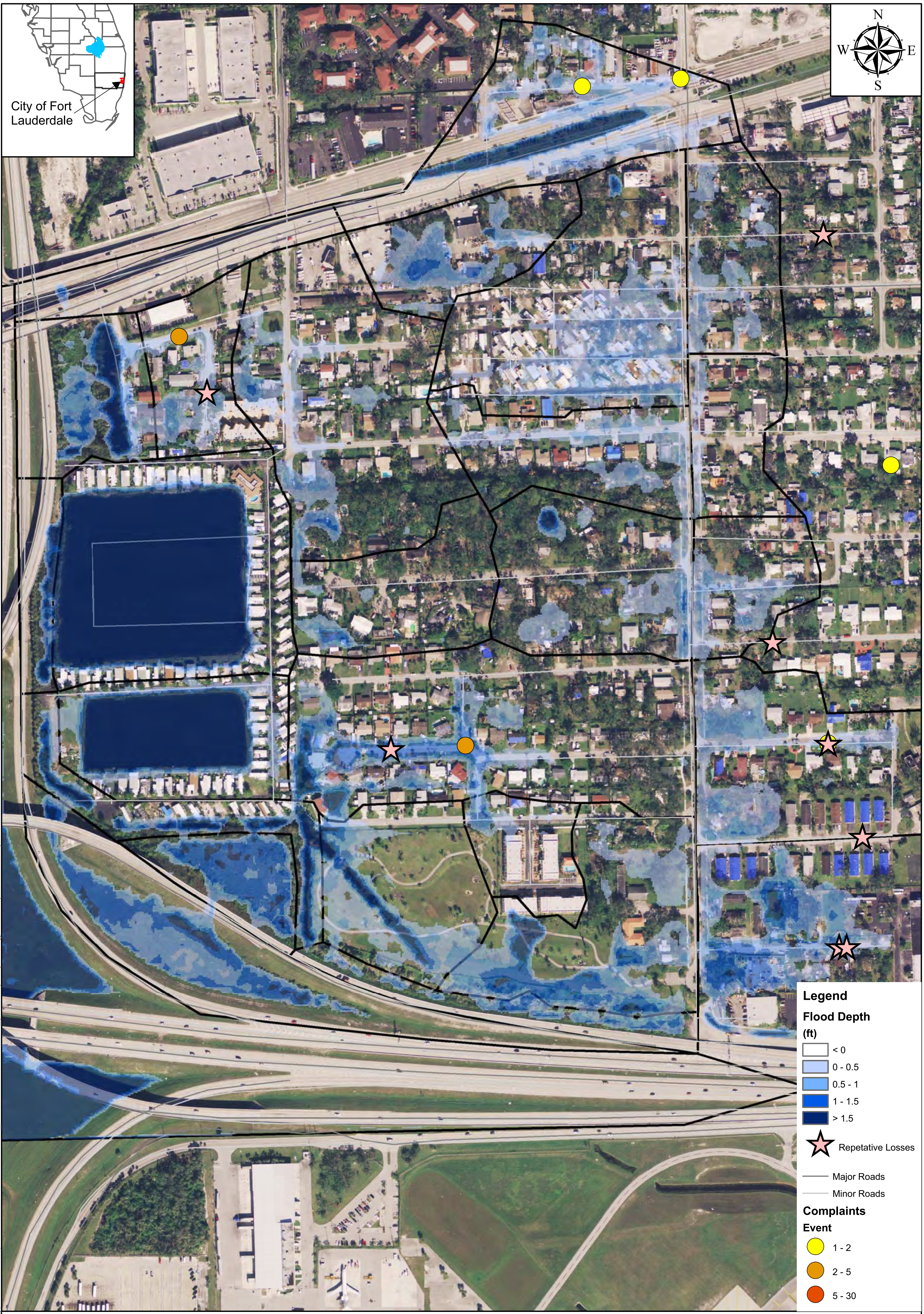
The 1986 FDOT design plans for the construction of the I-95 / I-595 interchange were also utilized to determine flow patterns, pipe sizes, and control measures. This information was confirmed and augmented by a number of field visits to the area. The City facilitated a site visit to Osceola Creek as it flows through Lauder Lakes Mobile Home Park, at which time site specific measurements were taken of the blockages at the culverts and a general conditional analysis of the conveyance capacity of the waterway was performed.

Model Objectives

Although the base models (and the regional model) indicate significant flooding potential throughout the entire neighborhood, most of the **alternatives** were geographically restricted in the extent of their application. For that reason it is anticipated that a combination of alternatives will best serve to mitigate the flooding throughout the West Edgewood neighborhood.

Base Model Results

Simulations of the base model for West Edgewood were run for the 2-year, 24-hour; 5-year, 24-hour; 10-year, 24-hour; 25-year, 72-hour; and 100-year, 72-hour SFWMD design storms. The results of these simulations are in **Appendix 7D** in Table 7D-1.The model nodes in this table are ordered by severity of flooding above the reference elevation for the peak stage of the 5-year, 24-hour design storm. The reference elevations were found from the survey data or LiDAR data where survey was unavailable, for local road centerlines near each model node. In the base condition, there is severe flooding expected for many roads and intersections in West Edgewood, even for the 2-year design storm. **Figure 7-10** displays the approximate extents of flooding in West Edgewood for the 5-yr, 24-hour design storm event. This map shows approximately where the simulated peak stages intersect the topography for problem area verification and identification. The figure also shows the locations of repetitive loss claims and complaints that were provided by the City of Fort Lauderdale and discussed in Section 2 of this report.



Source: City of Fort Lauderdale
Note: Base condition is evaluated with well maintained culverts and may under represent extent of actual flooding

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Figure 7-10
City-Wide Stormwater Master Plan
Simulated Peak Flood Map - West Edgewood
5-Year, 24-Hour Storm

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12-09-08

7.5.1 Alternative No. 1 – Maintenance of Existing System

Typically, Alternative No. 1 is an evaluation of the existing PSMS under varying degrees of maintenance as described in Section 7.3.1. However, the West Edgewood Model contains a limited number of pipes and site visits indicated that there are blockages in the culverts for Osceola Creek; therefore an exception to the general methodology discussed in Section 7.3.1 was employed. Field measurements were taken of the degree of siltation on the culverts conveying Osceola Creek under SW 32nd Street, SW 30th Street, and the southern end of the culvert under S.R. 84. This in-situ information, which showed blockages of between 30 and 50 percent, was combined with the 30% blocked condition and the associated increase in loss coefficients (on all pipes where measurements were not taken) to create the maintenance alternative for the West Edgewood local model.

Tables of peak stage per model junction, and differences from the base model are provided in Appendix 7D in Table 7D-2. The model node description/reference elevation location may be found in Table 7D-1 in Appendix 7D. The table indicates that the results of not maintaining the system may cause increases in peak stage of up to 0.5 ft above the already severe flooding problems in the neighborhood. Model simulations indicate that nodes representing Osceola Creek, OSCEOLA-05 through OSCEOLA-25, are severely impacted during the larger storm events. The extent of these effects impact the entire model as Osceola Creek is the major hydraulic conveyance feature in the area, draining nearly all the runoff from the West Edgewood neighborhood. The fact that the conveyance capacity is limited restricts the ability of the creek to drain Edgewood, and it also results in reduced conveyance capacity from the Interstate system as well as the Airport. Interviews with local residents along the creek confirm that this is an ever worsening problem, which may be attributed to maintenance needs.

In this neighborhood, potential reduction in PSMS capacity from debris and silt blockage is more noticeable for the larger design storms, by these model estimates. This is because for the smaller storms, there is still sufficient capacity in the large conveyance pipes, but during large events the system is quickly overwhelmed resulting in widespread flooding.

7.5.2 Alternative No. 2 – Exfiltration

This alternative was limited in its application due to the extremely low-lying topography of the West Edgewood neighborhood. The analysis evaluates adding exfiltration trenches along SW 15th Ave as well as numerous roadways extending either east (E) or west (W) off SW 15th Ave. In addition to the system along SW 15th Ave, exfiltration was applied in the following locations:

1. SW 27th St (E);

2. SW 27th Ct (E & W);

3. SW 28th St (E);

4. SW 29th St (E);

5. SW 30th St (E);

6. SW 31st St (E);

7. SW 30th Pl (W), SW 32nd St (W); and

8. SW 33rd St (E).

These streets are located in the following HUs as shown in **Figure 7-11**: HUEDGWDW09, 11, 12, 15, 16, 17, 21, 22, 23, 24, and 25.

7.5.2.1 Alternative No. 2 Implementation

Section 7.3.2 describes how exfiltration has been implemented in these local models for this SWMP. The following notes are site specific:

- The exfiltration trenches cannot be placed at the lowest elevations where flooding is most severe, because the catchment rim elevations would likely be too low for the systems to be effective; therefore, the alternative has been limited to roads where elevations are greater than 6 ft NGVD.

- The proposed trenches are designed to collect sheet flow along streets at higher elevations before flows settle at the lower elevations. Therefore, detailed street survey and construction plans are necessary to ensure that the sheet flow enters the catchments.

- The proposed alternative is to be self contained within the West Edgewood neighborhood. A connection to the existing PSMS along S.R. 84 at the north end of 15th Ave was investigated, but it resulted in backflows from S.R. 84, reducing the effectiveness of the system.

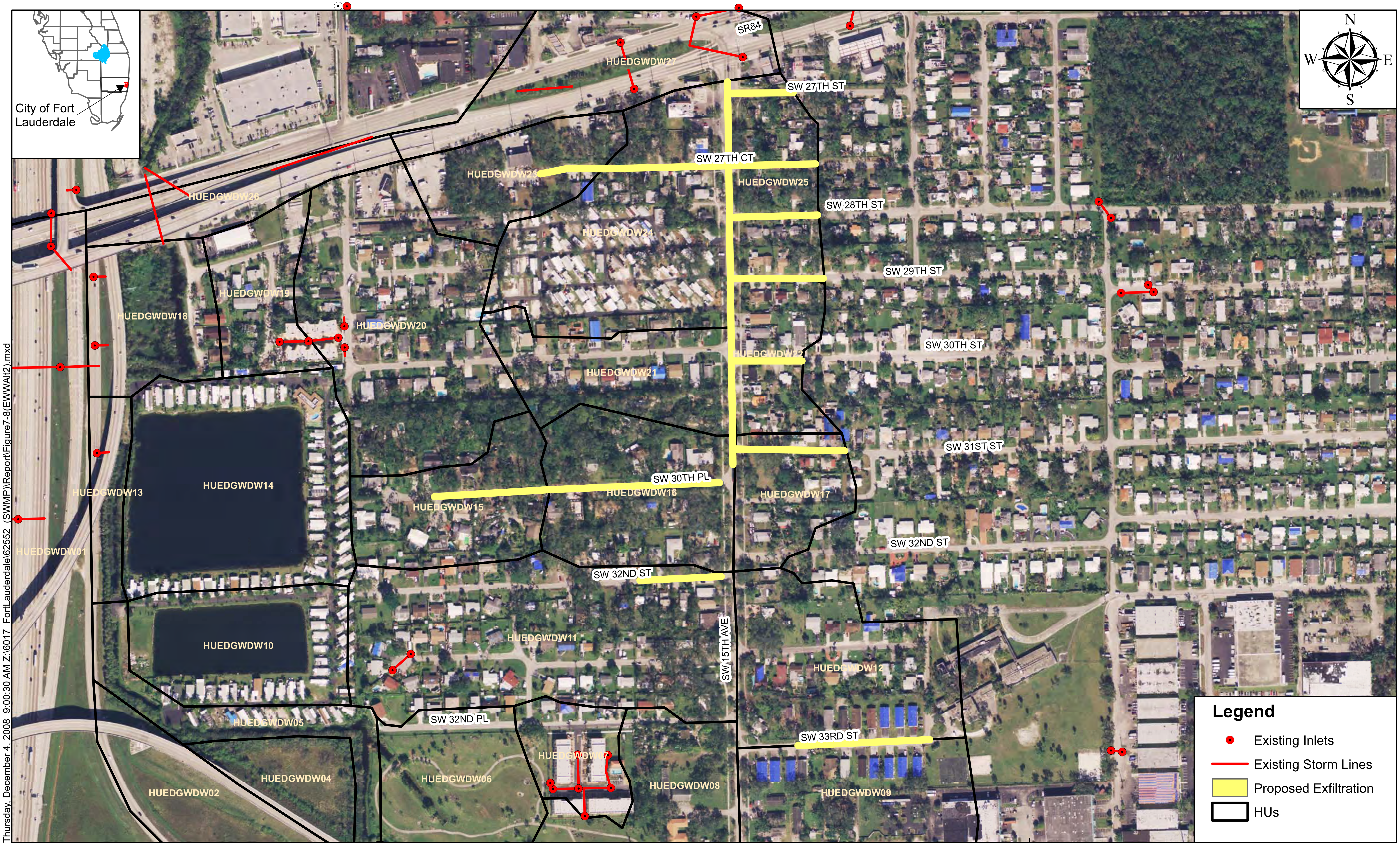
This alternative consists of approximately:

- 1350 ft of 19-inch by 30-inch elliptical pipe along SW 15th Ave between S.R. 84 and SW 30th Pl;

- 225 ft of 19-inch by 30-inch elliptical pipe along SW 27th St immediately east of SW 15th Ave;

- 975 ft of 19-inch by 30-inch elliptical pipe along SW 27th Ct on either side of SW 15th Ave;

- 300 ft of 19-inch by 30-inch elliptical pipe along SW 28th St immediately east of SW 15th Ave;



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Source: City of Fort Lauderdale

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Figure 7-11
City-Wide Stormwater Master Plan
West Edgewood
Alternative No. 2 Site Map

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- 325 ft of 19-inch by 30-inch elliptical pipe along SW 29th St immediately east of SW 15th Ave;
- 250 ft of 19-inch by 30-inch elliptical pipe along SW 30th St immediately east of SW 15th Ave;
- 400 ft of 19-inch by 30-inch elliptical pipe along SW 31st St immediately east of SW 15th Ave;
- 1000 ft of 19-inch by 30-inch elliptical pipe along SW 30th Pl immediately west of SW 15th Ave;
- 300 ft of 19-inch by 30-inch elliptical pipe along SW 32nd St immediately west of SW 15th Ave; and
- 450 ft of 19-inch by 30-inch elliptical pipe along SW 33rd St immediately east of SW 15th Ave.

This represents a total of approximately 5,575 linear feet (lf) of exfiltration trench. In areas where exfiltration trench ran along a HU boundary, the length of trench was split equally between the HUs. It should be noted that the potential for exfiltration trenches under the roadways within the recently removed mobile home park, (SW 28th St to SW 29th Ct, immediately west of SW 15th Ave) was not evaluated. There are no longer homes present in this area, and the future status for development of the parcel containing the aforementioned roadways is unknown. The area was evaluated as a potential regional stormwater treatment facility, which would necessitate the purchase of the parcel.

The exfiltration alternative was modeled with and without the connection to the existing S.R. 84 PSMS. This connection resulted in a reduction in LOS within the neighborhood due to backflow from the S.R. 84 system, therefore the connection was omitted from the alternative.

In numerous areas within West Edgewood it is not possible to install exfiltration trench in the locations most severely affected by flooding due to topographic limitations (road elevations below 6 feet NGVD). In these areas it is often possible to install exfiltration trench in some of the higher adjacent areas to intercept runoff en route to the "bottom of the bowl" (see HUEDGWDW09 for example). Modeling areas such as this poses a problem, as trench installed along the higher streets will reduce the flooding in lower areas, but not nearly to the extent that would be found utilizing the pump-type SWMM link described in detail in Section 7.3.2. In order to more accurately depict the trench performance in these instances, an initial abstraction was applied to the hydrology of the HU based on the area intercepted by the trench and the equivalent water quality volume provided based on SFWMD methodology.

7.5.2.2 Alternative No. 2 Results

As noted above, two sets of simulations were conducted for this alternative to provide an envelope of results for the unknown, site specific hydraulic conductivity. In the first set of simulations, a K_s value of 1.0 x 10^{-4} cfs/ft^2/ft of head was used for the five design storms. These results are presented in Appendix 7D, in Table 7D-3. The LOS improvements due to this alternative are quite significant in areas where an appreciable amount of trench could be installed. The reductions in peak stage ranged from 1.5 feet for the 2-year storm to a few inches during larger storms. Since a 1.5-ft reduction in stage would lower the hydraulic grade below catchment levels, the LOS goals are expected to be met for this storm and the LOS improvement would be at least 0.5 feet (from the elevation of the peak stage in the base condition to the reference elevation).

In areas where only short, isolated sections of trench could be installed there was no measureable improvement to LOS. **Table 7-6** below shows five of the primary nodes located near the proposed system for this alternative. It can be seen that even with limited hydraulic conductivity there are significant reductions in both peak stage and duration of flooding for several of the areas within West Edgewood.

Table 7-6. Flood Stages and Durations for Alternative No. 2, 5-Year, 24-Hour Storm

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 2 K_s=1x10^{-4} (ft NGVD)	Peak Stage Delta (ft)	Flood Duration* Base (hrs)	Flood Duration* Alt. No. 2 K_s=1x10^{-4} (hrs)	Flood Duration Delta (hrs)
EDGWDW-16	5.8	6.1	5.8	0.3	49.5	0	49.5
EDGWDW-17	5.5	6.1	5.8	0.3	89	1.5	87.5
EDGWDW-22	6.4	6.5	5.9	0.6	1	0	1
EDGWDW-23	6.5	6.9	6.5	0.5	36	0	36
EDGWDW-25	7.0	6.9	6.2	0.6	N/A	N/A	N/A

* Approximate flood duration based on LOS depths above Reference Elevations

In the second set of exfiltration simulations, a K_s value of 5.0 x 10^{-4} cfs/ft^2/ft of head was used for the five design storms. This represents the higher end of the envelope of the hydraulic conductivities that were tested, although some sites may differ significantly from these values. The results of this test are presented in Appendix 7D, in Table 7D-4. The peak stage improvements due to this alternative ranged from nearly four feet of improvement for the 2-year storm to merely a few inches for the larger storms. As in the first scenario, the large reduction in stage would lower the hydraulic grade below catchment levels for the smaller storms. The LOS improvement would be at least 0.5 feet (from the elevation of the peak stage in the base condition to the reference elevation).

Again, in areas where only short, isolated sections of trench could be installed there was no calculable improvement to LOS. However, in areas where an appreciable amount of trench could be installed there were large reductions in peak stages, often resulting in meeting the desired LOS for the 10-year storm event. Additionally, the duration of the flooding was shortened with this alternative for all the design storms. **Table 7-7** below shows the seven primary nodes near the proposed system for this alternative. The peak stages and approximate flooding duration are given. The flooding duration is measured based on the nodes' reference elevations.

Table 7-7. Flood Stages and Durations for Alternative No. 2, 5-Year, 24-Hour Storm

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 2 K_s=5x10^{-4} (ft NGVD)	Peak Stage Delta (ft)	Flood Duration* Base (hrs)	Flood Duration* Alt. No. 2 K_s=5x10^{-4} (hrs)	Flood Duration Delta (hrs)
EDGWDW-15	5.8	5.6	5.0	0.6	N/A	N/A	N/A
EDGWDW-16	5.8	6.1	3.7	2.4	49.5	0	49.5
EDGWDW-17	5.5	6.1	3.6	2.5	89	0	89
EDGWDW-21	5.8	6.3	6.0	0.2	37	21	16
EDGWDW-22	6.4	6.5	3.5	3.0	1	0	1
EDGWDW-23	6.5	6.9	5.6	1.3	37	0	37
EDGWDW-25	7.0	6.9	3.5	3.4	N/A	N/A	N/A

* Approximate flood duration based on LOS depths above Reference Elevations

This table indicates that the proposed alternative is very effective in areas that have the required topographic separation between the road and groundwater to allow for the installation of exfiltration trench. It should also be noted that the peak stage reductions shown are based on relatively large areas, and that in low-lying regions within the HU where a collection system is not present, minor localized flooding is still likely. An additional consideration is the variability in results based on the differing hydraulic conductivity values. Site-specific hydraulic conductivity field measurements are recommended for each location (e.g., saturated vertical and lateral hydraulic conductivities), as these will have a large impact on the effectiveness of an exfiltration trench system.

7.5.3 Alternative No. 3 – Recharge Wells

Based on area specific testing previously performed for the City at Jacob's Landing, it was determined that gravity recharge wells were not a feasible option. It was determined that wells needed to be extremely deep (approximately 200' below land surface, potentially much deeper) in order to discharge below the USDW (see Section 7.3.3) so as not to interfere with the drinking water supply. In order to overcome the head losses associated with such deep wells it would be necessary to employ a pump to lift water to an elevated stand tank to generate the required driving head. The costs associated with these types of specialized wells preclude them from wide-spread application, and therefore this alternative was not analyzed for the West Edgewood neighborhood.

7.5.4 Alternative No. 4 – Storage Facility

This alternative evaluates the construction of a 4.4 acre wet detention stormwater storage facility located between SW 28th St and SW 29th Ct immediately east of SW 15th Ave as shown in **Figure 7-12**. In this alternative, the residential neighborhood along SW 15th Avenue would be connected to the storage facility by approximately 20 Catch basins and 3500 lf of 15-inch diameter pipe. The wet detention facility is fed by a gravity system serving HUs HUEDGWDW09, 12, 16, 17, 21, 22, 23, 24, and 25. A gravity outfall has been added connecting the proposed facility with the PSMS along S.R. 84.

The possibility of utilizing a stormwater pump to expand the reach of the regional stormwater facility to provide mitigation to the aforementioned HUs plus HUEDGWDW15 and 20 was analyzed. It was determined that the additional benefit obtained was minimal and did not warrant the increased cost associated with constructing a pump station and all the associated features.

7.5.4.1 Alternative No. 4 Implementation

The close proximity of the storage facility to Fort Lauderdale – Hollywood International Airport could lead to some potential regulatory challenges. The Federal Aviation Administrations' (FAA) Advisory Circular 150 (AC 150) typically requires a 10,000 foot setback from the runway for wet detention facilities due to fog and aviary concerns. Due to the fact that the facility would not be located in the glide path and that federal funding is not likely to be utilized for construction, AC 150 regulations concerning setbacks for constructed water bodies may not apply here. It is possible that these regulations would require the facility be constructed as a dry detention system, which would necessitate the bottom being constructed at 3.5 feet NGVD which is one foot above the high water table elevation (2.5 ft NGVD). The loss in live storage volume could result in the dry system needing to employ a pump to transfer stormwater into the facility, which is a costly option. For purposes of this investigation, a gravity fed regional wet detention facility was evaluated.

The proposed facility is located on a 7.1 acre vacant parcel located immediately west of SW 15th Ave between SW 28th St and SW 29th Ct. The parcel once contained a mobile home park that has since been removed, and is located in the lowest part of HUEDGWDW24 with existing ground elevations ranging from 5.3 ft to 7.6 feet NGVD based on LiDAR for the area. The proposed storage facility is approximately 4.4 acres at top of bank elevation of 7 ft NGVD, with 3:1 side slopes going down to approximately 3.9 acres at the normal water level (NWL) of 2.5 ft NGVD. The facility would be excavated to a depth of 8 feet below NWL to inhibit cattail growth and

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Figure 7-12
City-Wide Stormwater Master Plan
West Edgewood
Alternative No. 4 Site Map

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increase residence time, providing for more water quality treatment. The proposed facility would result in approximately 84,000 cubic yards of excess fill material which could be sold to offset the capital costs associated with construction. A conservative buffer of 50 feet was used in determining the size of the facility. It is possible that a lesser distance could be employed allowing for the creation of a larger facility.
The piping from the neighborhood to the stormwater facility is significant in length in order to attempt to move as much water as possible from the severely flooded streets to the storage facility. The alternative calls for approximately 3,500 lf of 15-inch diameter pipe primarily along SW 15th Ave as well as several of the intersecting cross streets (see Figure 7-12 for more exact locations).

A sensitivity analysis was performed to determine if larger pipes would provide for an improved LOS, and it was determined that no appreciable benefit was obtained by upsizing the conveyance system.

This alternative involves the purchase of a large piece of land, approximately 7 acres, located at immediately west of SW 15th Ave between SW 28th St and SW 29th Ct. The area is relatively low and currently floods, making it an ideal location for a regional stormwater treatment facility. While property costs have recently dropped, the cost of acquiring such a large piece of property will certainly account for a large portion of the total cost of developing the facility.

A second area was identified for a potential regional stormwater treatment facility. Edgewood Passive Park, located immediately northeast of the intersection of I-95 and I-595, could be retrofitted to provide stormwater storage and treatment (see Figure 7-12). In order to preserve the passive park and eliminate any potential issues with FAA AC 150 and the Airport, the proposed stormwater treatment area would function as a dry detention facility. The dry detention facility was evaluated at approximately 6.4 acres at top of bank, with a bottom elevation of 3.5 feet NGVD, providing a foot of separation between the facility bottom and the seasonal high water table. A collection and conveyance system was laid out to capture water from HUs HUEDGWDW09, 11, 12, 15, 16, 17, and 20, as well as providing a connection to the northern basins. A small outlet pipe was connected to Osceola Creek to allow for drawdown after storm events. Peak flows were analyzed downstream of the outfall to ensure that discharges do not increase for the 25-year design storm per SFWMD regulations. Utilizing a pump station for the southern facility was analyzed, and it was determined that the additional benefit obtained was negligible and did not warrant the increased cost associated with constructing a pump station and all the associated features.

7.5.4.2 Alternative No. 4 Results

Table 7D-5 in Appendix 7D gives the results of developing the northern wet detention facility in peak stage per model junction, and differences from the base model for the five design storms. The model node description/reference elevation location may be found in Table 7D-1 in Appendix 7D.

The results indicate that employing the northern facility provides the LOS for HUEDGWDW21, 22, and 23, and reduces peak stages and durations in a number of other areas. While this option certainly helps mitigate the severity of flooding in numerous areas, significant flooding would still be expected throughout the neighborhood for most of the design storms. The LOS goals would be met in many areas for the 2-year design storm and smaller for all but the lowest points in the neighborhood. Flooding would still be expected under these conditions in the low-lying areas found along the southern boundary of the neighborhood and in the northwest corner.

The reduction in overall stages is not as wide reaching as with other alternatives. This is due in part to the fact that the facility is located in an area of the model that is somewhat higher than some of the regions that experience the worst flooding.

Table 7-8 below shows five primary nodes near the proposed system for the northern pond alternative. The peak stages and approximate flooding duration are given. The flooding duration is measured using a set stage for each node. This stage is based on the nodes' reference elevations.

Table 7-8. Flood Stages and Durations for Alternative No. 4, 5-Year, 24-Hour Storm

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 4 N. Storage (ft NGVD)	Peak Stage Delta (ft)	Flood Duration* Base (hrs)	Flood Duration* Alt. No. 4 N. Storage (hrs)	Flood Duration Delta (hrs)
EDGWDW-21	5.8	6.3	5.9	0.4	37	0.3	36.7
EDGWDW-22	6.4	6.5	6.3	0.2	1	0	1
EDGWDW-23	6.5	6.9	6.4	0.5	37	0	37
EDGWDW-24	6.4	6.4	5.2	1.2	N/A	N/A	N/A
EDGWDW-25	7.0	6.9	6.3	0.6	N/A	N/A	N/A

* Approximate flood duration based on LOS depths above Reference Elevations

7.5.4.3 Additional Storage Tests

After analyzing the storage alternative and not finding a solution that would provide widespread relief for the severe flooding in this neighborhood, some additional tests were performed. One test was to relocate the storage facility to a topographically lower area of the model. Broward County owns a large portion of land located immediately adjacent to the northeast of the intersection of I-95 and I-595, Edgewood Passive Park. When the facility was relocated to this area it had much of the same effect as seen previously, it reduced the peak flood elevations of the areas immediately adjacent to it, but did not provide the regional solution desired.

In an attempt to provide an area-wide solution, two regional stormwater treatment facilities were modeled. A northern wet detention facility located in HUEDGWDW24 as described previously, and an additional gravity fed dry detention facility located within Edgewood Passive Park in HUEDGWDW06 and HUEDGWDW08. **Table 7-9** below shows 10 primary nodes near the proposed system for this alternative. The peak stages and approximate flooding duration are given. The flooding duration is measured using a set stage for each node. This stage is based on the nodes' reference elevations.

Table 7-9. Flood Stages and Durations for Alternative No. 4, 5-Year, 24-Hour Storm

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 4 2 Pond Storage (ft NGVD)	Peak Stage Delta (ft)	Flood Duration* Base (hrs)	Flood Duration* Alt. No. 4 2 Pond Storage (hrs)	Flood Duration Delta (hrs)
EDGWDW-09	5.7	5.8	5.5	0.3	1.1	0	1.1
EDGWDW-12	5.7	5.9	5.6	0.3	20	0	20
EDGWDW-15	5.8	5.6	5.4	0.2	N/A	N/A	N/A
EDGWDW-16	5.8	6.1	5.6	0.5	49.5	0	49.5
EDGWDW-17	5.5	6.1	5.6	0.5	89	0.7	88.3
EDGWDW-21	5.8	6.3	5.0	1.2	37	0	37
EDGWDW-22	6.4	6.5	5.1	1.4	1	0	1
EDGWDW-23	6.5	6.9	6.2	0.7	37	0	37
EDGWDW-24	6.4	6.4	5.0	1.4	N/A	N/A	N/A
EDGWDW-25	7.0	6.9	5.0	1.9	N/A	N/A	N/A

* Approximate flood duration based on LOS depths above Reference Elevations

Table 7D-6 in Appendix 7D gives the results of this combined alternative in peak stage per model junction, and differences from the base model for each of the five design storms. The modeling indicated that creating two regional stormwater treatment facilities provided a much more comprehensive solution to the flooding in West Edgewood.

7.5.5 Alternative No. 5 – Combination of Alternative Nos. 2 and 4

This alternative evaluates the combination of Alternative No. 2, 5575 lf of exfiltration trench assuming $K_s = 5x10^{-4}$, with Alternative No. 4, the 6.4 acre dry detention facility located within Edgewood Passive Park, as shown in **Figure 7-13**. The southern pond was chosen to be used in conjunction with the exfiltration trench as the two measures provide flood relief to two distinct areas.

Source: City of Fort Lauderdale

CDM

0 100 200 400 600 800 Feet

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 858-5000

Figure 7-13
City-Wide Stormwater Master Plan
West Edgewood
Alternative No. 5 Site Map

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7.5.5.1 Alternative No. 5 Implementation

See Sections 7.5.2.1 and 7.5.4.1 for alternative details and figures.

7.5.5.2 Alternative No. 5 Results

Table 7D-7 in Appendix 7D gives the results of this combined alternative in peak stage per model junction, and differences from the base model for each of the five design storms. The model node description/reference elevation location may be found in Table 7D-1 in Appendix 7D.

The results indicate that this alternative improves the LOS for this neighborhood better than the previous alternatives as expected, with LOS goals for even the 5-year, 24-hour design storm being met in numerous areas. The reduction in the duration of flooding is also better than any of the alternatives as separate projects. The only scenario that compares to Alternative 5 for a comprehensive, area-wide solution is the implementation of the two stormwater ponds.

Table 7-10 below shows nine primary nodes near the proposed systems for this combined alternative. The peak stages and approximate flooding duration are given. The flooding duration is measured using a set stage for each node. This stage is based on the nodes' reference elevations.

Table 7-10. Flood Stages and Durations for Alternative No. 5, 5-Year, 24-Hour Storm

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 5 Pond and Exfil. (ft NGVD)	Peak Stage Delta (ft)	Flood Duration* Base (hrs)	Flood Duration* Alt. No. 5 Pond and Exfil. (hrs)	Flood Duration Delta (hrs)
EDGWDW-09	5.7	5.8	5.3	0.5	1.1	0	1.1
EDGWDW-12	5.7	5.9	5.3	0.7	20	0	20
EDGWDW-16	5.8	6.1	5.2	0.9	49.5	0	49.5
EDGWDW-17	5.5	6.1	5.2	0.9	89	0	89
EDGWDW-21	5.8	6.3	5.7	0.5	37	0	37
EDGWDW-22	6.4	6.5	5.1	1.4	1	0	1
EDGWDW-23	6.5	6.9	5.9	1.0	37	0	37
EDGWDW-24	6.4	6.4	5.9	0.5	N/A	N/A	N/A
EDGWDW-25	7.0	6.9	4.8	2.1	N/A	N/A	N/A

* Approximate duration based on LOS depths above Reference Elevations

For the combined alternative, the caveats from each of the individual alternatives apply (see Section 7.3 and Sections 7.5.2 and 7.5.4). Additionally, the storage facility may create groundwater mounding that could affect the exfiltration trenches, although this is not likely due to the horizontal separation between the two BMPs.

7.5.6 Conceptual Probable Capital Costs

The following estimates of conceptual probable capitol costs are provided to aid in the cost benefit analysis of each alternative. The costs are based on bid tabs available for recent construction projects throughout south Florida. Projects local to Fort Lauderdale were given much greater consideration in the development of the conceptual cost estimations.

7.5.6.1 Alternative No. 1 - System Maintenance

The first alternative analyzed was general maintenance of the collection and conveyance system. The costs associated with cleaning the system, most likely utilizing vacuum trucks and high pressure water jetting, was derived based on unit costs made available by the FDOT. The cost was per linear foot (lf) and varied based on pipe size as follows:

- Pipe diameter zero to twenty-four inches: $7/lf;
- Pipe diameter twenty-five to thirty-six inches: $12/lf;
- Pipe diameter thirty-seven to forty-eight inches: $16/lf;
- Pipe diameter forty-nine to sixty inches: $20.5/lf; and
- Pipe cleaning for 7′x6′ box culverts (cost extrapolated): $31/lf.

Maintenance of the approximately 4,000 linear feet of pipe located within the West Edgewood neighborhood is a very cost effective means of helping to mitigate peak flood stages. It is estimated that maintenance of the conveyance system serving West Edgewood would cost approximately $64,000, which is by far the least expensive alternative analyzed (see Section 7.5.6.5 for a conceptual cost comparison).

7.5.6.2 Alternative No. 2 - Exfiltration

The second alternative analyzed was the installation of exfiltration trench in all regions that were determined to have the appropriate topographic relief between the road surface and the groundwater table (minimum road elevation of 6′ NGVD). The conceptual cost estimate developed for installation of exfiltration trench was based off recent FDOT projects in the area, and accounts for installation of the system, but does not take into consideration the operation and maintenance (O&M) costs associated with the exfiltration trenches. It should be noted that annual O&M costs associated with exfiltration trench are often significant, ranging from 3-20 percent of the capital cost as stated in the SFWMD publication "BMPs for South Florida Urban Stormwater Management Systems", SFWMD, 2002. It is also important to note that the typical effective operational duration ranges from five to ten years for most systems due to clogging by fine particulates, and total replacement may be the only effective means of restoring the original design treatment capacity.

Capital costs associated with exfiltration trench were based on the following:

- Cost of materials, installation, and repair of roadway: $195/lf; and
- Cost of catch basins: $2,500 per.

Based on these conceptual costs it is estimated that the installation of approximately 5,575 lf of exfiltration trench along with 20 catch basins will cost approximately $1,137,000, the second most cost effective alternative analyzed for West Edgewood (see Section 7.5.6.5 for a conceptual cost comparison).

7.5.6.3 Alternative No. 3 - Recharge Wells

It was determined that the installation of stormwater recharge wells was not a feasible option for the West Edgewood neighborhood. Please refer to section 7.5.3 for a detailed discussion.

7.5.6.4 Alternative No. 4 - Storage Facility

The development of a regional stormwater treatment facility was analyzed as Alternative No. 4. The conceptual cost analyses took into account excavation, control structures, pump stations and associated backup power (if necessary), the collection and conveyance system, as well as any necessary earth work associated with developing facility berms. It is important to note that the cost estimate did not include the cost associated with land acquisition. Capital costs associated with development of a regional stormwater facility were based on the following:

- Cost of excavation: $9/CY;
- Cost of Control Structure: $5,000 per;
- Cost of piping was based on pipe size: 15-inch RCP = $78/lf;
- Cost of catch basins: $2,500 per; and
- Cost of earthwork associated with a 1′ high berm: $4.5/lf.

The development of the conceptual wet detention facility would result in a cut volume of 84,000 CY, a 1,900 lf berm, and the installation of a collection system consisting of approximately 3,500 lf of pipe and 20 catch basins. The conceptual cost associated with development of this facility is approximately 1.6 million dollars, the most expensive of the original four alternatives examined (see Section 7.5.6.5 for a conceptual cost comparison). This cost is associated with the development of the northern wet detention facility and collection system shown in Figure 7-12. It should again be noted that this cost does not include the acquisition of the land required for the facility.

Costs associated with development of the southern dry detention facility are based on the same assumptions as laid out above. Due to the decreased cut volume associated with the dry facility, the conceptual cost associated with developing the southern stormwater treatment area is approximately one million dollars. It should be noted that this cost does not include the price associated with land acquisition.

7.5.6.5 Alternative No. 5 - Combination of Alternative Nos. 2 and 4

In an effort to provide an area-wide solution to flooding the fifth alternative was developed. This scenario evaluates the combination of Alternative No. 2, 5,575 lf of exfiltration trench assuming $K_s = 5x10^{-4}$, with Alternative No. 4, the 6.4 acre dry detention facility located within Edgewood Passive Park, as shown in Figure 7-13. The cost associated with this alternative are based on the assumptions set forth in Sections 7.5.6.2 and 7.5.6.4. The cost of the exfiltration system remains unchanged, while the stormwater treatment area utilized for this simulation would result in a cut volume of 36,000 CY, a 2,700 lf berm, and the installation of a collection system consisting of approximately 4,500 lf of pipe and 8 catch basins. It should be noted that it was assumed that the exfiltration trench was physically connected to the conveyance system servicing the pond.

The conceptual costs associated with this alternative, approximately 2.2 million dollars, were by far the highest of all alternatives. This is to be expected as it involves the development of two distinct best management practices. Again, it should be noted that the cost associated with the development of the storage facility does not include the cost of land acquisition.

A summary of the total estimated cost for each evaluated alternative is provided below in **Table 7-11**.

Table 7-11. Conceptual Probable Capital Costs of Evaluated Alternatives for West Edgewood.

Alternative	Estimated Cost
Alternative No. 1 - Maintenance	$64,000
Alternative No. 2 - Exfiltration	$1,137,000
Alternative No. 3 – Recharge Wells	N/A
Alternative No. 4* - North Storage	$1,589,000
Alternative No. 5* - South Storage and Exfiltration	$2,173,000

* Cost of storage facilities does not account for land acquisition

7.5.7 West Edgewood Conclusions and Recommendations

After completing the analysis of the five alternatives proposed to provide flood mitigation to the West Edgewood problem areas the following conclusions are offered:

- Results indicated that the effect of siltation is more pronounced during large storm events, which has the serious potential to lead to potential loss of life and property. This is due to the fact that the obstructed culverts on Osceola Creek are acting as throttle points during large storm events, resulting in a ripple effect of flooding throughout the area.

- The results showed exfiltration on highly conductive soils as the single alternative that provided the best reduction in peak stages and duration of flooding. It is imperative to note that due to the sensitivity of the analysis to hydraulic conductivity and the high variability of hydraulic conductivity values in the area that site specific saturated vertical and lateral hydraulic conductivity testing would be necessary prior to installation of exfiltration test to better quantify the expected performance.

- It should also be noted that the applicability of exfiltration trenches is limited in the West Edgewood area due to the low elevations. Care needs to be taken in interpreting the modeling results as the lowest lying portions of even the areas that show the most promise are still going to experience flooding. This is due to the ambient rainfall that lands on them, but the flooding should not be of the intensity and duration previously experienced.

- The installation of a stormwater storage facility is capable of locally reducing stages and meeting the desired level of service, but only to some of those areas directly connected to it via a collection and conveyance system.

- None of the alternatives analyzed were able to achieve the desired LOS in the lowest lying areas of West Edgewood. The model estimates approximately 49 acre-feet of excess runoff that results in flooding throughout West Edgewood during the 5-year storm simulation for base conditions. In order to store this volume and effectively achieve the desired LOS approximately 12 acres of storage would be required, assuming 4 vertical feet of depth. It is important to note that a single 12-acre facility would not be sufficient, rather the storage needs to be provided throughout the neighborhood, with the greatest amounts in the areas most affected by flooding (see Figure 7-10 for 5-year base condition flooding).

- In order to best alleviate the flooding in West Edgewood the alternatives need to be geographically separated. Alternative 5 shows that when flood control measures are employed throughout the neighborhood that they provide a much more comprehensive solution.

Recommendations based on performance and cost analysis:

- Routine maintenance of the existing system is recommended as a cost effective alternative to help alleviate flooding.

- Install 5,575 lf of exfiltration systems in problem areas where sufficient hydraulic conductivity exists and the ground elevation is greater than 6.0 ft NGVD.

- Exfiltration trench is a more cost effective alternative for alleviating flooding along NW 15th Avenue than installation of a northern stormwater storage facility and should be utilized if the aforementioned conditions can be met.

- Further investigation into utilizing Edgewood Passive Park as a dry detention facility should be initiated. It is suspected that the BCAD has the area earmarked to provide stormwater treatment for the pending airport expansion, but nonetheless the possibility of a joint venture should be pursued.

- Attempt to identify and acquire additional areas within the southern and western portions of the West Edgewood neighborhood for development as a regional stormwater facility. Providing additional areas to offset the loss of floodplain storage due to development in the region would allow for localized mitigation of flooding.

7.6 Progresso Alternative Evaluations

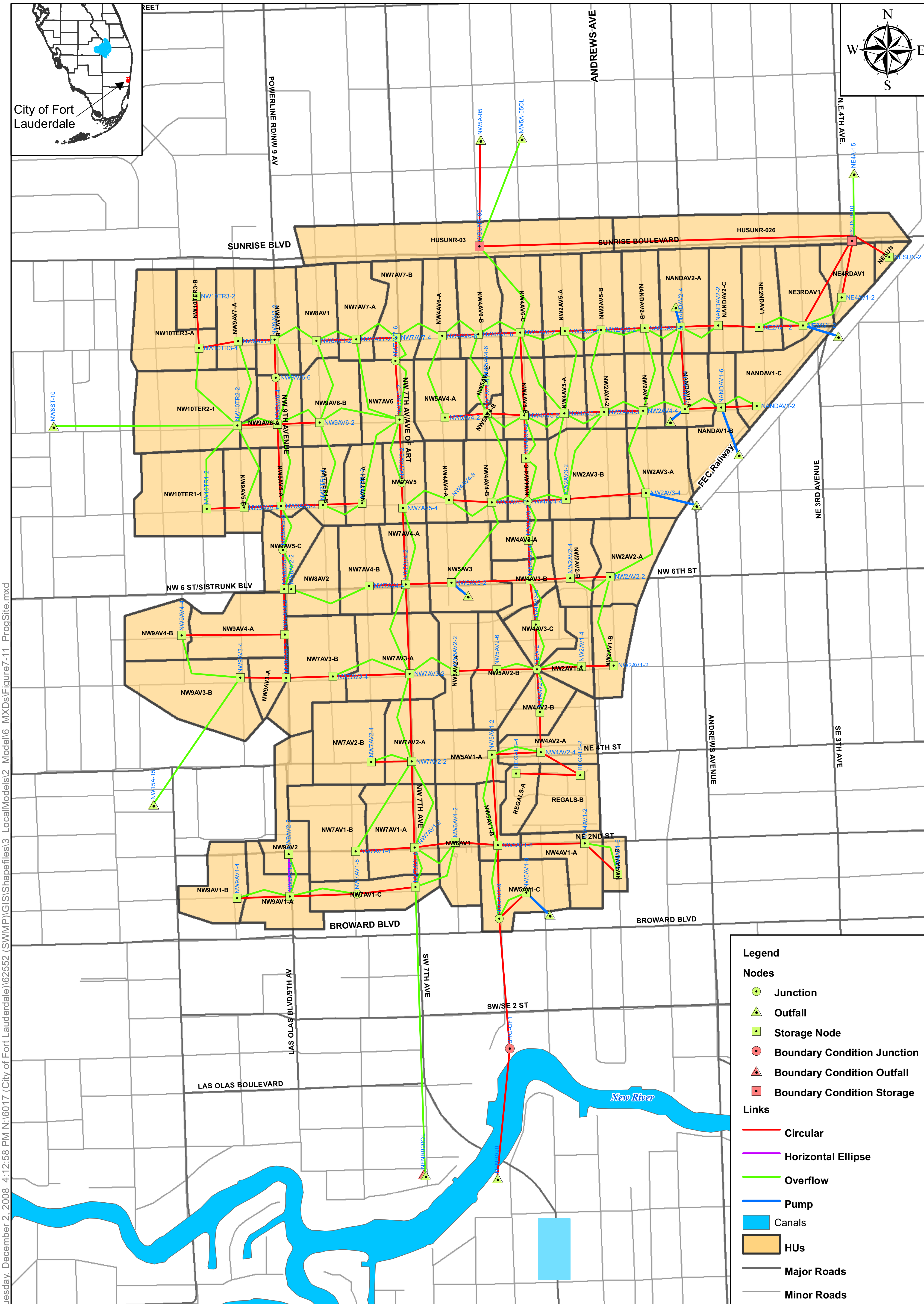
The Progresso area was the third area identified and selected for further evaluation through the use of a local model. This neighborhood covers approximately 463 acres (0.72 square miles) and was delineated using the stormwater infrastructure information provided by the City. Progresso is bounded to the north by Sunrise Boulevard, to the east by the railroad tracks of the Florida East Coast Railway, to the west by the NW 11th Avenue, and to the south by Broward Boulevard. The land use within the project area is primarily comprised by light industrial and commercial (38%) located north of Sistrunk Boulevard, high density residential (31%) distributed throughout the model area, heavy industrial (19%) distributed north of Sistrunk Boulevard and open land/vacant lots (12%).

Most of the Progresso area is drained by the existing stormwater infrastructure consisting of pipes and exfiltration trenches. The City has been implementing some exfiltration systems as part of Waterworks 2011 projects, which have been phasing out septic tanks and installing new sewer systems.

According to topography, residential and commercial areas located in the northeast sector of the neighborhood are low-lying areas with high flooding potential, primarily along NW 8th and 9th Streets and NW 4th Avenue, where a major stormwater conveyance system is located with pipe sizes varying from 2.5 ft to 4 ft in diameter. **Figure 7-14** displays the site map and local model schematic for the Progresso neighborhood.

Boundary Conditions

Five boundary conditions were extracted from the regional model for the Progresso model and placed in the following model nodes (all boundary conditions have five hydrographs (or stage time series), one for each design storm) :



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Source: City of Fort Lauderdale

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Figure 7-14
City-Wide Stormwater Master Plan
Progresso Neighborhood Site Map

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- WSUNR-05 / NW5A-05;
- NE4A-15;
- NW8ST-10;
- NW15A-15; and
- NFNR020.

According to regional model simulations, overland flow coming from north of the project area is expected to overtop the topographic high of Sunrise Boulevard for the design storms and flow into the project area. Additionally, the regional model predicts flows out of the project area, north through the stormwater pipes along NW 5th Avenue. Therefore, this model has been developed with two boundary conditions in the vicinity of model node WSUNR-05.

These include inflow hydrographs at this node representing regional flows into the area from the north, and pipe/overflow links to outfalls NW5A-05 and NW5A-05OL, which have stage time series from the regional model (see Section 7.2.2 for further discussion of boundary condition outfalls).

The regional model predicts overland flow from the northeast corner of the model, near node ESUNR-10, north to node NE4A-15, which becomes an outfall in the local model. The stage time series from the regional model at this node was used as the outfall boundary condition. The link between ESUNR-10 and the outfall is the overflow conduit from the regional model.

The regional model predicts overland flow from the northwest side of the model, near node NW10TR2-2, west to node NW8ST-10, which becomes an outfall in the local model. The stage time series from the regional model at this node was used as the outfall boundary condition. The link between NW10TR2-2 and the outfall is the overflow conduit from the regional model.

Also, the regional model predicts overland flow from the southwest side of the model, near node NW9AV3-4, southwest to node NW15A-15, which becomes an outfall in the local model. The stage time series from the regional model at this node was used as the outfall boundary condition. The link between NW9AV3-4 and the outfall is the overflow conduit from the regional model.

Finally, the regional model predicts both pipe flow along NW 5th Avenue and overland flow from the south side of the model, near node NW7AV1-6, south to the New River, represented by node NFNR020 which becomes outfalls NFNR020 and NFNR020OL in the local model. These outfalls use stage time series from the regional model as boundary conditions (see Section 7.2.2 for further discussion of boundary condition outfalls).

Model Setup

The base condition of the Progresso Neighborhood Model consists of 84 HUs, 93 nodes of which 84 are storage nodes, 14 outfalls of which 7 are used to represent existing exfiltration, and 191 links of which 7 are pump-type links also used in representing existing exfiltration (see Section 7.3.2 for a description of how pump-type links are used to model exfiltration). The Progresso Site Map, Figure 7-14, also displays the model schematic of these features.

The HUs were delineated using the stormwater infrastructure information provided by the City, such as inlets, manholes, junctions, and pipes. The Progresso model is more refined than the previous models because it was necessary to define a HU for every end-of-pipe, 12-inches and diameter and greater, in the system. Therefore, the HUs are defined in this model at the catchment level. Even though the primary source of delineation of HUs was the available stormwater GIS data, divisions between adjacent inlets and pipes draining to different parts of the system were delineated based on topography.

DCIA values were reviewed for Progresso by visually inspecting available high resolution aerial photography. The results of this inspection were, for all land uses, similar to the values used in the regional model except for high density residential (HDR). For HDR, which in this area is a mixture of medium density residential (MDR) and HDR, a value of 55 percent DCIA is used, as opposed to 65 percent DCIA that was used in the regional model.

In addition to the GIS information provided by the City, information from previous CDM work in the Progresso neighborhood of sanitary sewer and water main improvements was also used. However, this information was limited to the north portion of the Progresso neighborhood, i.e., north of Sistrunk Boulevard. Missing diameter pipe information was generally located in the most upstream locations of the watershed. Where data was missing, the estimated pipe sizes were 1.0, 1.25, or 1.5 ft in diameter based on field observations and engineering judgment.

The existing stormwater sewer network primarily consists of three major trunks, along NW 4th Avenue, NW 7th Avenue, and Powerline Road. The latter two join at NW 5th Street and continue along NW 7th Avenue to join the NW 4th Avenue trunk at NW 2nd Street. The combined systems leave the model to the south at the New River boundary condition. The primary trunk in the model is the one along NW 4th Avenue, which collects stormwater from low lying areas south of Sunrise Boulevard along NW 8th and 9th Streets starting with a 2.5 ft diameter pipe, continues with 3 ft diameter pipe south of NW 8th Street, becomes a 4-ft diameter pipe at NW 5th Lane, and leaves the Progresso neighborhood via a 6-ft diameter pipe. Inverts at some locations of these major trunks were missing and thereby were estimated based on topography and engineering judgment.

Existing exfiltration trenches in the Progresso neighborhood were identified from the stormwater GIS layer and the previous CDM work in the area, where some of these systems were proposed and constructed for stormwater improvements along NW 8th Street and Andrews Avenue.

Model Objectives

The base model and the regional model indicate significant flooding potential on the north portion of the Progresso neighborhood, especially north of Sistrunk Boulevard and east of NW 6th Avenue. Most of the alternatives focused on reducing the severe flooding expected in this area, which is a combination of residential and commercial land uses.

Base Model Results

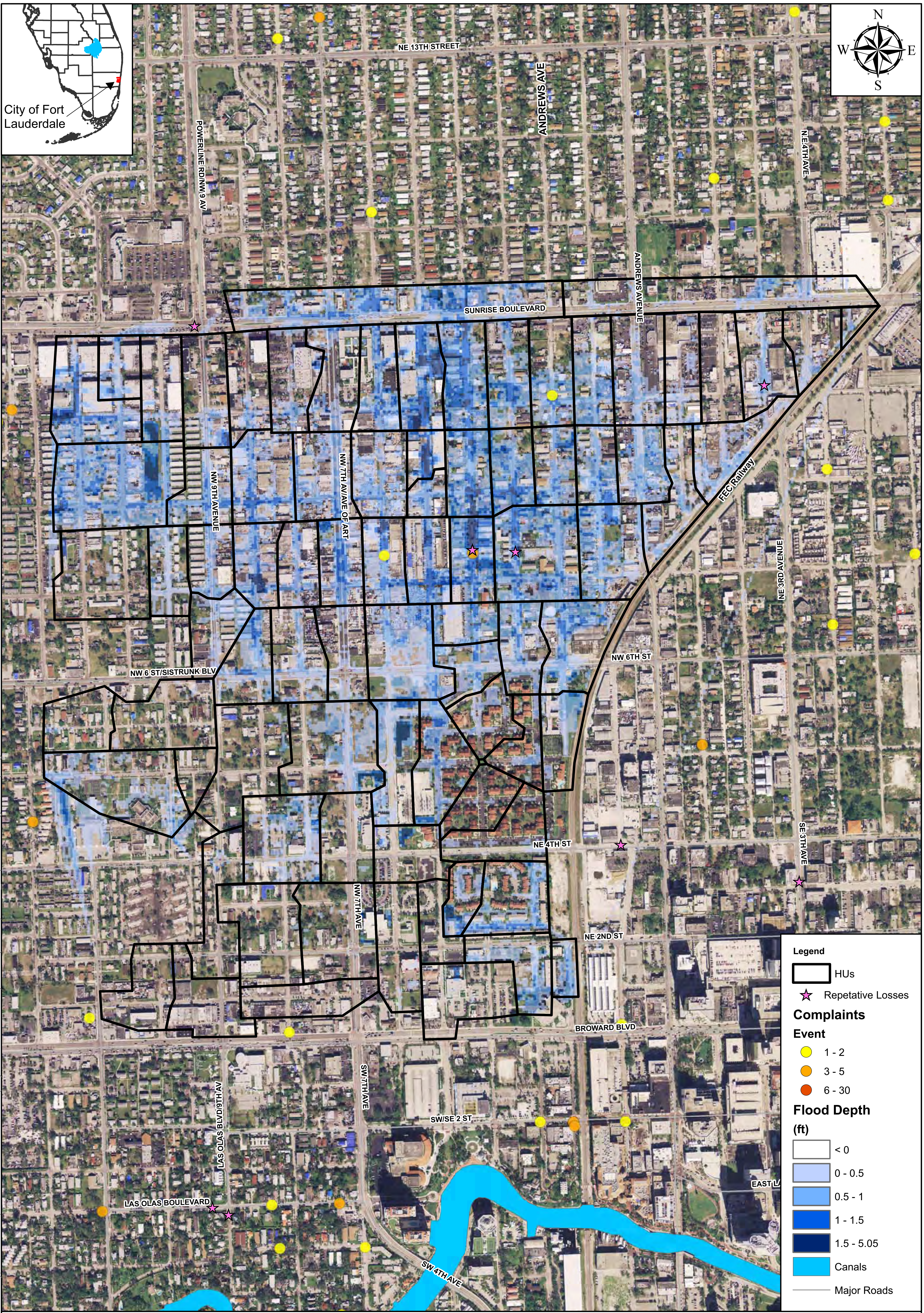
Simulations of the base model for the Progresso Neighborhood were run for the 2-year, 24-hour; 5-year, 24-hour; 10-year, 24-hour; 25-year, 72-hour; and 100-year, 72-hour SFWMD design storms. The results of these simulations are in **Appendix 7E** in Table 7E-1. **Figure 7-15** displays the approximate extents of flooding in Progresso for the 5-yr, 24-hour design storm event.

This map shows approximately where the simulated peak stages intersect the topography for problem area verification and identification. The figure also shows the locations of repetitive loss claims and complaints that were provided by the City of Fort Lauderdale and discussed in Section 2 of this report.

7.6.1 Alternative 1 - Maintenance

Alternative No. 1 is an evaluation of the existing PSMS under varying degrees of maintenance as described in Section 7.3.1. The Progresso Model provides no exceptions to the general methodology discussed in Section 7.3.1. Tables of peak stage per model junction, and differences from the base model are provided in Appendix 7E in Tables 7E-2 through 7E-4. The model node description/reference elevation location may be found in Table 7E-1 in Appendix 7E.

The results indicate that, for the 5-year storm, flood stages are expected to increase as much as 0.3 ft at certain nodes for the 10% silted condition, and as much as 0.6 ft for the 30% silted condition. At the same time, for the same levels of siltation, the effect of any given silted condition decreases for less frequent (higher intensity) storms, for which street flooding and overland flow is characteristic. Therefore, the effect of siltation is more pronounced in the 2-year storm where 0.6 ft and 1.4 ft increases of peak stages are expected at some model nodes for 10% and 30% silted conditions, respectively. These peak stage increases suggest that not maintaining the system may significantly decrease the LOS for the more frequent storms. For the 2-year storm, the model estimates that 6 nodes that were initially complying with the established LOS of 3 inches above the reference elevation, would no longer comply under the 30% silted condition. The model predicts an average increase of 0.4 ft in peak stage in all the nodes for this scenario.



Source: City of Fort Lauderdale

Feet
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CDM	City of Fort Lauderdale 100 North Andrews Avenue Fort Lauderdale, Florida 33301 Tel # (954) 828-5000	**Figure 7-15** City-Wide Stormwater Master Plan Simulated Peak Flood Map for Progresso 5-Year, 24-Hour Storm	UPDATED 12-08-08

The results also predict a reduction of the peak stages at eight nodes in the model. This reduction is due to flow that is backed up in upstream locations, retarding the arrival of water from these locations.

7.6.2 Alternative 2 - Exfiltration

For this alternative, 16,350 lf of exfiltration trenches were added to twenty-nine HUs in the area of Progresso where the base model indicates that flooding is likely to exist for the 5-year, 24 hour design storm, and where there is no existing exfiltration. These HUs were mostly located north of Sistrunk Boulevard and in selected locations in the south portion of the project area. **Figure 7-16** shows the location of proposed exfiltration trenches in the Progresso Neighborhood.

7.6.2.1 Alternative No. 2 Implementation

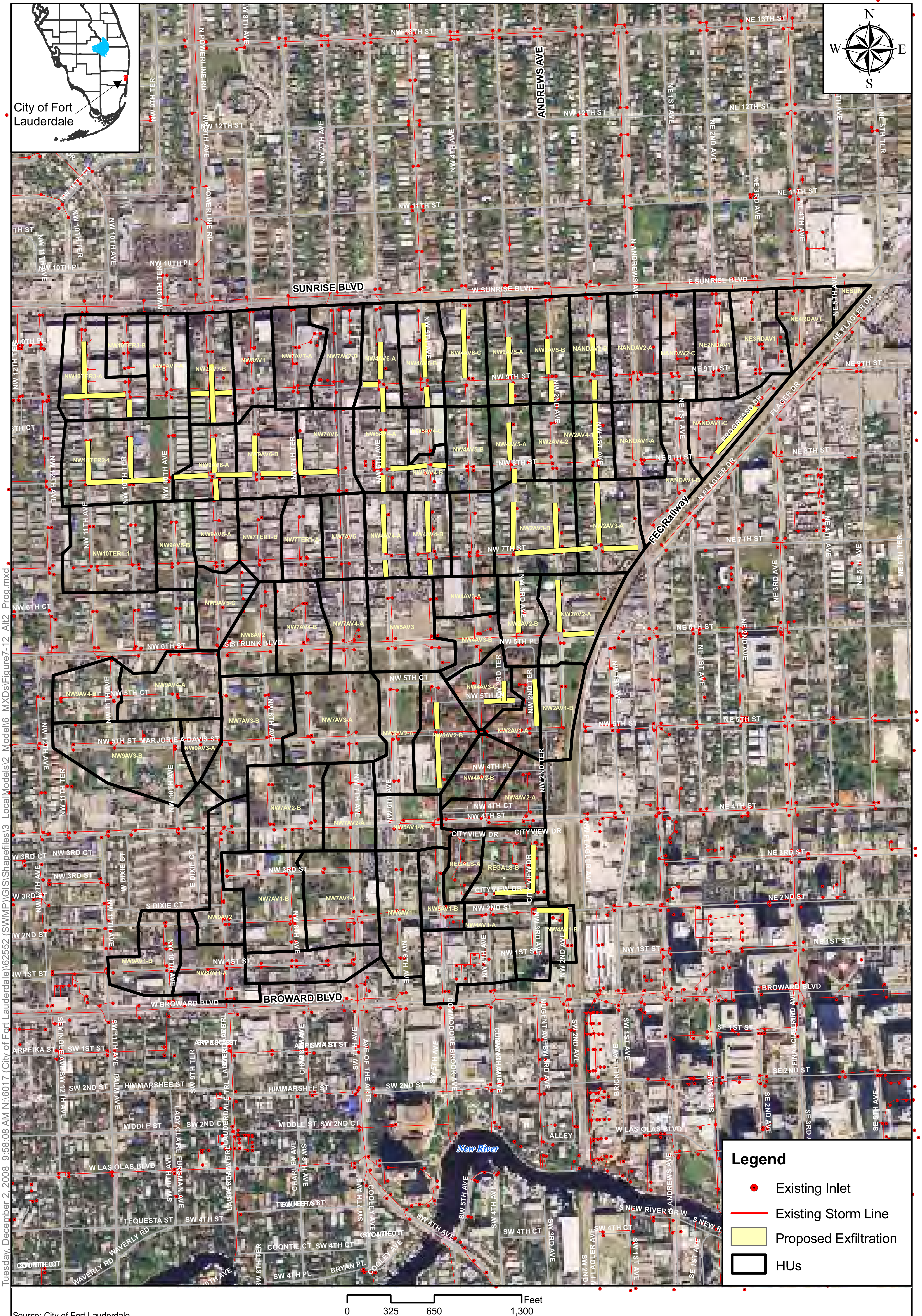
Exfiltration trenches were proposed along NW 8th and 9th Streets in the northwest portion of the neighborhood; NW 6th, 5th, 3rd, 2nd, and 1st Avenues in the northeast portion of the neighborhood; Progresso Drive on the west side of the railroad tracks; NW 2nd Terrace and Sistrunk Boulevard; and NW 2nd Avenue and NW 2nd Street.

Some of the proposed exfiltration trenches replace existing stormwater pipes in the model, namely:

- 315 ft of 19-inch by 30-inch elliptical pipe along NW 10th Avenue and Powerline Road replaces 12-inch diameter pipe;
- 553 ft of 19-inch by 30-inch elliptical pipe along NW 2nd Avenue and NW 2nd Street replaces 12-inch diameter pipe;
- 315 ft of 19-inch by 30-inch elliptical pipe along NW 5th Street between NW 5th Avenue and NW 4th Avenue replaces 15-inch diameter pipe;
- 345 ft of 19-inch by 30-inch elliptical pipe along NW 8th Street between NW 6th and 5th Avenue replaces 12-inch diameter pipe;
- 290 ft of 19-inch by 30-inch elliptical pipe along NW8th Street between NW 5th and 4th Avenue replaces 15-inch diameter pipe; and
- 330 ft of 19-inch by 30-inch elliptical pipe along NW 8th Street between Powerline Road and NW 8th Avenue replaces 15-inch diameter pipe.

The following considerations were made in locating these trenches:

- Areas with ground elevations lower than 5.5 ft NGVD were not considered for use in this alternative. The 6.0-ft cutoff was lowered in this project area to 5.5 ft because existing exfiltration trench is known to function at this level in this neighborhood.



Source: City of Fort Lauderdale

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Figure 7-16
City-Wide Stormwater Master Plan
Progresso Neighborhood
Alternative No. 2 Site Map

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12-02-08

- The trenches were oriented to capture the north overland flow coming from Sunrise Boulevard. Along many existing 12-inch diameter pipes located in the avenues intersecting Sunrise Boulevard, exfiltration trenches were proposed to replace existing pipe. These pipes are not included in the model per se, but the effect of the exfiltration trenches in the stormwater flow is.

7.6.2.2 Alternative No. 2 Results

As mentioned in Section 7.3.2, two hydraulic conductivity (K_s) values were used to simulate the response of groundwater mounding and hence, the performance of the exfiltration trenches. Table 7E-5 and Table 7E-6 in Appendix 7E show the model results for this alternative using $K_s = 1 \times 10^{-4}$ cfs/ft²/ft and $K_s = 5 \times 10^{-4}$ cfs/ft²/ft, respectively, which were found to be the range of measured K_s values in available local studies. The model node description and reference elevation location may be found in Table 7E-1 in Appendix 7E.

For a selected set of nodes located near the problem areas where most of the evaluated alternatives focus on, peak stage information and flooding duration with respect to the reference elevation for the 5-year design storm is presented in **Table 7-12** and **Table 7-13**, for both aforementioned K_s values, respectively.

Table 7-12. Flood Stages and Durations for Alternative No. 2, 5-Year 24-Hour Storm

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 2 K_s=1x10^{-4} (ft NGVD)	Peak Stage Delta (ft)	Flood Duration* Base (hrs)	Flood Duration* Alt. No. 2 K_s=1x10^{-4} (hrs)	Flood Duration Delta (hrs)
West Sector							
NW10TR2-2	5.9	6.7	6.7	0.0	24.5	23.8	0.7
NW10TR3-4	6.4	6.7	6.7	0.0	14.1	14.1	0.0
Northeast Sector							
NANDAV1-2	6.4	7.0	6.9	0.1	12.8	8.3	4.5
North Sector							
NW2AV5-2	6.0	6.8	6.8	0.0	14.2	13.3	0.9
NW4AV5-4	5.6	6.8	6.8	0.0	16.9	15.2	1.7
NW4AV6-2	5.6	6.9	6.8	0.0	17.0	15.6	1.4
NW4AV6-8	6.1	6.9	6.8	0.0	12.6	11.4	1.2
NW2AV3-2	6.2	6.8	6.8	0.0	11.2	10.4	0.8
NW2AV3-4	6.6	6.8	6.8	0.0	5.3	4.1	1.2
NW4AV3-2	6.0	6.8	6.8	0.0	13.1	12.6	0.5
NW4AV4-2	4.9	6.8	6.8	0.0	19.6	17.6	2.0
NW4AV4-8	5.9	6.8	6.8	0.0	14.9	14.2	0.7

* Approximate flood duration based on LOS depths above Reference Elevations

In general, stages are not significantly reduced with this alternative. If the site conditions result in hydraulic conductivities at the lower end of the tested envelope, the effects of LOS improvements using this alternative are expected to be minor because the duration of the flooding is only reduced by approximately 9%, on average, for the selected nodes in Table 7-12. Even for the 2-year storm, this

Table 7-13. Flood Stages and Durations for Alternative No. 2, 5-Year 24-Hour Storm

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 2 K_s=5x10^{-4} (ft NGVD)	Peak Stage Delta (ft)	Flood Duration* Base (hrs)	Flood Duration* Alt. No. 2 K_s=5x10^{-4} (hrs)	Flood Duration Delta (hrs)
West Sector							
NW10TR2-2	5.9	6.7	6.6	0.0	24.5	22.1	2.4
NW10TR3-4	6.4	6.7	6.6	0.0	14.1	13.6	0.5
Northeast Sector							
NANDAV1-2	6.4	7.0	6.8	0.2	12.8	1.5	11.3
North Sector							
NW2AV5-2	6.0	6.8	6.7	0.1	14.2	11.1	3.1
NW4AV5-4	5.6	6.8	6.8	0.0	16.9	13.8	3.1
NW4AV6-2	5.6	6.9	6.8	0.0	17.0	13.7	3.3
NW4AV6-8	6.1	6.9	6.8	0.0	12.6	10.2	2.4
NW2AV3-2	6.2	6.8	6.8	0.0	11.2	9.5	1.7
NW2AV3-4	6.6	6.8	6.7	0.1	5.3	1.6	3.7
NW4AV3-2	6.0	6.8	6.8	0.1	13.1	10.3	2.8
NW4AV4-2	4.9	6.8	6.8	0.0	19.6	15.4	4.2
NW4AV4-8	5.9	6.8	6.8	0.0	14.9	11.5	3.4

* Approximate flood duration based on LOS depths above Reference Elevations

alternative is not expected to reduce stages for more than 3 inches, although flood durations are reduced and the alternative provides water quality treatment.

For the results of the simulations using the higher hydraulic conductivities, peak stages are reduced by 2 inches on the northeast area of Progresso for the 5-year storm. In the areas dominated by overland flows at the boundaries, such as the north and west areas, the effect of implementing this alternative is minimal for reducing the 5-year design storm peak stages. However, the duration of the flooding is reduced by 26%, on average, for the selected nodes in Table 7-13.

7.6.2.3 Additional Exfiltration Tests

Exfiltration trenches were also evaluated outside of the general problem areas located north of Sistrunk Boulevard. The additional trenches were located in the southeastern sector of the project area, and are affected by neither the north nor the west boundary condition flows. The proposed exfiltration systems would replace existing stormwater pipes that are not performing at the desired LOS for the 5-year design storm, according to model simulations. These simulations were performed within the same models as those described above. The distance between the control measures was enough to allow for the separate evaluation of the areas north of Sistrunk, and these in the southeast sector of the model, using the same models. Therefore, the results of the simulations for all storms and all model nodes are within the Tables 7E-5 and 7E-6 in Appendix 7E using $K_s = 1 \times 10^{-4}$ cfs/ft^2/ft and $K_s = 5 \times 10^{-4}$ cfs/ft^2/ft, respectively, as before.

Table 7-14 summarizes the peak stages for selected nodes adjacent to these additional exfiltration trenches with respect to the expected LOS for the 5-year design storm. The LOS goals that are tested require no more than 3 inches of flooding above the reference elevation (road crown) at any time during the 5-year, 24-hour design storm.

Table 7-14. Flood Stage Reduction Comparison for Additional Exfiltration Trenches, 5-Year 24-Hour Storm.

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 2 K_s=1x10^{-4} (ft NGVD)	LOS Goal Met K_s=1x10^{-4}	Peak Stage Alt. No. 2 K_s=5x10^{-4} (ft NGVD)	LOS Goal Met K_s=5x10^{-4}
NW4AV1-6	5.9	6.8	6.7	NO	6.3	NO
REGALS-2	7.4	7.7	7.6	YES	7.3	YES
NW5AV2-6	6.7	7.1	6.8	YES	6.8	YES
NW2AV1-4	6.7	7.0	6.9	YES	6.3	YES
NW4AV3-6	6.4	6.7	6.7	YES	6.5	YES
NW2AV2-4	6.4	6.8	6.8	NO	6.6	YES
NW2AV2-2	6.4	6.8	6.8	NO	6.7	YES

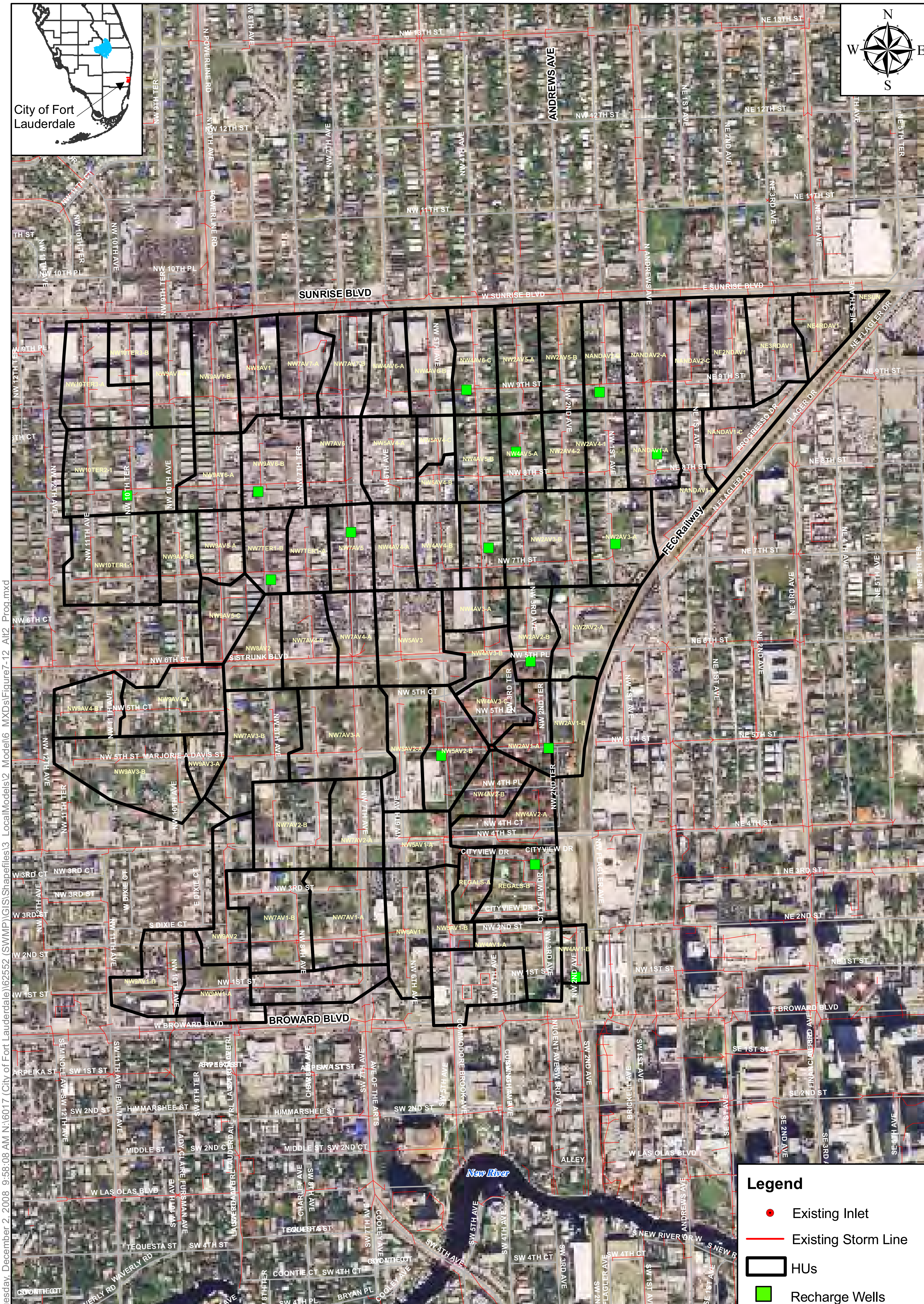
The peak stage reduction in this area was up to 6 inches for the 5-year design storm and 10 inches for the 2-year design storm. If in-situ hydraulic conductivities are near the high end of the tested envelope, the modeling predicts that the LOS goals would be met for 6 of the 7 nodes near the control measure, where all 7 did not meet the goal in the base condition. Flooding durations are not shown because at nodes where the LOS goals are met, flood durations are zero as they are based upon the goal elevation. For the node where the goal was not met, flood durations are significantly reduced.

7.6.3 Alternative No. 3 - Recharge Wells

For this Alternative evaluation, 15 recharge wells were located around the problem areas keeping a minimum distance of 700 ft between proposed wells as shown in **Figure 7-17**.

7.6.3.1 Alternative No. 3 Implementation

Section 7.3.3 describes how recharge wells were implemented in this SWMP for the four local models. The wells are located generally in the same problem areas where exfiltration trenches were also proposed in Alternative No. 2. As discussed in Section 7.3.3, there are no stand tanks or pump stations explicitly modeled in this alternative. These wells may not work as simulated if the geologic conditions are not as conductive as expected. Geological testing is recommended at each location to determine whether these components are necessary. For final design, the sites should be tested to ensure the density differences and losses in the well may be overcome, or those additional components would be necessary.



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Source: City of Fort Lauderdale

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Figure 7-17
City-Wide Stormwater Master Plan
Progresso Neighborhood
Alternative No. 3 Site Map

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Based on the likely depth to the USDW increasing to the west, the application of this alternative may be limited to the east portion of the Progresso neighborhood where the most inland side of saltwater intrusion fringe along coastline has been identified.

This alternative consists of wells at the following intersections:

1. NW 10th Terrace & NW 8th Street;
2. NW 8th Avenue & NW 8th Street;
3. NW 4th Avenue & NW 9th Street;
4. NW 1st Avenue & NW 9th Street;
5. Andrews Avenue & NW 8th Street;
6. NW 1st Avenue & NW 7th Street;
7. NW 4th Avenue & NW 7th Street;
8. NW 8th Avenue & NW 7th Street;
9. NW 3rd Avenue & NW 6th Street;
10. NW 2nd Terrace & NW 5th Street;
11. NW 5th Avenue & NW 5th Street;
12. City View Drive northeast;
13. Between NW 8th and 7th Street along NW 7th Avenue;
14. Between NW 9th and 8th Street along NW 3rd Avenue; and
15. Between NW 2nd Street and Broward Boulevard along NW 2nd Avenue.

7.6.3.2 Alternative No. 3 Results

Table 7E-7 in Appendix 7E gives the model results for this alternative. The model node description and reference elevation location may be found in Table 7E-1 in Appendix 7E. **Table 7-15** provides a summary of reduction in peak stages and flooding duration for the 5-year design storm implementing recharge well as a means of stormwater volume reduction in potential flooding areas at selected nodes.

The peak stage reduction for this alternative shown in Table 7-15 is minimal for most of the selected nodes within the problem areas. The flooding duration reduction for this alternative is better than that estimated for Alternative 1 for the lower K_s value case. On average, the duration of flooding with respect to the reference elevation is reduced by 9% for the selected nodes in Table 7-15.

Table 7-15. Flood Stages and Durations for Alt. No. 3, 5-Year 24 Hour Storm.

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 3 Recharge (ft NGVD)	Peak Stage Delta (ft)	Flood Duration* Base (hrs)	Flood Duration* Alt. No. 3 Recharge (hrs)	Flood Duration Delta (hrs)
West Sector							
NW10TR2-2	5.9	6.7	6.7	0.0	24.5	24.5	0.0
NW10TR3-4	6.4	6.7	6.7	0.0	14.1	14.1	0.0
Northeast Sector							
NANDAV1-2	6.4	7.0	7.0	0.0	12.8	12.1	0.7
North Sector							
NW2AV5-2	6.0	6.8	6.8	0.0	14.2	12.8	1.4
NW4AV5-4	5.6	6.8	6.8	0.0	16.9	14.2	2.7
NW4AV6-2	5.6	6.9	6.8	0.0	17.0	14.7	2.3
NW4AV6-8	6.1	6.9	6.8	0.0	12.6	11.9	0.7
NW2AV3-2	6.2	6.8	6.8	0.0	11.2	10.5	0.7
NW2AV3-4	6.6	6.8	6.8	0.0	5.3	4.6	0.7
NW4AV3-2	6.0	6.8	6.8	0.0	13.1	11.9	1.2
NW4AV4-2	4.9	6.8	6.8	0.0	19.6	16.0	3.6
NW4AV4-8	5.9	6.8	6.8	0.0	14.9	13.8	1.1

* Approximate flood duration based on LOS depths above Reference Elevations

7.6.3.3 Additional Recharge Wells

Recharge wells were also evaluated outside of the general problem areas located north of Sistrunk Boulevard. These areas are mostly located in the southeast portion of the neighborhood and are affected by neither the north nor the west boundary condition flows. Wells were located at locations where the base model predicts flooding for the 5-year design storm.

Table 7-16 summarizes compare the peak stages for these additional recharge wells with respect to the expected LOS for the 5-year design storm.

Table 7-16. Flood Stage Reduction for Additional Recharge Wells, 5-Year 24-Hour Storm.

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 3 Recharge (ft NGVD)	LOS Goal Met Alt No.3
NW4AV1-6	5.9	6.8	6.5	NO
REGALS-2	7.4	7.7	7.6	YES
NW5AV2-6	6.7	7.1	6.9	YES
NW2AV1-4	6.7	7.0	6.8	YES
NW4AV3-6	6.4	6.7	6.6	YES
NW2AV2-4	6.4	6.8	6.8	NO
NW2AV2-2	6.4	6.8	6.8	NO

The peak stage results presented in Table 7-16 suggests that given suitable geological conditions, recharge wells may reduce peak stages such that LOS goals are met in areas where flooding is not as severe in the existing condition. For nodes where the goals were not met, there were significant reductions in the duration of flooding.

7.6.4 Alternative No. 4 - Storage Facility and Pump Station

This alternative was concentrated in addressing the severe flooding problem area located south of Sunrise Boulevard, north of Sistrunk Boulevard, and east of NW 6th Avenue, which basically comprises the area drained by the existing NW 4th Avenue stormwater sewer system.

Three wet detention facilities were considered for this alternative. Two of them are located upstream in the watershed and were designed to capture incoming overland flow from the north near Sunrise Boulevard. Initially, these two facilities were evaluated alone. However, the peak stage and flooding duration reductions were not significant with only these two structures. Therefore, this alternative called for additional improvements in order to reduce flooding in the low lying areas along NW 8th and 9th Streets. The additional improvements consisted of larger diameter pipes and another wet detention area located just south of Sistrunk Boulevard.

7.6.4.1 Alternative No. 4 Implementation

Figure 7-18 shows the location of the proposed wet detention areas along NW 9th Street together with other alternative components.

The first wet detention facility is located between NW 1st and 2nd Avenues just north of NW 9th Street. The size of the parcel is of 1.55 acres. After considering proper set-back distances, the area at the top of the berm is 0.98 acres, providing a storage volume of 4.75 acre-feet from the top of the berm to the high water table elevation of 2.5 ft NGVD. This wet detention facility will have a permanent pool of at least 5 feet. The berm height was evaluated at 2 feet above the surrounding ground elevation. A pump and a wet well are needed to feed the storage facility. They are to be located at the node NANDAV2-6. A weir control structure with control elevation set at 8 ft NGVD will regulate the overflow at the detention facility, which will be returned to the stormwater network via a 440-ft, 18-in diameter pipe to the node NW2AV5-2 along NW 2nd Avenue.

The second wet detention facility is located between NW 3rd and 4th Avenues just south of NW 9th Street. The size of the parcel is of 0.78 acres. After considering proper set-back, the area at the top of the berm is 0.46 acres, providing a storage volume of 2.08 acre-feet from the top of the berm to the high water table elevation of 2.5 ft NGVD. This wet detention facility will have a permanent pool of at least 5 feet. The berm height was designed to be 2 feet above the surrounding ground elevation. A pump and a wet well are needed to feed the storage facility. They are to be located at the node NW2AV5-6. A weir control structure with control elevation set at 7.5 ft NGVD will regulate the overflow at the detention facility, which will be returned to

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Figure 7-18
City-Wide Stormwater Master Plan
Progresso Neighborhood
Alternative No. 4 Site Map

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Tuesday, December 2, 2008 9:58:08 AM N:\6017 (City of Fort Lauderdale)\62552 (SWMP)\GIS\Shapefiles\3_LocalModels\2_Model6_MXDs\Figure7-12_Alt2_Prog.mxd the stormwater network via a 270-ft, 18-in diameter pipe to the node NW4AV6-2 on the intersection with NW 4th Avenue.

The stormwater pipe improvements that are proposed to complement the potential benefits of this alternative are along the existing NW 4th Avenue sewer system, namely:

- Replace existing 2.5 ft pipe with 4 ft pipe between NW 9th Street and node NW4AV4-2, located between NW 8th Street and NW 7th Street.
- Replace existing 3.0 ft pipe with 5 ft pipe between node NW4AV4-2 and Sistrunk Boulevard.

The third wet detention facility is located between NW 5th and 7th Avenues just south of Sistrunk Boulevard. The size of the parcel is of 4.9 acres. After considering proper set-back distances, the area at the top of the berm is 2.68 acres, providing a storage volume of 11.8 acre-feet from the top of the berm to the high water table elevation of 2.5 ft NGVD. This wet detention facility will have a permanent pool of at least 6 feet. The berm height was designed to be 3 feet above the surrounding ground elevation. A pump and a wet well are needed to feed the storage facility.

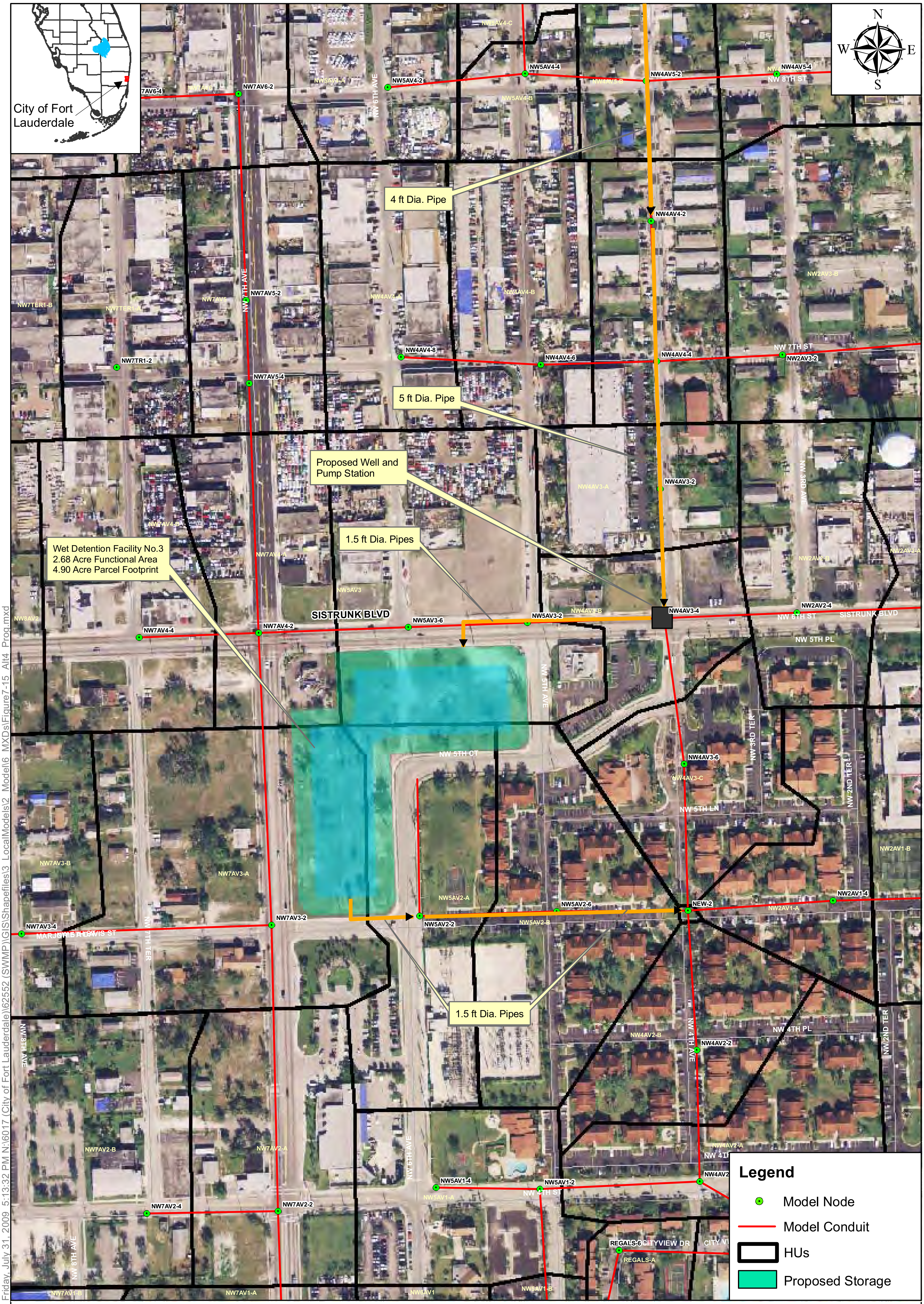
They are to be located at node NW4AV3-4. A weir control structure with control elevation set at 8.5 ft NGVD will regulate the overflow at the detention facility, which will be returned to the stormwater network via a 170-ft, 1.5 ft diameter pipe to the node NW5AV2-2 on the intersection of NW 6th Avenue and NW 5th Street. **Figure 7-19** shows the location of the third wet detention areas south of Sistrunk Boulevard together with other alternative components. The outfall connection of the third detention facility to node NW5AV2-2 would require the replacement of existing stormwater pipes with 1.5 ft diameter pipes for a length of approximately 640 ft. This

alternative calls for the installation of water level controls both in the wet well and in the wet detention facility for proper pump operation.

7.6.4.2 Alternative No. 4 Results

Table 7E-8 in Appendix 7E provides the model results for this alternative in peak stage per model junction, and differences from the base model for the five design storms. The model node description and reference elevation location may be found in Table 7E-1 in Appendix 7E.

Table 7-17 presents a summary for selected nodes of the peak stage and the flooding duration reductions associated to the implementation of this alternative. The results in Table 7-17 suggest that neither the peak stages are reduced to meet the wanted LOS nor the duration of flooding is reduced significantly. On average, the duration of flooding is reduced by 12% on the selected nodes listed in Table 7-17. This LOS is comparable to Alternative No. 3, since both provide approximately half of the reduction that could be achieved with highly hydraulic conductivity soils when exfiltration is applied in suitable locations.



Friday, July 31, 2009 5:13:32 PM N:\6017 (City of Fort Lauderdale)\62552 (SWMP)\GIS\Shapefiles\3_LocalModels\2_Model\6_MXDs\Figure7-15_Alt4_Prog.mxd

Source: City of Fort Lauderdale

CDM

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
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Figure 7-19
City-Wide Stormwater Master Plan
Progresso Neighborhood
Alternative No. 4 - South - Site Map

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Table 7-17. Flood Stages and Durations for Alternative No. 4, 5-Year 24-Hour Storm.

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 4 Storage (ft NGVD)	Peak Stage Delta (ft)	Flood Duration* Base (hrs)	Flood Duration* Alt. No. 4 Storage (hrs)	Flood Duration Delta (hrs)
West Sector							
NW10TR2-2	5.9	6.7	6.7	0.0	24.5	25.1	-0.6
NW10TR3-4	6.4	6.7	6.7	0.0	14.1	14.1	0.0
Northeast Sector							
NANDAV1-2	6.4	7.0	7.0	0.0	12.8	8.5	4.3
North Sector							
NW2AV5-2	6.0	6.8	6.7	0.1	14.2	13.4	0.8
NW4AV5-4	5.6	6.8	6.8	0.0	16.9	16.5	0.4
NW4AV6-2	5.6	6.9	6.8	0.0	17.0	16.6	0.4
NW4AV6-8	6.1	6.9	6.8	0.0	12.6	11.5	1.1
NW2AV3-2	6.2	6.8	6.8	0.0	11.2	10.2	1.0
NW2AV3-4	6.6	6.8	6.7	0.1	5.3	2.7	2.6
NW4AV3-2	6.0	6.8	6.8	0.0	13.1	11.6	1.5
NW4AV4-2	4.9	6.8	6.8	0.0	19.6	19.4	0.2
NW4AV4-8	5.9	6.8	6.8	0.0	14.9	15.5	-0.6

* Approximate flood duration based on LOS depths above Reference Elevations

Possible explanations of the lack of performance of this alternative are multiple. First, the amount of available storage is minimal compared to the volume of flood waters in the neighborhood, even for the smaller storms. Second, the downstream wet well needed for wet detention pond No. 3, even though it was sized according to the incoming flow and diameter piping, backs-up flow upstream from this location and therefore reduces the performance of the proposed system. Third, the location of wet detention pond No. 3 with respect to the problem area does not provide the maximum efficiency in flood reduction since stormwater has to be routed through the existing network first before being stored.

The peak stage reductions for the 2-year design storm and less frequent storms listed in Table 7-17 of Appendix 7C are comparable to the other alternatives previously evaluated.

7.6.4.3 Additional Storage Tests

Several combinations of stormwater improvement components were tried to achieve the desired LOS for this neighborhood. A combination that offered a slightly better reduction in peak stages was to consider only the three wet detention facilities without including the pipe improvements along NW 4th Avenue. The slight improvements to peak stages in some nodes were offset by longer flooding durations in other nodes. The pipe replacement component nearly doubled the expected reduction in flood duration and provides a better LOS.

The volume of water needed to be retained north of Sistrunk Boulevard within the NW 4th Avenue trunk sub-watershed in order to meet the LOS for the 5-year design storm is approximately 42 acre-feet. In total, the proposed system is providing 18.6 acre-ft of which 63% of it is located downstream of the problem area (i.e., wet detention pond No. 3). This is not desirable for flood control protection. If an area of the size of wet detention pond No. 3 becomes available near the problem area, which there currently is not, a better reduction in flood stages may be expected.

7.6.5 Alternative No. 5 - Combination of All

This alternative evaluates the combination of Alternative No. 2, 16,350 lf of exfiltration in highly conductive soils, with Alternative No. 3, the 15 recharge wells, and Alternative No. 4, the 18.6 acre-ft volume in three wet detention facilities and stormwater pipe improvements.

7.6.5.1 Alternative No. 5 Implementation

See Sections 7.6.2.1, 7.6.3.1, and 7.6.4.1 for alternative details and figures.

7.6.5.2 Alternative No. 5 Results

Table 7E-9 in Appendix 7E gives the results of this combined alternative in peak stage per model junction, and differences from the base model for each of the five design storms. The model node description and reference elevation location may be found in Table 7E-1 in Appendix 7E. **Table 7-18** presents a summary for selected peak stage nodes and this alternative's associated flooding duration reductions.

Table 7-18. Flood Stages and Durations of Alternative No. 5, 5-Year 24-Hour Storm.

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 5 (ft NGVD)	Peak Stage Delta (ft)	Flood Duration* Base (hrs)	Flood Duration* Alt. No. 5 (hrs)	Flood Duration Delta (hrs)
West Sector							
NW10TR2-2	5.9	6.7	6.6	0.0	25.0	23.5	1.5
NW10TR3-4	6.4	6.7	6.6	0.0	14.1	13.6	0.5
Northeast Sector							
NANDAV1-2	6.4	7.0	6.8	0.2	12.8	2.0	10.8
North Sector							
NW2AV5-2	6.0	6.8	6.7	0.2	14.1	12.2	1.9
NW4AV5-4	5.6	6.8	6.8	0.1	16.7	13.9	2.8
NW4AV6-2	5.6	6.8	6.8	0.1	17.0	14.8	2.2
NW4AV6-8	6.1	6.8	6.8	0.1	12.6	9.5	3.1
NW2AV3-2	6.2	6.8	6.8	0.1	10.8	8.8	2.0
NW2AV3-4	6.6	6.8	5.1	1.7	5.1	0.0	5.1
NW4AV3-2	6.0	6.8	6.7	0.1	13.0	9.7	3.3
NW4AV4-2	4.9	6.8	6.8	0.1	19.5	16.0	3.5
NW4AV4-8	5.9	6.8	6.8	0.1	14.7	13.3	1.4

* Approximate flood duration based on LOS depths above Reference Elevations

7.6.5.3 Additional Tests

A combination of recharge wells and exfiltration systems was considered for isolated problem areas, away from the north and west boundary conditions. The effect of upstream wet detention facilities was minimal at these locations, which are generally located in the southeast portion of the Progresso neighborhood. **Table 7-19** provides a comparison of peak stages estimated for this alternative with respect to Alternative No. 2 in highly conductive soils.

Table 7-19. Flood Stage Reduction in Additional Locations for Alternative No. 5, 5-Year 24-Hour Storm.

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 2 K_s=5x10^{-4} (ft NGVD)	LOS Goal Met Alt No. 2 K_s=5x10^{-4}	Peak Stage Alt. No. 5 (ft NGVD)	LOS Goal Met Alt No.5
NW4AV1-6	5.9	6.8	6.3	NO	5.4	YES
REGALS-2	7.4	7.7	7.3	YES	7.3	YES
NW5AV2-6	6.7	7.1	6.8	YES	6.9	YES
NW2AV1-4	6.7	7.0	6.3	YES	5.9	YES
NW4AV3-6	6.4	6.7	6.5	YES	6.6	YES
NW2AV2-4	6.4	6.8	6.6	YES	6.4	YES
NW2AV2-2	6.4	6.8	6.7	YES	4.2	YES

Table 7-19 indicates that given adequate site conditions for recharge and the higher exfiltration rates, the LOS goals could be met with these two alternatives combined. There is a slight improvement in peak stage reduction compared to Alternative No. 2 alone, and there is predicted to be significant improvement in node NW4AV1-6.

7.6.6 Conceptual Probable Capital Costs

The costs of the required components for each alternative were quantified to allow for a cost based comparison. The costs are based on bid tabs available for recent construction projects throughout south Florida. Projects local to Fort Lauderdale were given much greater consideration in the development of the conceptual cost estimations.

7.6.6.1 Alternative No. 1 - System Maintenance

The first alternative analyzed was general maintenance of the collection and conveyance system. The costs associated with cleaning the system, most likely utilizing vacuum trucks and high pressure water jetting, was derived based on unit costs made available by the FDOT. The cost was per linear foot (lf) and varied based on pipe size as follows:

- Pipe diameter zero to twenty-four inches: $7/lf;

- Pipe diameter twenty-five to thirty-six inches: $12/lf;
- Pipe diameter thirty-seven to forty-eight inches: $16/lf; and
- Pipe diameter forty-nine to sixty inches: $20.5/lf.

Maintenance of the approximately 85,800 linear feet of pipe located within the Progresso neighborhood is a very cost effective means of helping to mitigate peak flood stages. Diameter information was not available from the GIS layer for 51 percent of the existing pipes within Progresso; therefore, it was assumed that their diameters are between 8 and 24 inches, which share the same unit cost for cleaning. It is estimated that maintenance of the conveyance system serving Progresso would cost approximately $700,000, which is by far the least expensive alternative analyzed (see Section 7.6.6.4 for a conceptual cost comparison).

7.6.6.2 Alternative No. 2 - Exfiltration

The second alternative analyzed was the installation of exfiltration trench in all regions that were determined to have the appropriate topographic relief between the road surface and the groundwater table. The conceptual cost estimate developed for installation of exfiltration trench was based off recent FDOT projects in the area, and accounts for installation of the system, but does not take into consideration the operation and maintenance (O&M) costs associated with the exfiltration trenches. It should be noted that annual O&M costs associated with exfiltration trench are often significant, ranging from 3-20 percent of the capital cost as stated in the SFWMD publication "BMPs for South Florida Urban Stormwater Management Systems", SFWMD, 2002. It is also important to note that the typical effective operational duration ranges from five to ten years for most systems due to clogging by fine particulates, and total replacement may be the only effective means of restoring the original design treatment capacity.

Capital costs associated with exfiltration trench were based on the following:

- Cost of materials, installation, and repair of roadway: $195/lf; and
- Cost of catch basins: $2,500 per.

Based on these conceptual costs it is estimated that the installation of approximately 16,350 lf of exfiltration trench along with 160 catch basins will cost approximately $3,600,000 (see Section 7.6.6.4 for a conceptual cost comparison).

7.6.6.3 Alternative No. 3 - Recharge Wells

Alternative No. 3 analyzed the affects of installing gravity recharge wells throughout the areas. The cost of the recharge wells was based on local experience with drillers and accounts for all materials and labor required to install the wells. Capital costs associated with recharge wells were based on the following:

- Cost of materials, labor, and installation of 12-inch diameter well: $100,000/per well.

Based on these conceptual costs it is estimated that the installation of approximately 15 gravity recharge wells will cost approximately 1.5 million dollars (see Section 7.6.6.4 for a conceptual cost comparison).

For Alternative No. 3, the lump sum cost was estimated for a 12-inch diameter well to 200 ft below surface. For this conceptual analysis, the gravity well consists of a catchment attached to the well casing. If it is determined that additional driving head is needed it can be provided by using a small pump to lift water into an elevated stand tank, thereby artificially generating the head required to overcome the density differential of the fluids and the losses in the well. The costs associated with this option typically preclude it from wide-spread applicability. Additionally, locating the pump stations and stand tanks may be problematic in some neighborhoods. Approximate costs associated with generating additional head, exclusive of the cost of the well, are as follows:

- Cost of pump and fittings: $150,000 per;
- Cost of elevated Storage Distribution Structure: $75,000 per; and
- Standby Power, Fuel, Level Controls, Conduit, P/I&C: $100,000 per.

This raises the potential cost of implementing Alternative No. 3 to 6.4 million dollars, which would make this alternative the most expensive single alternative for Progresso.

7.6.6.4 Alternative No. 4 - Storage Facility

The development of a regional stormwater treatment facility was analyzed as Alternative No. 4. The conceptual cost analyses took into account excavation, control structures, pump stations and associated backup power (if necessary), the collection and conveyance system, as well as any necessary earth work associated with developing facility berms. It is important to note that the cost estimate did not include the cost associated with land acquisition. Capital costs associated with development of a regional stormwater facility were based on the following:

- Cost of excavation: $9/CY;
- Cost of Control Structure: $5,000 per;
- Cost of Pump Station: $550,000 per;
- Cost of Standby Power: $200,000 per;
- Cost of piping was based on pipe size: 15-inch RCP = $78/lf; 18-inch RCP = $90/lf; 48-inch RCP = $296/lf; 60-inch RCP = $486/lf ;

- Cost of catch basins: $2,500 per; and
- Cost of earthwork associated with a 2′ high berm: $6/lf.

There are three wet detention facilities to be developed as part of this alternative. Collectively they consist of 3 pump stations with associated standby power, a cut volume of 380,900 CY, 3,400 lf of berm, and the installation of a collection system consisting of approximately and 4,500 lf of pipe. The conceptual cost associated with development of these facilities is approximately 5.2 million dollars (see Section 7.6.6.4 for a conceptual cost comparison). This cost is associated with the development of the stormwater storage facilities and collection system shown in Figures 7-18 and 7-19. It should again be noted that this cost does not include the acquisition of the land required for the facility.

A summary of the total estimated cost for each evaluated alternative is provided below in **Table 7-20**.

Table 7-20. Conceptual Probable Capital Costs of Evaluated Alternatives for Progresso.

Alternative	Estimated Cost
Alternative No. 1 - Maintenance	$700,000
Alternative No. 2 - Exfiltration	$3,600,000
Alternative No. 3 - Recharge Wells (without/with PS Facilities)	$1,500,000/$6,400,000
Alternative No. 4* - Storage	$5,200,000
Alternative No. 5* - Combined (without/with PS Facilities)	$10,300,000/$15,200,000

* Cost of storage facilities does not account for land acquisition

7.6.7 Progresso Conclusions and Recommendations

After evaluating the four alternatives proposed to reduce peak stages and flooding duration in the identified problem areas, thereby complying with the established LOS for 5-year storm, the following conclusions/recommendations are offered:

- Routine maintenance of the existing system is recommended to prevent further deterioration of the currently provided LOS. Results indicated that the effect of siltation is more pronounced in frequent storms (i.e., 2-year storms and smaller), which could constitute in a periodic nuisance for local residential neighborhoods.
- Recharge (gravity) wells provided a better reduction in peak stage and duration of flooding than the exfiltration alternative for site soil conditions with poor hydraulic conductivity. The application of recharge wells instead of exfiltration for this case is subjected to suitable local subsurface geological conditions associated with discharge capacity and TDS content.
- The results showed exfiltration on highly conductive soils as the alternative that provided the best reduction in peak stages and duration of flooding. However,

this reduction was not enough to comply with the desired LOS for the 5-year design storm (i.e., 3 inches above reference elevation). Further, site specific hydraulic conductivity values need to be confirmed to determine the effectiveness of individual trenches.

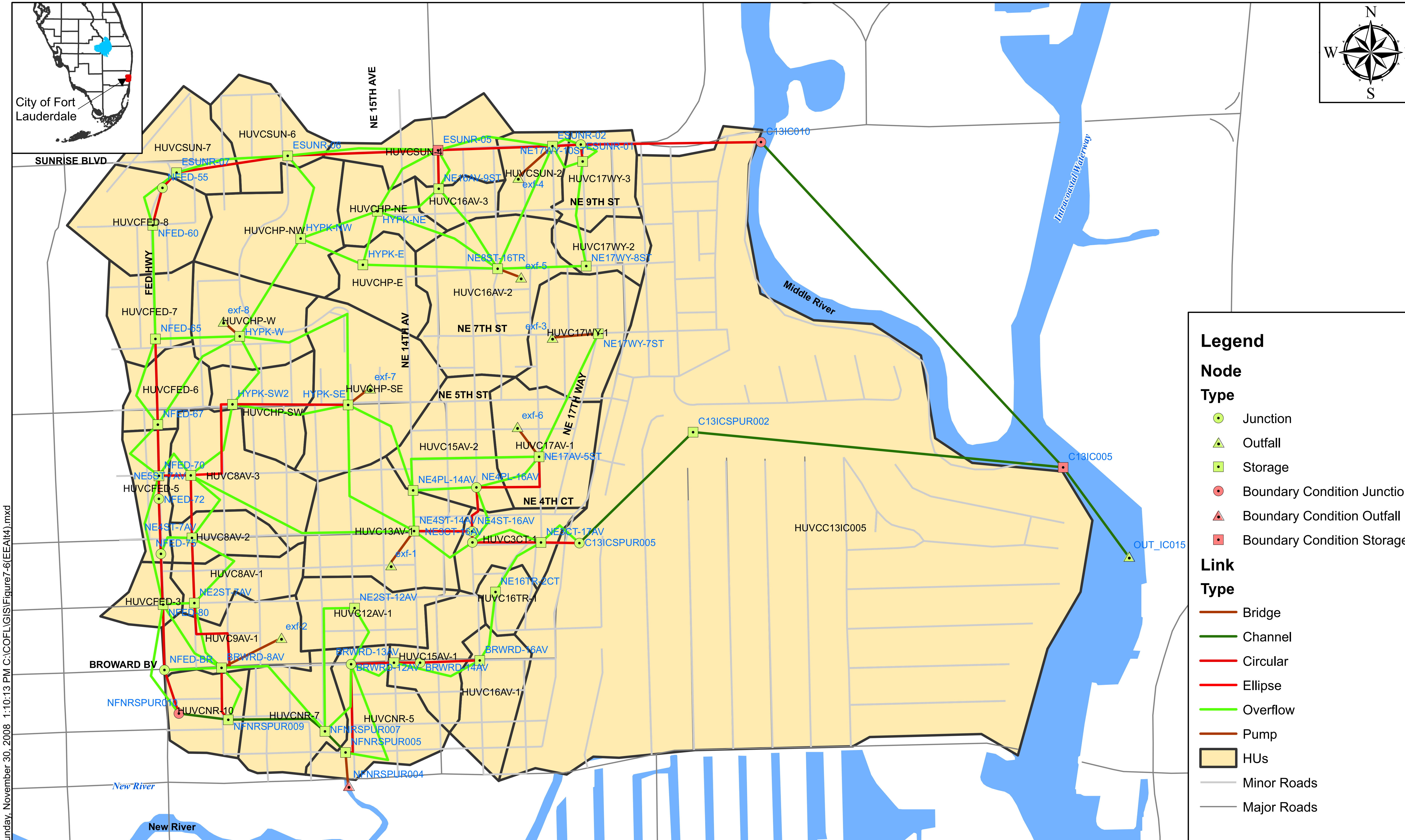
- None of the evaluated alternatives provided enough peak stage reduction to meet the desired LOS. They do however reduce the duration of flooding in the neighborhood.
- The efficiency of Alternative No. 4, the addition of storage facilities, was compromised due to the lack of available lots in the vicinity of the problem area located south of Sunrise Boulevard.
- For areas affected by neither the north nor the west overland flow boundary conditions, both recharge wells and exfiltration trenches helped reduced peak stages and flooding duration. In these areas, exfiltration trenches were effective for the full range of hydraulic conductivities simulated.

Recommendations based on cost analysis and conclusions:

- Routine maintenance of the existing stormwater network is recommended as a cost effective alternative to reduce the level of nuisance flooding due to frequent storms.
- Install 16,350 lf of exfiltration trench in problem areas where sufficient hydraulic conductivity exists and the ground elevation is greater than 5.5 ft NGVD.
- Utilize recharge wells throughout the project area, provided suitable geologic conditions exist (i.e., discharge capacity and TDS content).
- Secure vacant lots near NW 9th and 8th Street and NW 4th and 3th Avenue for potential storage in the future. Providing additional areas to offset the loss of floodplain storage due to development in the region would allow for localized mitigation of flooding.

7.7 Victoria Park Alternative Evaluations

Victoria Park, as delineated by the City, is approximately 1 square mile (668 acres) located in the central part of Fort Lauderdale and is bounded to the west by Federal Highway, to the east by the Middle River, to the north by Sunrise Boulevard and to the south by Broward Boulevard. The project area and model schematic are displayed in **Figure 7-20.** Stormwater is presently conveyed by infiltration to the groundwater table through exfiltration trenches, and by gravity drainage systems which eventually discharge into the Middle River via outfalls located at Sunrise Boulevard east of NE 20th Avenue, NE 3rd Court east of North Victoria Road and into the New River via outfalls located at Federal Highway south of Broward Boulevard, SE 8th Avenue south of Broward Boulevard, SE 11th Avenue south of Broward Boulevard and SE 12th



Source: City of Fort Lauderdale

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Fort Lauderdale, Florida 33301
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Figure 7-20
City-Wide Stormwater Master Plan
Victoria Park Site Map

UPDATED 12-02-08

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Avenue south of Broward Boulevard. In Section 3, Victoria Park was shown to have severe flooding, even for the smaller design storms, and the highest number of complaints to the City, despite the existing PSMS.

The land use within the project area is primarily single family residential, bordered by commercial areas along Sunrise Boulevard, Federal Highway and Broward Boulevard. In addition there is a municipal park, Holiday Park, with an area of 75 acres located in the northwest corner of the project area.

Flooding problems are caused mainly by large rainfall volumes, flat and isolated drainage basins, and low-lying terrain. The eastern section of the project area located near the Middle River is characterized by low elevations on the order of 2 to 6 feet NGVD. There is a ridge along North Victoria Road that rises to between 13 and 16 feet NGVD that separates this tidally influenced region from areas to the west. Elevations gradually decrease towards the west end of the project area to approximately 4 to 8 feet NGVD. Holiday Park is located in a natural low depression and this low-lying area extends south along SE 8th and SE 9th Avenues and then southwest converging at Federal Highway and NE 4th Street. Depressions, bounded by natural elevated ridges, are scattered throughout the area.

Boundary Conditions

Four major boundary conditions were extracted from the regional model for the Victoria Park neighborhood, namely:

- ESUNR-05, which is located along Sunrise Boulevard, uses inflow hydrographs (per design storm) as boundary conditions that consist of a combination of three overland flows (from the regional model) coming from north of Sunrise Boulevard into the project area.

- C13IC005, which is located in the Intracoastal Waterway/ Middle River upstream of the outfall of the Middle River Basin, uses inflow hydrographs (per design storm) as a boundary condition to load the surface runoff from regional model HUs northeast of the Middle River. The surface runoff from areas outside the local model to the Middle River may affect stages in the model.

- C13IC010, which is located in the Middle River, uses inflow hydrographs (per each design storm) to represent flow in the Middle River under the bridge at Sunrise Boulevard. These very large flows represent flow into the model from the Middle River Basin as simulated in the regional model.

- NFNRSPUR010, which is located at Federal Highway and SE 2nd Street, uses inflow hydrographs as boundary conditions, which represent combined pipe inflows from the regional model in the form of time series for each storm event.

- NFNRSPUR004, which is located a small canal (spur) that connects to the New River, is an outfall node that uses stage-time histories as boundary conditions for each storm event.

Model Setup

The project area was divided into hydrologic units based on existing topography. Where possible, the hydrologic units were isolated into individual subbasins to simulate watershed flooding in the model. For those HUs with measureable change in topography, stage-storage area relationships were developed in order to better estimate runoff and flood stages. The model contains 36 HUs, 50 nodes of which 37 are storage units, 34 pipe conduits, 62 overland flow transects, 7 open channel transects and 1 bridge structure.

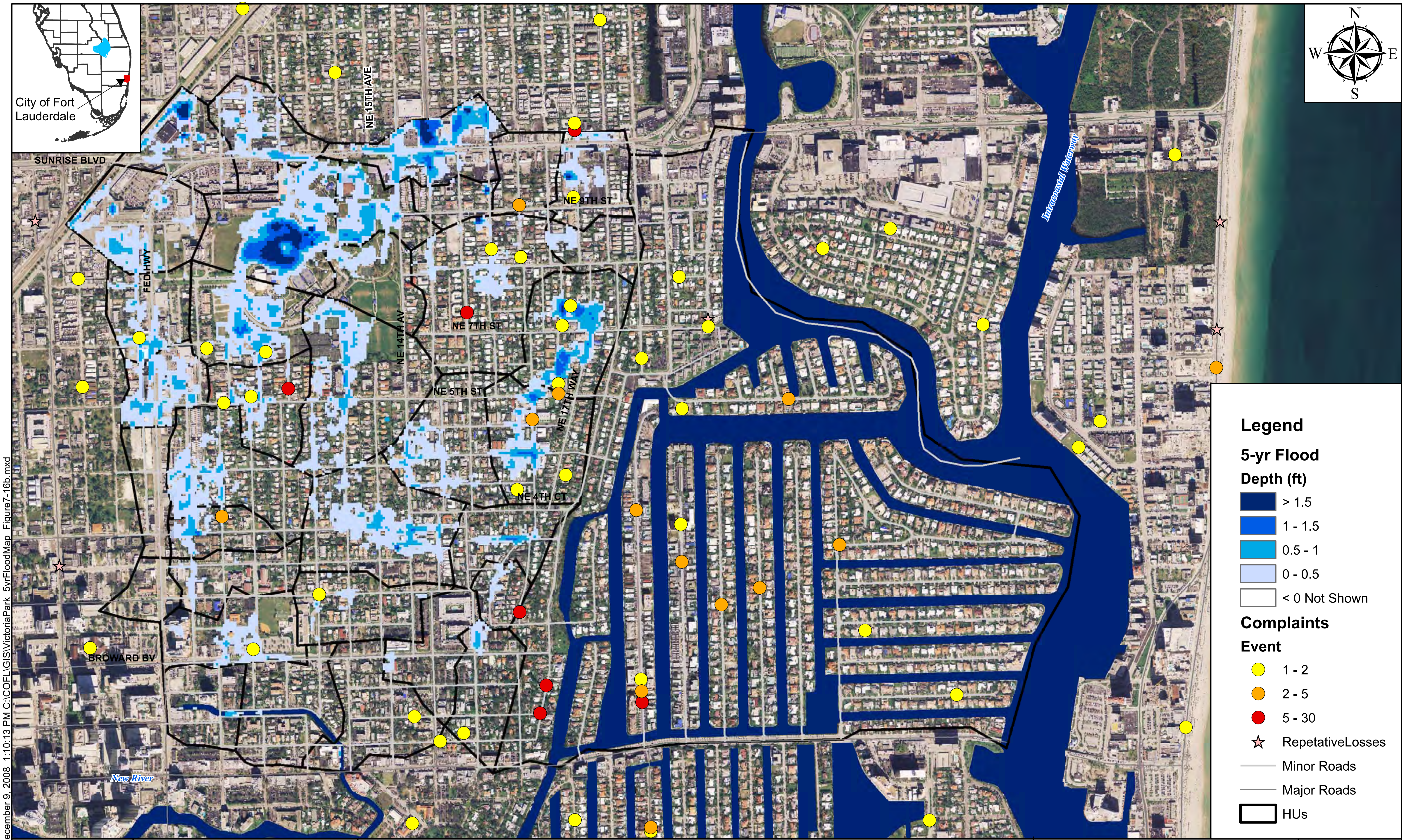
CDM evaluated the feasibility of various alternatives to alleviate flooding problems in this area. This report summarizes the evaluation, results, and recommendations for stormwater improvements for Victoria Park.

Four control measure alternatives were analyzed for Victoria Park. Alternative No. 1 evaluates maintenance of the existing stormwater collection pipes and infrastructure. Three scenarios were evaluated with pipes modeled with blockages of 10%, 20% and 30% of pipe flow capacity. Alternative Nos. 2a and 2b evaluate exfiltration in two sections of the project area. Alternative No. 3 evaluates the construction of 13 recharge wells at intersections throughout the residential neighborhoods of Victoria Park and in low areas of Holiday Park. Alternative No. 4 evaluates a wet detention storage pond and pump station located in the southwest corner of Holiday Park.

For the area along Ne 20th Avenue between NE 9th Place and NE 7th Place, adjacent to the Middle River, localized flooding is tidally influenced. This portion of the project area is characterized by low elevations on the order of 3 to 6 feet NGVD. A discussion of tidally influenced flooding in presented in Section 7.9.

Base Model Results

Simulations of the base model for Victoria Park were run for the 2-year, 24-hour; 5-year, 24-hour; 10-year, 24-hour; 25-year, 72-hour; and 100-year, 72-hour SFWMD design storms. The results of these simulations are in **Appendix 7F** in Table 7F-1. The model nodes in this table are ordered by severity of flooding above the reference elevation for the peak stage of the 5-year, 24-hour design storm. The reference elevations were found from the survey data, or LiDAR data where survey was unavailable, for local road centerlines near each model node. **Figure 7-21** displays the approximate extents of flooding in Victoria Park for the 5-yr, 24-hour design storm event. This map shows approximately where the simulated peak stages intersect the topography for problem area verification and identification. The figure also shows the locations of repetitive loss claims and complaints that were provided by the City of Fort Lauderdale and discussed in Section 2 of this report.



Source: City of Fort Lauderdale

CDM

0 1,000 2,000 4,000 Feet

City of Fort Lauderdale
100 North Andrews Ave
Fort Lauderdale, Florida 33301
Tel # (954) 858-5000

Figure 7-21
City-Wide Stormwater Master Plan
Victoria Park 5-Year Flood Map

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7.7.1 Alternative No. 1 - Maintenance of Pipes

Alternative No. 1 is an evaluation of the existing PSMS under varying degrees of maintenance as described in Section 7.3.1. The premise was to estimate the improvement of the PSMS based on cleaning of pipes and inlets. The Victoria Park Model provides no exceptions to the general methodology discussed in Section 7.3.1. The model results for the different storm events for pipe blockage are summarized in Appendix 7F in Tables 7F-2 through 7F-4. The model node description and reference elevation location may be found in Table 7F-1 in Appendix 7F. The tables indicate that the results of not maintaining the system may cause increases in peak stage of up to 1.5 feet above the current flooding levels in the neighborhood.

The pipe silting scenarios show measureable effects on peak stages for the smaller rainfall events (2-year, 5-year and 10-year storms) in the main trunk collector along Federal Highway, in NE 16th Avenue between NE 3rd Court and NE 4th Place and in NE 3rd Court between NE 16th Avenue and NE 17th Avenue. For the larger rainfall events (25-year and 100-year storms) pipe silting has a less overall effect on flooding because larger percentages of the runoff are conveyed by overland flow. It is recommended that routine maintenance be performed by the City on the PSMS to achieve better performance in existing pipes, culverts and inlets.

7.7.2 Alternative No. 2 – Exfiltration at Holiday Park

Alternative 2a evaluates adding 2,000 lf of exfiltration trench along the southwest border of Holiday Park, NE 6th Street , NE 7th Street, NE 8th Avenue and NE 10th Avenue. These streets are located in the following HUs as shown in **Figure 7-22**: HUVCHP-W and HUVCHP-SW.

Possible locations of exfiltration where flooding is expected along NE 6th Street and NE 9th Avenue were limited due to surface elevations being near or below 6.0 NGVD where exfiltration may be less effective. The proposed location in Holiday Park has plenty of open space, surface elevations that exceed 6.0 NGVD, lies just upstream from flooding areas along NE 6th Street and has the potential to capture runoff that might normally flow south to this problem area.

7.7.2.1 Alternative No. 2 Implementation

Section 7.7.2.1 describes how exfiltration has been implemented in these local models for this SWMP. The following notes are site specific:

- This alternative covers the neighborhood along NE 6th Street and NE 7th Street between NE 7th and NE 10th Avenues where exfiltration is not already in use.
- The exfiltration trenches were not placed at the lowest elevations where flooding is most severe, because the catchment rim elevations would likely be too low for the systems to be effective; therefore, the alternative has been limited to roads where elevations are greater than 6 ft NGVD.

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Figure 7-22
City-Wide Stormwater Master Plan
Victoria Park
Alternative No. 2a Site Map

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- The proposed trenches are designed to collect sheet flow along streets at higher elevations before flows settle at the lower elevations. Therefore, detailed street survey and construction plans are necessary to ensure that the sheet flow enters the catchments and that existing utilities do not conflict with proposed gravity piping to the existing PSMS.

This alternative consists of:

- 1,000 ft of 19-inch by 30-inch elliptical pipe along the southwest corner of Holiday Park just north of NE 7th Street,
- 250 ft of 19-inch by 30-inch elliptical pipe along NE 7th Street between NE 8th Avenue and NE 9th Avenue,
- 250 ft of 19-inch by 30-inch elliptical pipe along NE 6th Street between NE 7th Avenue and NE 8th Avenue,
- 250 ft of 19-inch by 30-inch elliptical pipe along NE 8th Avenue between NE 7th Street and NE 8th Street
- 250 ft of 19-inch by 30-inch elliptical pipe along NE 10th Avenue between NE 6th Street and NE 7th Street,

This represents a total of 2,000 linear feet (lf) of exfiltration trench: 1,000 lf in HUVCHP-W and 1,000 lf in HUVCHP-SW.

The alternative was not modeled with a connection to the existing PSMS. However, the 1,000 lf of exfiltration could be connected to existing infrastructure or could be designed to receive sheet flows directly from NE 7th Street and interface with the proposed 250 lf of exfiltration in NE 7th Avenue. Additionally, the proposed 250 lf of exfiltration in NE 10th Avenue could be connected to existing piping at NE 6th Street. Additional piping would be needed to connect other proposed sections of exfiltration in order to avoid low areas (where exfiltration has less effect). Control structure configuration and design would depend on the availability of space, existing conditions and survey data.

There is potential for additional exfiltration trench adjacent to the proposed system in Holiday Park. However, these locations would be further away from existing flooding problem areas and make it difficult and more expensive to connect to the existing PSMS.

7.7.2.2 Alternative No. 2 Results

As noted in Section 7.3.2, two sets of simulations were conducted for this alternative to provide an envelope of results for the unknown, site specific hydraulic conductivity. In the first set of simulations, the K_s value of 1.0×10^{-4} cfs/ft^2/ft of head was used for the five design storms. These results are presented as tables of peak stage per model junction, and differences from the base model in Appendix 7F, in

Tables 7F-5a and 5b. The model node description and reference elevation location may be found in Table 7F-1 in Appendix 7F. The LOS improvements due to this alternative are minor, if the site conditions result in hydraulic conductivities at the lower end of the tested envelope. Although this alternative results in shorter durations of flooding in these streets, the LOS for peak flood stages would likely not improve significantly if the hydraulic conductivities are low.

In the second set of simulations, the K_s value of 5.0 x 10^{-4} cfs/ft^2/ft of head was used for the five design storms. This represents the higher end of the envelope of the hydraulic conductivities that were tested, although some sites may vary significantly from these values. The results of this test are presented in Appendix 7F, in Tables 7F-5c and 5d. The LOS improvements due to this alternative ranged from 0.6 ft of improvement for the 2-year storm to only 0.2 ft for the larger storms. Again, there is not enough improvement in the reduction of peak stage during the 5-year storm to meet LOS goals. However, the results for the 2-year storm indicate that there would likely be passable roads for smaller storms if the site specific hydraulic conductivities were in the tested range. Additionally, the duration of the flooding was shortened with this alternative for all the design storms. **Table 7-21** below shows the four primary nodes near the proposed system for this alternative. The peak stages and approximate flooding duration are given. The flooding duration is measured using a set stage for each node. This stage is based on (but higher than) the nodes' reference elevations.

Table 7-21. Flood Stages and Durations for Alternative No. 2a, 5-Year, 24-Hour Storm

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 2 K_s=5x10^{-4} (ft NGVD)	Peak Stage Delta (ft)	Flood Duration* Base (hrs)	Flood Duration* Alt. No. 2 K_s=5x10^{-4} (hrs)	Flood Duration Delta (hrs)
HYPK-W	5.4	6.5	6.4	0.1	90	14	76
HYPK-SE	6.3	7.4	7.4	0.0	75	27	48
HYPK-SW2	5.3	6.2	6.0	0.2	37	13	24
NE5ST-7AV	5.1	5.7	5.6	0.1	25	15	10

* Approximate flood duration based on LOS depths above Reference Elevations

This table indicates that although the proposed alternative significantly helps reduce the duration of flooding, there would still likely be severe flooding during the 5-year, 24-hour design storm and that in many areas, the flooding would last between 13 and 27 hours.

7.7.2.3 Additional Exfiltration Tests

A second exfiltration test was performed as Alternative No. 2b, which evaluated new exfiltration near the intersection of NE 17th Way and NE 7th Street as shown in **Figure 7-23**. The proposed exfiltration system is designed to discharge to a weir (to provide treatment) before discharging to an 18-inch outfall storm pipe running east along NE

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Figure 7-23
City-Wide Stormwater Master Plan
Victoria Park
Alternative No. 2b Site Map

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7th Street. The proposed outfall pipe will continue south along NE 18th Avenue connecting to an existing outfall at Sunrise Key Boulevard just south of NE 6th Court.

This alternative consists of:

- 1,000 ft of 19-inch by 30-inch elliptical pipe along NE 17th Way, north and south of NE 7th Street;
- 830 ft of 18-inch circular pipe along NE 7th Street between NE 17th Way and NE 19th Avenue;
- 450 ft of 18-inch circular pipe along NE 19th Avenue between NE 7th Street and Karen Drive;
- 100 ft of 18-inch circular pipe along Karen Drive between NE 19th Avenue and Sunrise Key Boulevard; and
- A control structure consisting of a 5-ft long weir at an elevation of 7.5 ft-NGVD between the proposed trench system along NE 17th Way and proposed 18-inch outfall pipe in NE 7th Street.

This represents a total of 1,000 linear feet (lf) of exfiltration trench and 1,480 lf of 18-inch circular pipe. The control structure was added to keep a minimum head on the trench, to keep simulated peak stages and flow in the existing system at or below the existing conditions, and to allow for treatment for waters that eventually outfall to the Middle River.

As before, two sets of simulations were conducted for this alternative to provide an envelope of results for the unknown, site specific hydraulic conductivity.

In the first set of simulations, the K_s value of 1.0×10^{-4} cfs/ft^2/ft of head was used for the five design storms. These results are presented as tables of peak stage per model junction, and differences from the base model in Appendix 7F, in Tables 7F-6a and 6b. The model node description and reference elevation location may be found in Table 7F-1 in Appendix 7F. In the second set of simulations, the K_s value of 5.0×10^{-4} cfs/ft^2/ft of head was used for the five design storms. This represents the higher end of the envelope of the hydraulic conductivities that were tested. The results of this test are presented in Appendix 7C, in Tables 7F-6c and 6d.

Table 7-22 below shows the peak stage and approximate flooding duration for node NE17WY-7ST, the primary node near the proposed system for both hydraulic conductivity simulations. The flooding duration is measured using a set stage for the node. The LOS improvements due to these simulations were maximum reduction in peak stages of 0.4 ft and 0.6 ft for the low and high hydraulic conductivities, respectively, for the 5-year storm.

Table 7-22. Flood Stages and Durations for Alternative No. 2b, 5-Year, 24-Hour Storm

Alt 2b, Node NE17WY-7ST	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 2 (ft NGVD)	Peak Stage Delta (ft)	Flood Duration* Base (hrs)	Flood Duration* Alt. No. 2 (hrs)	Flood Duration Delta (hrs)
K_s=1x10^{-4}	7.2	8.8	8.4	0.4	60	15	45
K_s=5x10^{-4}	7.2	8.8	8.2	0.6	60	2	58

* Approximate flood duration based on LOS depths above Reference Elevations

As in the previous simulation, the table indicates that although the proposed alternative helps lower peak flood stages somewhat, there would still likely be severe flooding during the 5-year, 24-hour design storm; however, the duration of flooding would be greatly reduced from two and a half days to approximately 2 hours. This is because the location in question is an isolated neighborhood, with no positive outfall. In the base condition, seepage into the groundwater table and evaporation are the only flood relief available. No measureable downstream effects were observed for this alternative at the proposed outfall, node C13ICSPUR002.

7.7.3 Alternative No. 3 – Recharge Wells

This alternative evaluates the construction of 13 recharge wells at intersections throughout the residential neighborhoods of Victoria Park and in low areas of Holiday Park as shown in **Figure 7-24**.

7.7.3.1 Alternative No. 3 Implementation

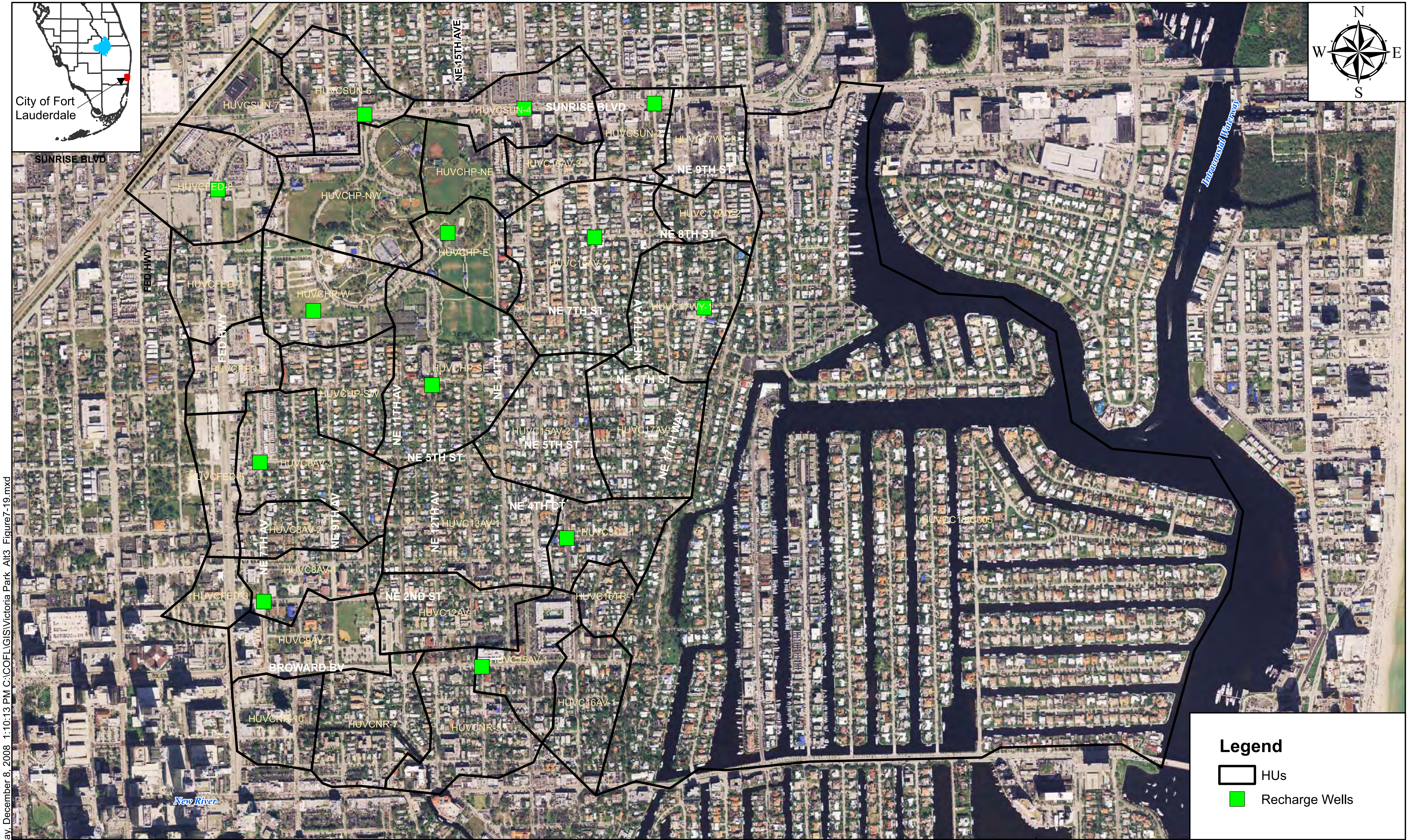
Section 7.7.3 describes how recharge wells were implemented in this SWMP for the four local models. The wells have been located approximately 1,000 feet apart.

The wells are located in areas where flooding is expected to occur, even for the smaller storms.

As discussed in Section 7.3.3, there are no stand tanks or pump stations explicitly modeled in this alternative. These wells may not work as simulated if the geologic conditions are not as conductive as expected. For final design, the sites should be tested to ensure the density differences and losses in the well may be overcome, or those additional components would be necessary.

This alternative consists of wells at the following intersections:

1. Sunrise Boulevard & NE 18th Avenue;
2. Sunrise Boulevard & NE 15th Avenue;
3. Sunrise Boulevard & NE 10th Avenue;
4. Federal Highway & NE 9th Street;



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Source: City of Fort Lauderdale

0 500 1,000 2,000 3,000 Feet

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Figure 7-24
City-Wide Stormwater Master Plan
Victoria Park
Alternative No. 3 Site Map

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5. NE 5th Street & NE 7th Avenue;
6. NE 2nd Street & NE 7th Avenue;
7. NE 6th Street & NE 12th Avenue;
8. Broward Boulevard & SE 14th Avenue;
9. NE 3rd Court & NE 16th Avenue;
10. NE 16th Terrace & NE 7th Street; and
11. NE 7th Street & NE 17th Way.

And the following locations in Holiday Park:

1. East side of Holiday Park; and
2. Southwest side of Holiday Park.

7.7.3.2 Alternative No. 3 Results

The results of this alternative are presented as tables of peak stage per model junction, and differences from the base model in Appendix 7F, in Tables 7F-7a and 7b. The model node description and reference elevation location may be found in Table 7F-1 in Appendix 7F.

The results are considerably less than those from Alternative No. 2, with many of the areas showing minimal improvement for the recharge well option. For the 5-year, 24-hour storm, peak reduction in flood stage is approximately 1 inch or less.
The reduction in the duration of flooding is expected to occur for similar magnitudes as Alternative No. 2, as flood durations with the wells in place are expected to last approximately between 15 and 25 hours, as opposed to between 20 to 65 hours in the existing condition, for the neighborhoods with the worst flooding. Since the recharge wells were targeted more to the streets with the most severe flooding, as opposed to the exfiltration in Alternative No. 2, they do tend to help the neighborhoods with the greatest needs.

Table 7-23 below shows three primary nodes near the proposed system for this alternative. The peak stages and approximate flooding duration are given. The flooding duration is measured using a set stage for each node. This stage is based on (but higher than) the nodes' reference elevations.

This table indicates that although the proposed alternative helps reduce peak flood stages somewhat, there would still likely be severe flooding during the 5-year, 24-hour design storm and that in many areas the flooding would last approximately one day.

Table 7-23. Flood Stages and Durations for Alternative No. 3, 5-Year, 24-Hour Storm

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 3 Recharge (ft NGVD)	Peak Stage Delta (ft)	Flood Duration* Base (hrs)	Flood Duration* Alt. No. 3 Recharge (hrs)	Flood Duration Delta (hrs)
NE17WY-7ST	7.2	8.8	8.7	0.1	63	25	38
NE5ST-7AV	5.1	5.7	5.7	0.0	22	17	5
HYPK-SE	6.3	7.4	7.4	0.0	40	25	15

* Approximate duration based on LOS depths above Reference Elevations

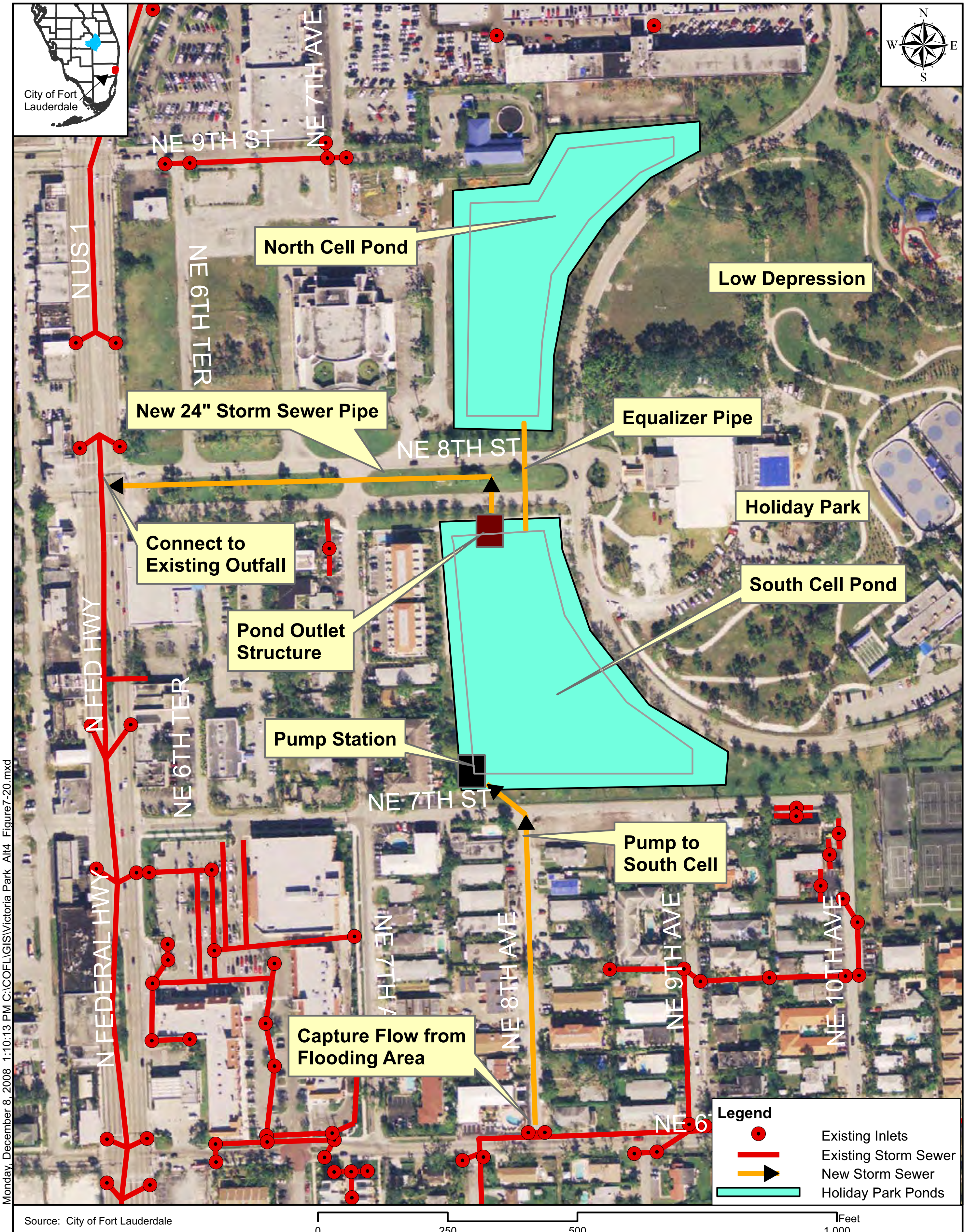
7.7.4 Alternative No. 4 - Wet Detention at Victoria Park

This alternative evaluates the construction of a 4.8 acre wet detention stormwater storage facility and a 25 cfs pump station in Holiday Park as shown in **Figure 7-25**. The pond is divided into two cells: a north cell and south cell connected by a gravity equalizer pipe to maintain water levels between the cells. In this alternative, the residential neighborhood south of Holiday Park along NE 6th Street would be connected to the pump station and storage facility by approximately 700 lf of 12-inch diameter pipe. There is a low depression in Holiday Park to the east of the proposed pond location that has no berms. Under existing conditions, there is expected to be significant flows (over 100 cfs) from the north into this low depression during the larger design storms. Therefore, this low area could not be used as the location for the pond. Instead, the proposed pond has been located in an open area of the park to the south and west of this low depression.

7.7.4.1 Alternative No. 4 Implementation

The storage facility has been proposed as a wet detention facility. The bottom of this facility is designed to be at -4.0 feet NGVD which is 6.5 feet below the high water table elevation (2.5 ft NGVD). This would allow for adequate wet storage during the dry months of the year while discouraging unwanted plant growth in the littoral zone. The facility is designed to be bermed to an elevation of 11 ft NGVD. This elevation is approximately 6 ft above the lowest land surface in the surrounding area and therefore the facility should be classified as a low-hazard structure. The maximum design height of water storage is 8 ft NGVD. This leaves 3 feet of freeboard for potential wave run-up to prevent overtopping, which should be sufficient for a facility of this size. The maximum design height would be achieved using a cutoff for the pump and an emergency spillway to the proposed outfall.

The facility includes direct piping via NE 8th Avenue to the flooded sub-basin along NE 6th Street. Intercepted flows from the corner of NE 8th Avenue and NE 6th Street will be pumped north and detained in the pond network. The proposed outlet of the pond will pipe outflows west along NE 8th Street discharging to an existing 36-inch RCP at the intersection of North Federal Highway and NE 8th Street.



Source: City of Fort Lauderdale

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Figure 7-25
City-Wide Stormwater Master Plan
Victoria Park
Alternative No. 4 Site Map

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The proposed berm is 15 ft wide with 4:1 side slopes. The proposed cut and fill are approximately 33, 000 cubic yards and 19,000 cubic yards, respectively. The difference may possibly be retained on site at the park, or sold to offset costs.

The pump station is proposed to be approximately 25 cfs and is located at the southwest corner of the facility. It is beyond the scope of this SWMP to design the pump station, but because it will be used for flood control, diesel backup generators should be included to allow for operations during power outages.

The proposed 12-inch diameter force main piping starts at the corner of NE 6th Street and NE 8th Avenue pumping north along NE 8th Avenue to a pumping station at the southwest corner of the south cell in Holiday Park.

A 24-inch diameter pipe at the pond outlet will outfall to an existing 36-inch diameter storm pipe in Federal Highway approximately 750 feet to the west.

This alternative converts a portion of Holiday Park to lake. There would likely need to be community involvement and acceptance of such a project.

7.7.4.2 Alternative No. 4 Results

Tables 7F-8a and 8b in Appendix 7F give the results of this alternative in peak stage per model junction, and differences from the base model for the five design storms. The model node description and reference elevation location may be found in Table 7F-1 in Appendix 7F.

The results indicate that this alternative improves the LOS for this neighborhood better than the previous alternatives, but that LOS goals are not met and that significant flooding would still be expected throughout the neighborhood for most of the design storms. Flooding would still be expected under these conditions along NE 6th Street (node HYPK-SW2).

Table 7-24 below shows four primary nodes near the proposed system for this alternative. The peak stages and approximate flooding duration are given. The flooding duration is measured using a set stage for each node. This stage is based on (but higher than) the nodes' reference elevations.

Table 7-24 Alternative No. 4, 5-year storm, Wet Detention at Holiday Park

Nodes Near Control Measure	Reference Elevation (ft NGVD)	Peak Stage Base Model (ft NGVD)	Peak Stage Alt. No. 4 Storage (ft NGVD)	Peak Stage Delta (ft)	Flood Duration* Base (hrs)	Flood Duration* Alt. No. 4 Storage (hrs)	Flood Duration Delta (hrs)
HYPK-SW2	5.3	6.1	6.0	0.1	30	5	25
NE4ST-7AV	5.0	5.7	5.6	0.1	18	14	4
NE5ST-7AV	5.1	5.7	5.6	0.1	23	18	5

* Approximate flood duration based on LOS depths above Reference Elevations

7.7.5 Conceptual Probable Capital Costs

The costs of the required components for each alternative were estimated to allow for a cost based comparison. The costs are based on bid tabs available for recent construction projects throughout south Florida. Projects local to Fort Lauderdale were given much greater consideration in the development of the conceptual cost estimations.

7.7.5.1 Alternative No. 1 - System Maintenance

The first alternative analyzed was general maintenance of the collection and conveyance system. The costs associated with cleaning the system, most likely utilizing vacuum trucks and high pressure water jetting, was derived based on unit costs made available by the FDOT. The cost was per linear foot (lf) and varied based on pipe size as follows:

- Pipe diameter zero to twenty-four inches: $7/lf;
- Pipe diameter twenty-five to thirty-six inches: $12/lf;
- Pipe diameter thirty-seven to forty-eight inches: $16/lf; and
- Pipe diameter forty-nine to sixty inches: $20.5/lf.

Maintenance of the approximately 70,000 linear feet of pipe located within the Victoria Park neighborhood is a very cost effective means of helping to mitigate peak flood stages. It is estimated that maintenance of the conveyance system serving Victoria Park would cost approximately $840,000 (see Section 7.7.6.4 for a conceptual cost comparison).

7.7.5.2 Alternative No. 2 - Exfiltration

Alternative 2a evaluated the addition of 2000 lf of exfiltration trench along the southwest border of Holiday Park, NE 6th Street , NE 7th Street, NE 8th Avenue and NE 10th Avenue., in areas that were determined to have the appropriate topographic relief between the road surface and the groundwater table. The conceptual cost estimate developed for installation of exfiltration trench was based off recent FDOT projects in the area, and accounts for installation of the system, but does not take into consideration the operation and maintenance (O&M) costs associated with the exfiltration trenches. It should be noted that annual O&M costs associated with exfiltration trench are often significant, ranging from 3-20 percent of the capital cost as stated in the SFWMD publication "BMPs for South Florida Urban Stormwater Management Systems", SFWMD, 2002. It is also important to note that the typical effective operational duration ranges from five to ten years for most systems due to clogging by fine particulates, and total replacement may be the only effective means of restoring the original design treatment capacity.

Capital costs associated with exfiltration trench were based on the following:

- Cost of materials, installation, and repair of roadway: $195/lf; and
- Cost of catch basins: $2,500 per.

Based on these conceptual costs it is estimated that the installation of approximately 2,000 lf of exfiltration trench along with 4 catch basins will cost approximately $400,000 (see Section 7.7.6.4 for a conceptual cost comparison). For Alternative 2b, which evaluated the installation of approximately 1,000 lf of exfiltration trench, 4 catch basins, a control structure and associated piping near the intersection of NE 17th Way and NE 7th Street, the conceptual cost are expected to be $345,000, the least expensive alternative analyzed for Victoria Park.

7.7.5.3 Alternative No. 3 - Recharge Wells

Alternative No. 3 analyzed the affects of installing 13 gravity recharge wells throughout Victoria Park. The cost of the recharge wells was based on local experience with drillers and accounts for all materials and labor required to install the wells. Capital costs associated with recharge wells were based on the following:

- Cost of materials, labor, and installation of 12-inch diameter well: $100,000/per well.

Based on these conceptual costs it is estimated that the installation of approximately 13 gravity recharge wells will cost approximately 1.3 million dollars (see Section 7.7.6.4 for a conceptual cost comparison).

For Alternative No. 3, the lump sum cost was estimated for a 12-inch diameter well to 200 ft below surface. For this conceptual analysis, the gravity well consists of a catchment attached to the well casing. If it is determined that additional driving head is needed, it can be provided by using a small pump to lift water into an elevated stand tank, thereby artificially generating the head required to overcome the density differential of the fluids and the losses in the well. The costs associated with this option typically preclude it from wide-spread applicability. Additionally, locating the pump stations and stand tanks may be problematic in some neighborhoods. Approximate costs associated with generating additional head, exclusive of the cost of the well, are as follows:

- Cost of pump and fittings: $150,000 per;
- Cost of elevated Storage Distribution Structure: $75,000 per; and
- Standby Power, Fuel, Level Controls, Conduit, P/I&C: $100,000 per.

This raises the potential cost of implementing Alternative No. 3 to 5.5 million dollars, which would make this alternative the most expensive alternative for Victoria Park.

7.7.5.4 Alternative No. 4 - Storage Facility

The development of a regional stormwater treatment facility was analyzed as Alternative No. 4. The conceptual cost analyses took into account excavation, control structures, pump stations and associated backup power (if necessary), the collection and conveyance system, as well as any necessary earth work associated with developing facility berms. This alternative is located in the City-owned Holiday Park so there would not be any direct land acquisition costs; however, the City may be required to purchase land elsewhere to mitigate the loss of public park space. It is important to note that the cost estimate did not include the cost associated with land acquisition. Capital costs associated with development of a regional stormwater facility were based on the following:

- Cost of excavation: $9/CY;
- Cost of Control Structure: $7,000 per;
- Cost of 25 cfs Pump Station: $550,000 per;
- Cost of Standby Power: $200,000 per;
- Cost of piping was based on pipe size: 24-inch RCP = $110/lf; 18-inch RCP = $90/lf; 12-inch RCP = $65/lf;
- Cost of catch basins: $2,500 per; and
- Cost of earthwork associated with berm: $56/lf.

The two wet detention facilities to be developed as part of this alternative consists of a cut volume of 67,000 CY, 3340 lf of berm, and the installation of a collection system consisting of approximately 700 lf of 24-inch diameter pipe, 300 lf of 18-inch diameter pipe, 700 lf of 12-inch diameter pipe and approximately 10 catch basins. The conceptual cost associated with development of these facilities is approximately 2.0 million dollars, (see Table 7-25 for a conceptual cost comparison). This cost is associated with the development of the stormwater storage facilities and collection system shown in Figures 7-24. It should again be noted that this cost does not include the acquisition of the land that may be required to mitigate for the loss of park space.

A summary of the total estimated cost for each evaluated alternative is provided below in **Table 7-25**.

Table 7-25. Conceptual Probable Capital Costs of Evaluated Alternatives for Victoria Park.

Alternative	Estimated Cost
Alternative No. 1 - Maintenance	$840,000
Alternative No. 2a - Exfiltration	$415,000
Alternative No. 2b - Exfiltration	$345,000
Alternative No. 3 - Recharge Wells (without/with PS Facilities)	$1,300,000/$5,500,000
Alternative No. 4* - Wet Detention Pond	$2,000,000

* Cost of storage facilities does not account for land acquisition

7.7.6 Victoria Park Conclusions and Recommendations

After evaluating alternatives to reduce peak stages and flooding duration in the identified problem areas, the following conclusions/recommendations are offered:

- Routine maintenance of the existing system is recommended to maintain LOS and prevent further deterioration of the currently provided LOS. Results indicated that the effect of siltation is more pronounced in frequent storms (i.e., 2-year storms and smaller), which could constitute a periodic nuisance for local residential neighborhoods.

- The results showed that given good soil conditions, exfiltration trenches would have a limited impact on improvement of peak flood stage LOS, although significant reductions in duration of flooding are expected. Provided site-specific conductivity of the soils to be at the higher end of the tested range, the lengths of trench needed to provide the reductions in peak stage for the desired LOS would be 4,000 lf and 2,000 lf, respectively for the Alternative Nos. 2a and 2b sites. Further study of the site, and local geologic tests would be needed to determine if extending these alternatives would be feasible (based on limited space and low road surfaces).

- Recharge (gravity) wells provided a minimal reduction in peak stage, but do provide significant improvement to the duration of flooding. Since the expected costs associated with implementing this alternative are significantly higher, exfiltration would be a more cost-effective option for overall improvement.

- For Alternative No. 4, (the proposed wet detention system and 25 cfs pump station), the results indicate that there is similar reduction in peak stage as the exfiltration alternative; however, the reduction in the duration of flooding is less.

- Combinations of maintenance, exfiltration, recharge wells, pipe upgrades, and lake storage expansion where space allows provided the greatest overall flood stage and duration reduction benefits.

Recommendations based on cost analysis and conclusions include:

- Routine maintenance of the existing stormwater network is recommended as a cost effective alternative to reduce the level of nuisance flooding due to frequent storms.

- Although none of the solutions provide reductions in flooding that meet the LOS goals that have been set, the exfiltration trenches would provide the most cost-effective solution in the neighborhoods that need it most, provided there are favorable local subsurface geological conditions. Geologic testing is recommended prior to potential design.

- Recharge wells could still be considered a cost-effective option on a smaller scale (case-by-case basis) in those locations where the horizontal space required for exfiltration is limited and the proposed recharge well could interface into the existing PSMS.

- The City should consider implementing a combination of maintenance, exfiltration, recharge wells, pipe upgrades, and lake storage expansion where space allows. Additionally, controlling the entry of tidal waters into the existing PSMS piping would help in reducing the backup effect that much of Victoria Park experiences. This could be accomplished by installing flap gates and control weirs at outfall locations.

7.8 River Oaks Landing

The River Oaks Landings area is a subset of the River Oaks community, roughly bounded by the South Fork of the New River on the north, SW 15th Avenue to the east, State Road 84 to the south, and I-95 to the west. This area was identified in the *City of Fort Lauderdale – River Oaks/Edgewood Stormwater Management Analysis* (Keith and Schnars, P.A., March 2002) as a “flooding area”. In January 2007 CDM delivered a technical memorandum to the City entitled *River Oaks Landings Subbasin Stormwater Management Analysis* (CDM, 2007). As part of this report CDM examined the flooding within the neighborhood and performed a stormwater analysis to determine if the construction of a proposed outfall to the South Fork of the New River is a feasible alternative for reducing flooding in the area.

As part of the study CDM performed event simulations for the area utilizing SWMM for a variety of storm events and land use scenarios. The modeling effort generated the following recommendations:

- Installation of a twin 24-inch RCP outfall will result in direct benefits for portions of the neighborhood.

- Installation of roadside swales wherever possible to help increase available floodplain storage.

- Installation of exfiltration and retention systems wherever possible.
- It may be necessary to acquire additional land in the area to offset the loss of floodplain storage that will result from the development of the proposed River Oaks Landings. It is imperative that, if the River Oaks Landings development proceeds, then the developer must provide mitigation in the form of compensating floodplain storage so there is no adverse impact from the development.
- Development of an area-wide stormwater storage and treatment facility.
- Re-establish the low-level historic flow path from the northwest portion of the neighborhood to the South Fork of the New River.

It can be seen that many of the potential solutions proposed for the River Oaks Landings neighborhood are similar in nature to those proposed throughout the City. For a detailed discussion regarding the River Oaks Landings stormwater analysis please refer to the technical memorandum entitled *River Oaks Landings Subbasin Stormwater Management Analysis* (CDM, 2007).

After the submittal of the 2007 technical memorandum and over the course of the SWMP development, land in the northwest portion of the neighborhood adjacent to the South Fork of the New River became available for purchase. Stormwater from this neighborhood historically would flow into the New River via an outfall that was cut off by the DOT access road in 2003. Plans were to reestablish this outfall, and connect a new stormwater system to it as described above. This outfall is adjacent to 9.1 acres of undeveloped land that was slated for development. The current property owner has approached the City to consider the purchase and preservation of this property. If the City is able to acquire this land, we will be able to use it for pretreatment, which would reduce stormwater flows to the New River and allow for water quality treatment before those rare events when discharge would be required. Additionally, this would result in less flooding as stormwater could be stored on this property. This area has been studied, and because of the water levels in the adjacent waterbodies, discharge is not always possible, especially at high tide. It was determined that the only way to significantly reduce flooding is to use land to temporarily store the stormwater so that it can naturally percolate into the ground or discharge during extreme events. This will not only serve to recharge the Biscayne Aquifer, but also reduce the amount of stormwater discharge to the New River after each rain event. The City took the innovative step of obtaining Community Budget Issue Request (CBIR) grant.

7.9 Tidally Influenced Flooding

Although not technically a storm water management issue, tidally influenced flooding is experienced in several neighborhoods around the City. The phenomenon occurs in low-lying areas such as the finger islands or along the many rivers or canals where the land originally used for fill is generally subsiding over time, or was initially graded at a low elevation. Because seawall structures are typically designed at a higher elevation and constructed with strong piles preventing their movement, the tide elevation can rise above the land elevation in these areas.

The effect is seen when the cyclical high tide backs up into the open pipe storm water outfalls which are normally above the tide level, and backflows out through the storm inlets and onto the streets. The effect is often exacerbated when coupled with a lunar high tide or a wind-driven surge, and inland flooding can exceed a foot in depth in areas, making certain roadways impassable during the event, even encroaching on surrounding resident's properties. The areas affected are usually characterized by high water marks on vegetation and structures, and a trail of floating debris left behind as the waters subside, similar to the pattern found on a sea shore when the outgoing tide wanes.

The relation of this phenomenon to storm water management issues occurs when there is a rain event which coincides with the wind surge or high tide condition. In these instances, the normal storm water drainage is severely impeded due to the resultant lack of driving head available due to the already high water levels in the "full" inlets. The duration of the flooding event is often coincident with the tidal cycle.

The City has performed research on the extent of the tidally influenced flooding and has identified several of the "worst" areas affected by this problem. This data should be compiled and presented in a report for easy reference by the City.

7.9.1 Management Alternatives For Retrofit

Alternatives exist for the retrofit management of tidally influenced flooding as discussed below. Several of these may be required to be implemented integrally in order to achieve desired results, and some alternatives may not be fully effective in every situation. Each area needs to be analyzed and alternatives formulated on a case by case basis. Any proposed combination of alternatives will have a large operation and maintenance, legal, public relations, and capital cost components.

Seawall Maintenance

One of the critical path tasks in the management of tidal flooding issues is the implementation and maintenance of contiguous, consistent, watertight, properly graded seawalls. Tide water will enter at leaks or low points along the seawalls and quickly inundate the lowlands being protected. As the seawalls are part of private property, special ordinances, enforcement, and regular inspection is required, and repairs can be costly.

Outfall Backflow Prevention

Because the prevention of the flow of water into the storm water system from tide is so critically important to the mitigation of tidally influenced flooding, some measures must be taken at the outfalls. There are several manufactured products available which allow the flow of water only in one direction, out of the outfall, (i.e., pinch valves, flap gates, flapper valves, float valves, etc.). The majority of these valves and gates have maintenance issues and require increased driving head (usually beyond that which is available at the small sizes/flows and low-lying elevations where this type of flooding is occurring). They are often maintenance intensive due to both the deterioration of the materials in the corrosive marine environment in which they are installed, coupled with the fact that they are prone to blockage and clogging due to the associated collected debris and crustaceous sea life. Some of the most plausible modifications to the outfalls may be the floating outfall extension devices where the outfall is physically extended with a flexible pipe attached on submerged rails to a floating device which keeps the tide from entering the pipe. Prototypes for these structures can be designed, tested, and optimized depending on the location and particular conditions of service.

Raised Roadways and Swales

Although not a direct fix for tidal flooding, the depth of the flooding can be controlled to a reasonable level of service by raising low roadways. As the roads are raised, swale storage and bermed areas will also need to be designed and created to prevent the flooding from shifting to other areas and possibly worsening the existing, somewhat contained situation. Unfortunately, many of the areas which experience the tidal flooding also have narrow and/or undefined rights of way, and the required improvements usually extend on to private property, making the process difficult to implement. Additional inlets and outfalls may be incorporated into the designs as well.

Stormwater Pumping Stations

Construction of storm water pump stations can be effective in mitigating the impact of tidal flooding, however the size, number required, along with the capital and operating and maintenance cost of the station necessary to pump the tide back out to sea would be prohibitive. The relative elevations also need to be examined, to avoid areas where the pump intake is below the tidal elevation, creating a looped pumping system.

7.10 Conclusions and Recommendations

In this section, four neighborhood-scale surface water hydrologic and hydraulic models were developed using the USEPA SWMM to estimate flooding and LOS in local areas within the City that were shown to have severe flooding problems in Section 3.The models use the regional model developed in Section 3 as a base, to evaluate alternative solutions in finer detail. The four problem areas modeled include East Edgewood, West Edgewood, Progresso, and Victoria Park. These neighborhoods were chosen due to the severity of flooding as determined in Section 3, and through deliberations with the City at the meeting which occurred on September 12, 2008.

Model simulations indicate that the severe flooding in these neighborhoods is not easily remedied due to reasons including low-lying topography, lack of positive outfalls, and lack of storage space, among others. Local conclusions and recommendations may be found in Sections 7.4.7, 7.5.7, 7.6.7, and 7.7.7. These conclusions may be made:

- Routine maintenance of the existing system is recommended to improve LOS and to prevent further deterioration of the currently provided LOS.

- The results showed that exfiltration trenches placed upstream of the lowest-lying areas (in low-lying areas they would not be expected to perform well), may catch some surface sheet flows and reduce peak stages for the design storms. If the site conditions provide highly conductive soils, the reductions in durations of flooding may be significant. The flood reduction benefits are greater for smaller design storms in terms of both peak stage and duration of flooding. Exfiltration also provides water quality treatment for permitting (ERPs) and pending TMDLs for impaired waters, and increases aquifer recharge.

- Recharge (gravity) wells may also provide small reductions in peak stage while potentially providing significant reductions in the duration of flooding. The wells may also provide water quality treatment, reduction of freshwater discharges and pollutant loads to receiving waters, and aquifer recharge, which may reduce saltwater intrusion in some areas. The expected costs associated with implementing this alternative may be significantly higher than exfiltration, especially if it is determined from site-specific analysis that pump stations and stand tanks are needed. The recharge wells would target the lowest-lying flood-prone areas better than the exfiltration trenches, however. The application of recharge wells is subject to suitable local subsurface geological conditions associated with discharge capacity and TDS content.

- Although storage options were limited within these neighborhoods, alternatives were tested that provided some reductions in peak stage and more significant reductions in flood duration. There may be significant costs associated with acquiring the land necessary to apply this alternative and community support is recommended for some of the options involving parks.

- Few of the evaluated alternatives provided enough peak stage reduction to fully meet the desired LOS for the 5-year storm (as well as the 10-, 25-, and 100-year storms). This is due to the built-out land use, low-lying topography, high groundwater table, and tidal conditions in and around the City. The alternatives do significantly reduce the duration of flooding in the neighborhood. CDM has provided conceptual estimates of the needed storage volumes to store the excess runoff for the 5-year storm for potential consideration as redevelopment and/or other opportunities occur (e.g., water and sewer, transportation, park and other projects.

Combinations of maintenance, exfiltration, recharge wells, pipe upgrades, and lake storage expansion where space allows provided the greatest overall flood stage and duration reduction benefits. Therefore, CDM recommends that the City implement these facilities in a systematic method across the four major problem areas and the City.

Section 8
Conclusions and Recommendations

The purposes of this Stormwater Master Plan (SWMP) were to:

- Inventory and evaluate available data on the City's stormwater management system and problems;
- Review the City's stormwater-related ordinances and regulations for potential update, coordination, and enhancement;
- Develop regional stormwater models for the City and four example local stormwater models;
- Evaluate existing and future land use stormwater Level of Service (LOS) conditions;
- Evaluate potential stormwater management improvements for flood control, water quality protection and improvement, aquifer recharge, and operation and maintenance; and
- Evaluate the City's stormwater utility and funding mechanisms to implement the program.

This section summarizes the conclusions and improvements recommendations from Sections 2 through 7. The SWMP recommendations are grouped into four categories: non-structural controls, structural controls, operations and maintenance, and funding sources. Conclusions regarding the existing status of each category and the proposed improvements will be presented for each.

8.1 Non-Structural Controls

Non-structural controls are existing regulations, ordinances, policies, standards, and/or procedures to manage the system and provide enforcement powers for compliance. The following sections provide a summary of the suggested modifications to the existing City non-structural controls.

8.1.1 National Pollutant Discharge Elimination System Permit

Review of the City's ordinances relative to the National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System (NPDES MS4) permit indicate modification to the City code is warranted to better support control of redevelopment and enforcement activities in controlling flooding, reducing stormwater pollutant discharges, increasing aquifer recharge, and maintaining compliance with the permit. City ordinances could be strengthened in the following areas:

- Structural controls including outfall retrofits and retention-detention systems for runoff reduction and treatment to improve water quality;

- Flood control, water quality, and aquifer recharge;
- Illicit discharge and connections;
- Construction site runoff; and
- Inspections and enforcement.

A suggested template for these modifications is the City's existing sanitary sewer code enforcement ordinances. These well-developed ordinances can be used to create additional stormwater related ones. There are other procedural activities that the City can undertake to provide source control to assist with NPDES permit compliance.

8.1.2 Recommended Policies and Procedures

Based on the current City ordinances, the requirements of the NPDES MS4 permit, and engineering experience, the following policies and procedures should be adopted and where applicable, regulations developed so that they may be enforced to manage stormwater in the City.

- Create a Land Development Procedures Manual to include:
  - Use erosion and sediment controls on all construction sites, including constructing permanent BMPs prior to the construction of new pavement;
  - Maintain or increase existing onsite storage of stormwater for 100 year conditions, even for non-FEMA related floodplains, for new development and redevelopment;
  - Prohibit developments from obstructing natural and man-made flow patterns and drainage courses;
  - Retain or detain onsite runoff for increases in onsite pavement or regrading in order to provide treatment of runoff and infiltration or attenuation of flows (maintain or reduce the rates of flow to offsite and maintain or reduce offsite flood stages);
  - Provide retention and infiltration of the first inch of runoff, in addition to treatment and attenuation of flows, for new development or redevelopment on hydrologic group A or B soils. This infiltration of stormwater to surficial or artesian aquifers should be in accordance with all regulatory requirements and not represent an environmental hazard;
  - Develop a typical design for stormwater features that protect the right-of-way and neighboring properties;
  - Encourage reuse of stormwater for landscaping; and
  - Reference FDOT specifications for construction.

- Create a Stormwater Utility and assign a Stormwater Utility Director for stormwater ordinance enforcement and verbiage for violation penalties;

- Install pollutant-reduction devices (baffle boxes, oil-water separators, exfiltration, recharge wells, swales) and retention-detention systems at proposed drainage structures and retrofit where available;

- Vacuum sweep parking lots at least once per week for new developments as part of Operation and Maintenance;
- Create a Greenspace Management Fund for providing natural drainage, clean water, wildlife habitat and passive recreational opportunities;
- Prohibit application of reclaimed water applied to impervious surfaces that allow drainage to surface waters unless Broward County surface water standards are met; and
- Train employees on proper fertilizer and pesticide application, storage, and training requirements.

8.2 Structural Controls

8.2.1 Wetlands Inventory and Management Plan

Most of the historic wetlands within the Fort Lauderdale SWMP study area have been destroyed and the few remaining wetlands have been heavily impinged upon by development. These wetlands are bordered by roads and parking lots and there is little or no opportunity for the establishment of wetland buffers. While most of the wetlands are hydrologically isolated, some are located adjacent to canals and could be incorporated into small stormwater management systems. Wetland habitat could be improved by removing exotic species and replacing them with native vegetation. Of the ten wetlands identified in the assessment, eight are not currently associated with parks or conservation easements. Therefore, there are several opportunities for preserving these wetlands. CDM recommends that the City consider the enhancement of these wetlands systems as part of an overall Environmental Resource Permit for the SWMP.

8.2.2 Regional Alternative Evaluations and Recommendations

CDM evaluated regional alternatives to improve stormwater quantity and quality conditions across the City. These included increased operation and maintenance, exfiltration, recharge wells, dredging, and regional storage. The results of the regional alternative modeling indicated that there are no cost effective regional solutions that would provide a desirable LOS for the City, such as all roads passable for the 5-year storm, major roads passable for the 10-year storm, and no buildings flooded for the 100-year storm. This is due to the built-out, flat and low topography, high groundwater, and tidal conditions in the City.

Exfiltration trenches and recharge wells can provide reduced peak flood stages at many locations in the City, would likely work well for smaller storms, would significantly reduce the duration of flooding, and would provide water quality treatment and aquifer recharge. These are all improvements to LOS but fall short of the goals outlined as part of this analysis.

Regional storage is impractical due to the built-out nature of the City, but has potential for specific areas where lakes exist for expansion and/or for public-private partnerships. To reduce flooding to the 100-year storm LOS goal would require significant condemnation of existing development for the construction of distributed regional ponds. The economic burden to the City in legal and real estate costs and significant dislocation of its residents that would result make this option unfeasible. Therefore, the regional pond options were not evaluated further.

Maintenance dredging may help reduce flood stages in upstream reaches immediately adjacent to the river, but in general, is more useful for navigation and to maintain the outfalls of the PSMS than to reduce flooding in and of itself. This navigation component should be funded separately from City stormwater utility funds. Based on the regional alternatives analyses, the following recommendations are offered:

- The City's stormwater system should be regularly maintained. This increased maintenance level is estimated to cost approximately $ 9 million per year to clean 240 miles of pipes. Catchments should be cleaned of trash and debris to allow full access to stormwater pipes. Pipes, exfiltration systems, swales, and channels should be cleared of silt and other debris to maintain full cross-sectional areas and storage, low roughness values, and exfiltration-infiltration capacity.

- Exfiltration and recharge wells may be implemented to reduce peak flood stages and improve LOS, but targeted local implementation will be more cost effective than a regional application.

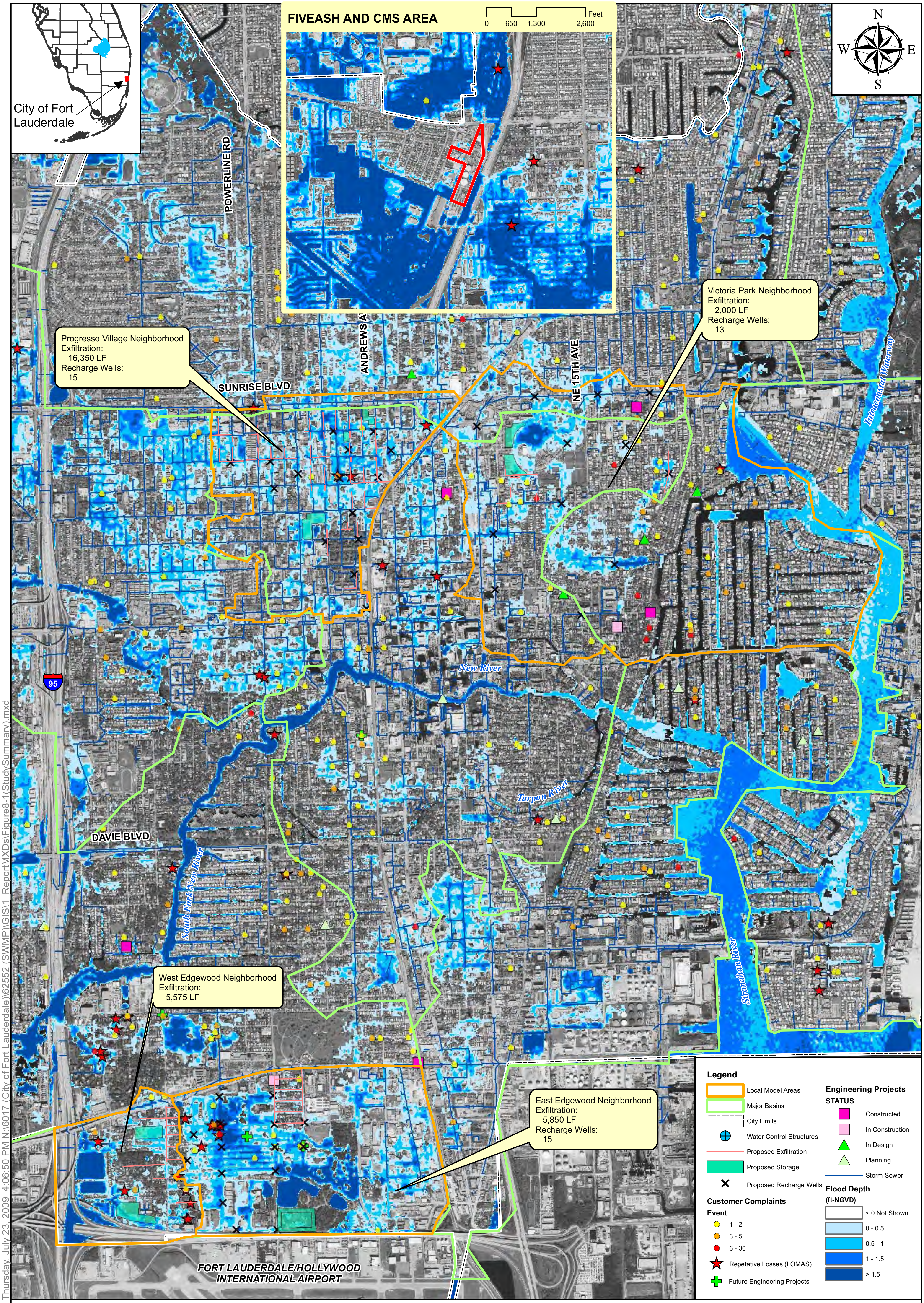
- There may be an opportunity for the City to use excess stormwater runoff and the regional baseflow from the canal system to augment potable water supplies and/or support ecosystem restoration. Although out of scope for this project, there may be benefits to working with Broward County in its ongoing water resource conservation planning to consider storage of stormwater west of the City or to redirect stormwater west into the Water Conservation Areas within hydraulic constraints. This would potentially:

    - Reduce flooding duration in the City and County;
    - Recharge the regional aquifer system;
    - Provide a source of potable and/or supplemental reuse water supply; and
    - Provide additional water for ecosystem restoration, including reduction of volume and pollutant loads to the receiving waters to assist the City with compliance for pending total maximum daily loads (TMDLs) and associated pollutant load reduction goals (PLRGs).

Figure 8-1 shows an overview of the regional and local stormwater improvement recommendations along with reported and projected problem areas.

8.2.3 Local Alternatives Evaluations and Recommendations

The following paragraphs present the recommendations for the four local neighborhood problems areas, which were evaluated in a higher level of detail as presented in Section 7. These four areas were selected and prioritized based on criteria



Thursday, July 23, 2009 4:06:50 PM N:\6017 (City of Fort Lauderdale)\62552 (SWMP)\GIS\1_Report\MXDs\Figure8-1(StudySummary).mxd

Note: Length of exfiltration may include areas outside the City Limits.
Source: City of Fort Lauderdale

0 2,000 4,000 8,000 Feet

CDM

City of Fort Lauderdale
100 North Andrews Avenue
Fort Lauderdale, Florida 33301
Tel # (954) 828-5000

Figure 8-1
City-Wide Stormwater Master Plan
Recommended Projects
Summary

UPDATED
07-23-09

discussed in Section 3 which included repetitive loss complaints, observations made after storm events, and level of service determinations.

8.2.3.1 Edgewood East

After evaluating five alternatives to reduce peak stages and flooding duration in the identified problem areas, the following recommendations are offered:

- Routine maintenance of the existing stormwater network is recommended as a cost effective alternative to reduce the level of nuisance flooding due to frequent storms. This is included in the City-wide recommendation of $9 million per year.

- Although none of the solutions provide reductions in flooding that meet the LOS goals that have been set, the recharge wells would provide the most cost-effective solution in the neighborhoods that need it most, provided there are suitable local subsurface geological conditions which do not require pump stations.

- The most effective solution to providing flood relief, in stage, duration, and frequency would be to implement Alternative No. 5, which is the combination of three systems: exfiltration trenches where there is sufficient topographic elevation to catch a portion of the runoff as it sheet flows down the streets to the low-lying areas, recharge wells in the low-lying areas, and a dry detention facility in Snyder Park. The conceptual probable capital cost estimate for this alternative is shown in Section 8.2.3.4.

8.2.3.2 Edgewood West

After completing the analysis of five alternatives to provide flood mitigation to the West Edgewood problem areas the following recommendations are offered:

- Routine maintenance of the existing system is recommended as a cost effective alternative to help alleviate flooding. This is included in the City-wide recommendation of $9 million per year.

- It appears that the most cost-effective option for this area is to implement Alternative 2, and the conceptual probable capital cost estimate for this alternative is shown in Section 8.2.3.4. Additional considerations include:

    - Install 5,575 LF of exfiltration systems in problem areas where sufficient hydraulic conductivity exists and the ground elevation is greater than 6.0 ft NGVD.
    - Exfiltration trenches are a more cost effective alternative for alleviating flooding along NW 15th Avenue than installation of a northern stormwater storage facility and should be utilized if the aforementioned conditions can be met.
    - Further investigation into utilizing Edgewood Passive Park as a dry detention facility should be initiated. It is suspected that the BCAD has the area earmarked to provide stormwater treatment for the pending airport

expansion, but nonetheless the possibility of a joint venture should be pursued.

- o Attempt to identify and acquire additional areas within the southern and western portions of the West Edgewood neighborhood for development as a regional stormwater facility. Providing additional areas to offset the loss of floodplain storage due to development in the region would allow for localized mitigation of flooding.

8.2.3.3 Progresso

After evaluating four alternatives to reduce peak stages and flooding duration in the identified problem areas, the following recommendations are offered:

- Routine maintenance of the existing stormwater network is recommended as a cost effective alternative to reduce the level of nuisance flooding due to frequent storms. This is included in the City-wide recommendation of $9 million per year.

- It appears that the most cost-effective option for this area is to implement Alternative 2 and the conceptual probable capital cost estimate for this alternative is shown in Section 8.2.3.4. Additional considerations include:

  - o Install 16,350 LF of exfiltration trench in problem areas where sufficient hydraulic conductivity exists and the ground elevation is greater than 5.5 ft NGVD.

  - o Construct 15 recharge wells throughout the project area, provided suitable geologic conditions exist (i.e., discharge capacity and TDS content).

  - o Secure vacant lots near NW 9^{th} and 8^{th} Street and NW 4^{th} and 3^{th} Avenue for potential storage in the future (21 ac). Providing additional areas to offset the loss of floodplain storage due to development in the region would allow for localized mitigation of flooding.

8.2.3.4 Victoria Park

After evaluating alternatives to reduce peak stages and flooding duration in the identified problem areas, the following recommendations are offered:

- Routine maintenance of the existing stormwater network is recommended as a cost effective alternative to reduce the level of nuisance flooding due to frequent storms. This is included in the City-wide recommendation of $9 million per year.

- It appears that the most cost-effective option for this area is to implement Alternative 2b, and the conceptual probable capital cost estimate for this alternative is shown in **Table 8-1**. Additional considerations include:

  - o Although none of the solutions provide reductions in flooding that meet the LOS goals that have been set, the exfiltration trenches would provide the most cost-effective solution in the neighborhoods that need it most, provided there are favorable local subsurface geological conditions. Geologic testing is recommended prior to potential design.

- Recharge wells could still be considered a cost-effective option on a smaller scale (case-by-case basis) in those locations where the horizontal space required for exfiltration is limited and the proposed recharge well could interface into the existing PSMS.
- Controlling the backflow of tidal waters into the existing PSMS piping would help in reducing the backup effect that much of Victoria Park experiences. This could be accomplished by installing flap gates and control weirs at outfall locations.

A summary of the capital improvement cost of the recommended alternative for each neighborhood is presented in Table 8-1.

Table 8-1. Summary of Conceptual Probable Capital Costs of Recommended Alternatives for Each Evaluated Neighborhood.

Neighborhood	Recommended Alternative	Estimated Cost
East Edgewood	Alternative No. 5* - Combined (without/with PS Facilities)	$6,800,000/$11,700,000
West Edgewood	Alternative No. 2 – Exfiltration *	$1,137,000
Progresso	Alternative No. 2 – Exfiltration *	$3,600,000
Victoria Park	Alternative No. 2b - Exfiltration	$345,000
TOTAL		$16,782,000

*Highly dependent on local hydraulic conductivity values.

8.3 Operations and Maintenance

8.3.1 Maintenance Dredging

It is recommended that the City continue using independent contractors for their dredging operations, and to dredge at a rate equaling that of the average annual request to curb the growth of the existing waitlist. In order to meet this goal, the City may need to streamline the pre-dredge evaluation process, as well as revise the Annual Dredging Contract, in order to expedite the additional dredging. Like many of the other municipalities in the state, it is recommended that the City either create local tax districts or assess the immediate homeowners to fund neighborhood canal dredging. Typically, dredging is a navigation issue more so than a stormwater issue, which directly benefits the homeowners with access to the canals. For larger waterways such as the New River, it is recommended that the City first seek federal and state grants for routine dredging operations as these are major navigation channels. Potential funding organizations include the EPA, Army Corp and/or the water management district.

8.4 Funding Sources

8.4.1 Stormwater Management Program

The conclusions found in this report will result in the definition of additional CIP and therefore, there may be a need for additional revenues from the stormwater management fees (as well as others). If the City seeks to increase revenues from the utility, the stormwater management ordinance should be revised and updated to account for the issues summarized below:

- Explicit language in the stormwater ordinance is needed to establish a Stormwater Utility and dedicated enterprise fund not just a stormwater management program (Sec. 28-194).
- The City should consider how a customer may have an option to reduce their fees in light of the Gainesville case summarized above.
- The definition of impervious area (Section 28-193) should be expanded to clarify what is and what is not impervious.
- Also in the definition section, airports are considered undeveloped property. If there is a conclusion by the City that the airport has reduced impact of the City's stormwater system then this should be authorized in an exemption.
- The method of calculation for rates should be included, defining the runoff coefficients. In lieu of defining the process in the ordinance, a Policy and Procedure Manual can be referenced which can include the methodology.
- The City should develop a Policy and Procedures Manual, referenced in the ordinance, to deal with billing maintenance and collection issues.
- The City should consider a level of service assessment to define the estimated budgets needed for higher levels of service and determine appropriate stormwater management fees accordingly.

8.4.2 Grants and Loans

Grants and loans also offer opportunities for stormwater improvements funding. Grants could include the State revolving funds and other cooperative grants with the SFWMD or innovative BMP grants through FDEP and EPA.

Loans can include the Florida State Revolving Loan program which offers funding to municipalities for storm water related infrastructure. The current rate is 2%.

Grants and loans are generally more available for communities with dedicated stormwater funding sources like Fort Lauderdale.

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Appendix 2A
Florida City Ordinance Reviews
Suggested Verbiage

The following language from the City of Miami, City of Sarasota and City of Jacksonville city codes is suggested as a basis for the City of Fort Lauderdale's Code of Ordinances and ULDR updates.

Review of Land Development Codes for City of Miami, City of Sarasota and City of Jacksonville yields a need for additional language in Ft. Lauderdale's ULDR.

Sample language excerpts are provided below in italics and taken directly from the aforementioned city codes.

1. Use of Erosion and Sediment Control on all construction sites;

Erosion and siltation control.
(a) The purpose of erosion and siltation control shall be to minimize the impact of land alteration, development and construction activities so that the control of erosion and sediment shall negate adverse impacts on storm and surface water systems; shall maintain the hydrologic balance of water sheds and water courses; shall protect the public health, safety and welfare; and shall conserve wildlife and aquatic habitats.
(b) A person or entity which shall cut, fill, grade or alter the natural topography of real property, by any other means whatsoever, shall obtain a permit from the city engineer. The erosion and siltation control plan shall conform to the requirements of the engineering design criteria manual. No building permit shall be issued until the city engineer has certified approval of the erosion and siltation control plan.
(c) The permit required by this section shall not be required in the following circumstances:
(1) Where minor land-disturbing activities, such as home garden work or individual home landscaping, repairs and home maintenance work, and related activities, would result in minor soil erosion.
(2) When construction pertains to single-family residence or a single-family duplex, or the demolition or removal of an existing single-family residence or single-family duplex.
(3) Any activity for which bids have been let or a construction contract signed, prior to the date of the adoption of this section, provided that the activity is completed by July 17, 1989.
(4) When the work consists of utility installation within the public right-of-way, routine maintenance or emergency work.
(d) The fee for erosion and siltation control permit is five dollars ($5.00) per one thousand (1,000) square feet to a maximum of three hundred dollars ($300.00).

Stormwater discharges from industrial activities and construction sites.
(a) Using best management practices, stormwater from construction sites shall be controlled to retain sediment on-site and prevent violations of state water quality standards. All erosion and sediment controls required under the pollution prevention plan of a National Pollutant Discharge Elimination System permit for construction, required by a stormwater permit issued by the Florida Department of Environmental Protection or the St. Johns River Water Management District, or required by a city permit or approved construction plan shall be properly implemented, maintained and operated. The minimum requirements for controlling stormwater run-off from construction sites are specified in the City Land Development Procedures Manual and its standard specifications and details.
(b) Stormwater from areas of construction activity shall be treated or managed on-site, using best management practices, before being discharged to an MS4 or to surface waters. All stormwater discharges from the site shall be of a quality which will not adversely impact the water quality or the beneficial uses of the receiving water.
(c) Owners and operators of industrial facilities and/or construction sites that will discharge stormwater to an MS4 shall notify the Office of the City Engineer, in writing, before the discharge begins. The noticed discharge shall not begin earlier than 5:00 p.m. of the next municipal working day after the City Engineer's Office receives the notice.
(d) Any person who has been issued an NPDES permit authorizing discharges to the MS4 shall submit a complete copy of the permit to the city NPDES coordinator, within 60 days after the effective date of this chapter, or 60 days after the issuance, of the permit.

2. Regulation on Fertilizer Application, Storage and Training Requirements;

Findings, purpose and intent.
(a) The Council finds and declares that discharges to surface water bodies have resulted in a finding that certain Duval County surface water bodies are exceeding allowable limits for nutrients that are commonly found in fertilizers. These exceedances have led to harmful algal blooms in the Lower St. Johns River and its tributaries and must be reduced in order to comply with the Nutrient Total Maximum Daily Load for the Lower St. Johns River established under the Clean Water Act.
(b) The pollution created by excessive nutrient loading directly and negatively impacts the use and enjoyment of the water bodies by the City of Jacksonville citizens and visitors.
(c) There are many sources of the nutrients affecting the water bodies, one of which is directly related to excessive or improper fertilization of public, commercial and residential turf and landscape plants. When such fertilizer is inappropriately applied, excess nutrients not absorbed by plants discharge into stormwater treatment systems, surface waters and groundwater within the City. Stormwater and groundwater discharges that contain excessive nutrient levels can lead to overgrowth of vegetation in the natural and artificial drainage features, resulting in the decreased functionality of the drainage feature and causing upland flooding, excessive maintenance costs and efforts, and damage to the natural environment.
(d) Effective and comprehensive regulation of fertilizer application by public and commercial applicators and introduction of a concerted public education program will be effective in eliminating the harmful environmental impacts caused by improper fertilizer application.
(e) The purpose and intent of this part is to protect and safeguard the surface waters and groundwater within the City from excessive and harmful nutrient levels associated with improper fertilization techniques and materials handling, thereby protecting public health, safety and welfare.
(f) It is also the purpose and intent of this part to augment the policies adopted and contained in the Conservation/Coastal Management Element of the City's Comprehensive Plan pertaining to the protection of the surface water resources within the City.

Jurisdiction.
Notwithstanding the provisions of Section 366.105, this Part 6, shall apply only within the First Urban Service District.

Definitions.
As used in this part, the following words and phrases shall have their indicated meanings. In the event that a term is not defined in this Part, but is defined elsewhere in this Chapter, the given definition will apply.
(a) Application or Apply shall mean the actual physical deposit of Fertilizer to Turf or Landscape Plants.
(b) Applicator shall mean any Person who applies Fertilizer on Turf and/or Landscape Plants in Duval County.
(c) Best Management Practices (BMPs) shall mean turf and landscape practices or combination of practices based on research, field-testing and expert review, determined to be the most effective and practicable on-location means, including economic and technological considerations, for improving water quality, conserving water supplies and protecting natural resources.
(d) Bulk Storage Facility shall mean any business, person, entity or agent which annually sells in the aggregate 10,000 pounds or more of Fertilizer products to small or individual consumers for personal application.
(e) Commercial Fertilizer Applicator shall mean any Person who applies Fertilizer on Turf and/or Landscape Plants in Duval County in exchange for money, goods, services or other valuable consideration.
(f) Department shall mean the Environmental and Compliance Department.
(g) Fertilize, Fertilizing or Fertilization shall mean the act of applying Fertilizer to Turf, specialized Turf or Landscape Plant.
(h) Fertilizer shall mean any substance or mixture of substances, except pesticide/fertilizer mixtures such as "weed and feed" products, that contains one or more recognized plant nutrients and promotes plant growth, or controls soil acidity or alkalinity, or provides other soil enrichment, or provides other corrective measures to the soil.
(i) Guaranteed Analysis shall mean the percentage of plant nutrients or measures of neutralizing capability claimed to be present in a Fertilizer.

(j) Institutional Applicator shall mean any Person, other than a non-commercial or commercial Applicator (unless such definitions also apply under the circumstances), that applies Fertilizer for the purpose of maintaining Turf and/or Landscape Plants. Institutional Applicators shall include, but shall not be limited to, owners and managers of public lands, schools, parks, religious institutions, utilities, industrial or business sites and any residential properties maintained in condominium and/or common ownership.
(k) Landscape Plant shall mean any native or exotic tree, shrub, or groundcover (excluding Turf).
(l) Lawn, Sod or Turf shall mean a piece of grass-covered soil held together by the roots of the grass.
(m) Low Maintenance Zone shall mean an area a minimum of six (6) feet wide adjacent to water courses which is planted and managed in order to minimize the need for fertilization, watering, mowing, etc.
(n) Pasture shall mean land used for livestock grazing that is managed to provide feed value.
(o) Prohibited Application Period shall mean the time period during which a Flood Watch or Warning, or a Tropical Storm Watch or Warning, or a Hurricane Watch or Warning, or a 3-day Cone of Uncertainty is in effect for any portion of Duval County, issued by the National Weather Service, or if heavy rain is expected.
(p) Slow Release, Controlled Release, Slowly Available, Timed Release, or Water Insoluble Nitrogen shall mean nitrogen in a form which delays its availability for plant uptake and use after application, or which extends its availability to the plant significantly longer than a reference rapid or quick release product.
(q) Vegetative debris or vegetative material shall mean all plant life collectively.

Fertilizer Content and Application Rates.
(a) No Applicator shall apply Fertilizers containing nitrogen and/or phosphorus to Turf and/or Landscape Plants during the Prohibited Application Period.
(b) Fertilizers Applied to Turf and/or Landscape Plants within Duval County shall be formulated and applied in accordance with requirements and directions provided by Rule 5E-1.003(2), Florida Administrative Code,Labeling Requirements For Urban Turf Fertilizers.
(c) Fertilizers shall be applied to Turf and/or Landscape Plants at the lowest rate necessary. Nitrogen shall not be applied at an application rate greater than 0.7 lbs of readily available nitrogen per 1000 ft2 at any one time based on the soluble fraction of formulated fertilizer, with no more that 1 lb total N per 1000 ft2 to be applied at any one time and not to exceed the annual nitrogen recommendations below:
Bahia grass, 2--3 lbs. N/1000 ft2 /year.
Bermuda grass, 3--5 lbs. N/1000 ft2 /year.
Centipede grass, 1--2 lbs. N/1000 ft2 /year.
St. Augustine grass, 2--4 lbs. N/1000 ft2 /year.
Zoysia grass, 3--5 lbs. N/1000 ft2 /year.
(d) For new Turf or Landscape Plants that are being installed or established, a one-time use of starter fertilizer as described in Rule 5E-1.003, Florida Administrative Code, shall be allowed at an application rate not to exceed 1.0 lb. of P2 O5 /1,000 ft2 .
(e) No person shall apply phosphorus Fertilizer to existing Turf and/or Landscape Plants within Duval County at application rates which exceed 0.25 lbs. of P2 O5 /1,000 ft2 per application nor exceed 0.50 lbs. of P2 O5 /1,000 ft2 per year.
(f) No person shall apply nitrogen or phosphorus fertilizer to Turf or Landscape Plants except as provided above unless a soil or tissue deficiency has been verified by a University of Florida IFAS, or other accredited laboratory, approved test.

Impervious Surfaces.
No person shall apply, spill, or otherwise deposit Fertilizer on any impervious surfaces. Any Fertilizer applied, spilled, or deposited, either intentionally or accidentally, on any impervious surface shall be immediately and completely removed to the greatest extent practicable. Fertilizer released on an impervious surface must be immediately contained and either legally applied to Turf or any other legal site, or returned to the original or other appropriate container. No person shall wash, sweep, or blow Fertilizer off of impervious surfaces into stormwater drains, ditches, conveyances, or water bodies. Section 366.614, Ordinance Code, is applicable to certain Fertilizer spills and may require that notification of a spill be provided to the Department.

Fertilizer Free Zones.
No person shall apply Fertilizer within ten feet, or three feet if a deflector shield or drop spreader is used, of any pond, stream, water course, lake, canal, or wetland as defined by the Florida Department of Environmental Protection (Chapter 62-340, Florida Administrative Code) or from the top of a seawall. Newly planted Turf and/or Landscape Plants may be fertilized in this Zone only for the first 60-day establishment period after planting.

Low Maintenance Zones.
A Low Maintenance Zone shall be established by no later than one year from the effective date of this ordinance. The Low Maintenance Zone shall be a minimum of six feet from any pond, stream, water course, lake, wetland or seawall. A swale/berm system is recommended for installation at the landward edge of this Low Maintenance Zone to capture and filter runoff. No mowed or cut vegetative material shall be deposited or left remaining in the Low Maintenance Zone or deposited in the water. Care should be taken to prevent the over-spray of aquatic weed products into the Low Maintenance Zone.

Mode of Application.
Spreader deflector shields are required when Fertilizing via rotary spreaders. Deflectors shall be positioned such that Fertilizer granules are deflected away from all impervious surfaces, fertilizer-free zones and water bodies, including wetlands.

Management of Grass Clippings and Vegetative Matter.
No person shall wash, sweep, or blow off grass clippings, vegetative material and/or vegetative debris into stormwater drains, ditches, conveyances, water bodies, wetlands, or sidewalks or roadways.

Exemptions.
The provisions set forth above in this Ordinance shall not apply to:
(a) Bona fide farm operations as defined in the Florida Right to Farm Act, Section 823.14, Florida Statutes, provided that fertilizers are applied in accordance with the appropriate Best Management Practices Manual adopted by the Florida Department of Agriculture and Consumer Services, Office of Agricultural Water Policy for the crop in question.
(b) Other properties not subject to or covered under the Florida Right to Farm Act that have Pastures used for grazing livestock provided that fertilizers are applied in accordance with the appropriate Best Management Practices Manual adopted by the Florida Department of Agriculture and Consumer Services, Office of Agricultural Water Policy for the particular crop in question.
(c) Golf courses provided that the latest edition ofBest Management Practices for Florida Golf Courses is followed when applying fertilizer to golf course practice and play areas.

Public Education.
(a) To assist in public information, the education of its citizens and the effective implementation of this Part, the Department will coordinate its efforts with those of the St. Johns River Water Management District, the UF-IFAS-Cooperative Extension Service and any other agencies. These entities should jointly sponsor frequent workshops on the design principles and standards, as well as maintenance, of Florida Friendly Landscapes.
(b) The University of Florida IFASFlorida Yards and Neighborhoods Handbook May, 2001 as updated, for protecting water resources in Florida is on file with the Legislative Services Division as a model method to Commercial Fertilizer Applicators and the public concerning Fertilization, irrigation and pesticide practices. A copy may be obtained by contacting the Department or by visiting the City's website.
(c) The Department will make available other public education materials at appropriate libraries and retail stores, as well as on the City's website.
(d) The Department will provide periodic public notices, especially immediately prior to Prohibited Application Periods summarizing the requirements of this Part.
(e) Commercial Fertilizer Applicators shall provide a copy of the approved Surface and Groundwater Protection Brochure to all customers within the regulated areas at the time of their first treatment after May 15th of each year.
(Ord. 2008-28-E, § 1)

BMP and Training Requirements.
(a) All Applicators of Fertilizer, who apply fertilizer within Duval County, other than golf course applicators and private homeowners, or their tenants, on their own property, shall abide by and successfully complete Florida Green Industries BMP training, providing training and continuing education requirements in minimizing nitrogen leaching and phosphorus runoff from fertilizer applications.
(b) Golf course applicators shall abide by and successfully complete Florida Department of Environmental Protection Golf Course BMP training, providing training and continuing education requirements in environmental stewardship and pollution prevention at golf courses.
(c) Non-commercial applicators, other than golf course applicators, are required to follow the recommendations of the University of Florida IFAS Florida Yards and Neighborhoods program when applying fertilizers.
(d) Any retail facility that sells fertilizer products, such as garden centers, nurseries or other similar establishments are encouraged to designate at least one management employee to complete the University of Florida IFAS Florida Green Industries Best Management Practices for Protection of Water Resources in Florida, as updated, and to implement an internal training program for other employees who interact with fertilizer customers.
(Ord. 2008-28-E, § 1)

Recordkeeping Requirements.
(a) Commercial and Institutional Fertilizer Applicators shall maintain adequate records that demonstrate compliance with this Part. Invoices and account histories documenting fertilizer content and application rates, as well as date of application, shall be retained for three years and must be made available at the place of business during normal business hours upon request by the Department.
(b) Upon Department request, all Applicators, other than private homeowners, shall provide proof of completion of the training required in section 366.612 above.
(Ord. 2008-28-E, § 1)

Bulk Storage Facility Requirements.
(a) All Bulk Storage Facilities shall comply with the IFAS Green Industries Best Management Practices fertilizer storage and handling requirements as set forth in Appendix C of Florida Green Industries,Best Management Practices for Protection of Water Resources in Florida , June 2002.
(b) All Bulk Storage Facilities shall also comply with the following requirements:
(1) Fertilizer transportation and application equipment shall be a sufficient distance away from, storm drains, ditches and canal banks to avoid a fertilizer spill entering surface waters;
(2) Fertilizer solution tanks shall not be rinsed directly or directly emptied into streams, canals, other water bodies, or on roadways;
(3) All personnel involved in handling fertilizer material at the bulk storage facility shall be properly trained. The facility shall maintain documentation of training for each person involved in handling fertilizer material.
(4) Fertilizer transportation and application equipment shall be parked only on designated paved sites with runoff controls.
(5) Buckets, shovels, and absorbents shall be readily available for immediate cleanup.
(6) Containers of liquid fertilizer shall be stored inside of secondary containment that provides capacity equal to the largest container stored within.
(c) Bulk Storage Facilities shall have a written spill containment plan on site that is readily available to all personnel involved in the handling and spreading of fertilizer. The written spill containment plan shall include the following:
(1) An identification of the personnel responsible for cleanup and a chain-of-command for documenting remedial actions taken.
(2) The procedures to be followed when cleaning up a spill, including the location of cleanup materials, including but not limited to, absorbents, tarps, buckets, and shovels;
(3) The materials used to train facility personnel in spill cleanup procedures.
(4) The telephone number of the Environmental Quality Division to be used by facility personnel to notify the Division of reportable spills.
(d) Bulk Storage Facilities shall report any fertilizer spills that are either ten gallons liquid or ten pounds dry to the Environmental Quality Division within 24 hours of the spill occurring. Any Fertilizer

spill occurring inside of a Bulk Storage Facility building that does not have a floor drain and where the spill does not leave the enclosed building is not required to be reported to the Division.
(e) The Department shall annually inspect each facility regulated under this section to review the facility's best management practice manual and spill containment plan to ensure compliance with the provisions of this section.

Violations.
The enforcement provisions of Section 366.206, Section 366.207 and Section 366.208 shall be applicable to violations of this Part.

Public Nuisance Declaration.
Violations of this Part are hereby declared public nuisances and may be abated or enjoined pursuant to the authority of the Department in Part 2 of this Chapter.

Severability.
It is the intent of the Council that if any section, subsection, clause, phrase, part or provision of this Part is held invalid or unconstitutional by a court of competent jurisdiction, such invalidity or unconstitutionality shall not be construed as to render invalid or unconstitutional the remaining provisions of this Part.

3. Assignment of a Stormwater Management Utility Director for stormwater ordinance enforcement and verbiage for violation penalties;

Stormwater Management Utility Director--Duties and powers.
The stormwater management utility director shall have all powers necessary for the exercise of responsibility of the drainage of stormwater from all properties with the City covered by this Chapter, including, but not limited to, the following:
(a) Preparation of plans for improvements and betterments to the stormwater management system.
(b) Construction of improvements and betterments to the stormwater management system.
(c) Promulgation of regulations for the use of the stormwater management utility and system, including provisions for enforcement of such regulations.
(d) Review and approval of procedures, regulations and criteria by which the Development Management Group reviews all new development permits within the city for compliance with stormwater management regulations included in present city ordinances or ordinances later adopted.
(e) Performance of routine maintenance and minor improvement to the stormwater management system.
(f) Recommend the establishment and adjustment of user fees and charges, which shall be submitted to City Council for approval, for the city's stormwater management utility and system.
(g) Evaluation of water quality concerns for discharges to the stormwater management system.
(h) Performance of all normal utility functions to include construction, operation, and maintenance of the city's stormwater management system, including, but not limited to, the hiring of staff, the selection of special consultants, the entering into contracts for services and construction of facilities, and the handling of purchase, lease, sale or other rights to property for the stormwater management system; all consistent with the personnel and procurement requirements of the City.
(i) Recommendation of the issuance of revenue bonds for the purpose of performing those duties as described herein.
(j) Award User Fee Credits, User Fee Reductions and User Fee Adjustments in accordance with this Section and the approved Adjustment and Credit Manual.

General penalty.
Any person violating the provisions of any section of this Code or any other ordinance, where no other penalty is prescribed, shall, upon conviction, be fined not more than $500.00, or be imprisoned at hard labor on the streets or other works of the city for not more than 60 days, or shall be both fined and imprisoned. Each day that such violation shall continue (or, in the case of shows and exhibitions illegally conducted, each performance) shall constitute a separate offense.

4. Installation of pollutant-retardant devices at proposed drainage structures and retrofit where available;

Environmental regulations.
All drainage structures, including wells, shall include pollutant-retardant devices approved by DERM pursuant to the South Florida Water Management District rules. Such pollutant-retardant devices shall be maintained in efficient operating condition, including periodic removal of accumulated contents.

5. New developments to include vacuum sweeping of parking lots at least once per week as part of Operation and Maintenance;

Environmental regulations.
Net new development shall reduce pollutants entering groundwater and/or surface waters by vacuum sweeping all parking lots of 11 or more vehicle spaces and private roadways serving the parking lots at least once per week.

6. Infiltration of stormwater to surficial or artesian aquifers shall be in accordance with all regulatory requirements and shall not represent an environmental hazard;

Deep wells for the disposal of on-site drainage of stormwater shall be constructed in accordance with requirements of the county department of environmental resources management and shall be approved by them. On-site stormwater must be accommodated on site.

In its stormwater management practices, the City will promote infiltration of storm water to surficial or artesian aquifers to prevent further saltwater intrusion, where such infiltration is deemed to be feasible and cost efficient, and is not likely to represent an environmental hazard.

7. Conditions for tree removal shall include adverse drainage conditions;

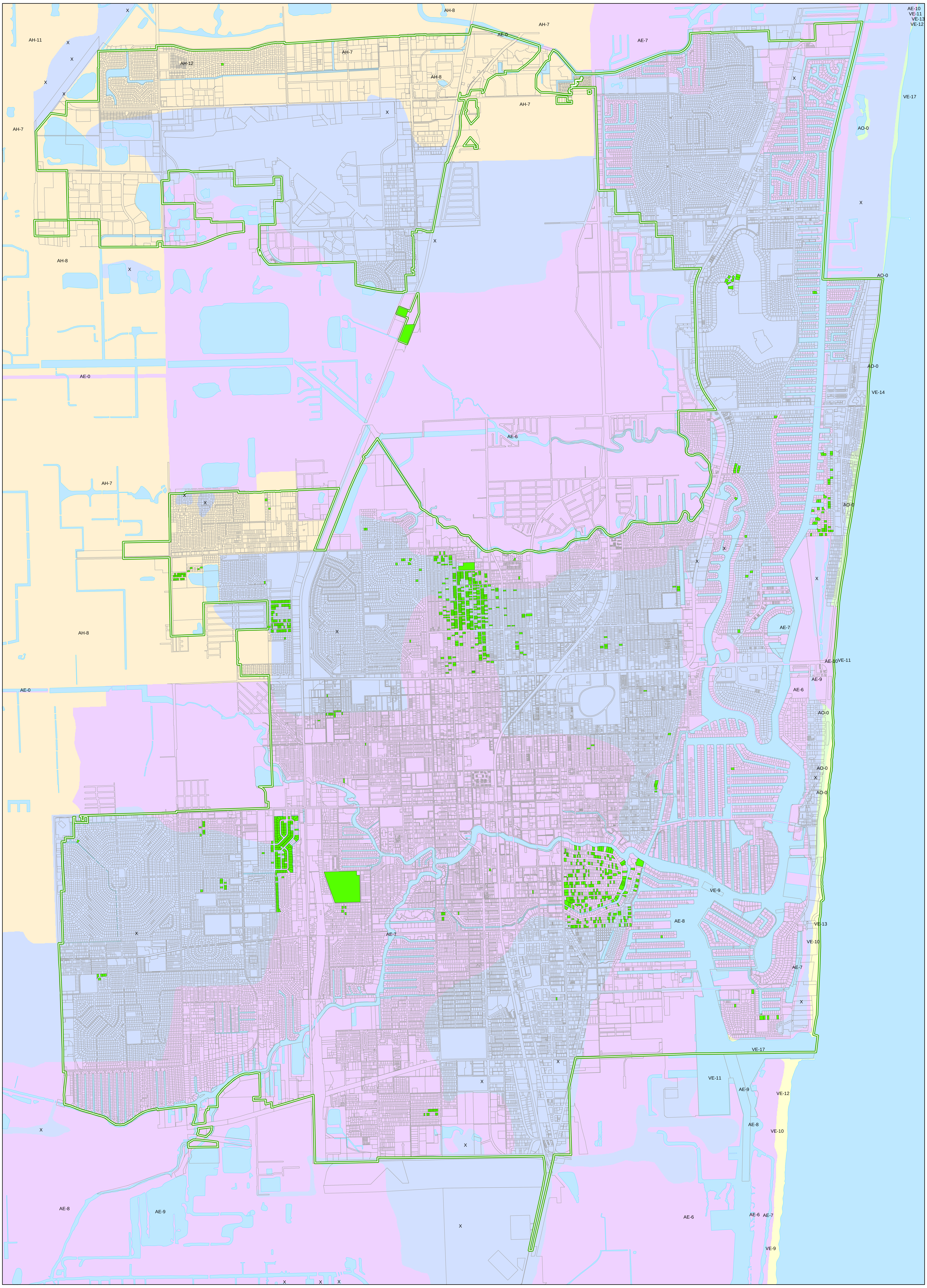
In determining the required preservation, relocation, or replacement of trees, the following factors shall be considered: Topography and drainage of the site.

8. Reclaimed water shall not be applied to impervious surfaces that allow drainage to surface waters and

Limitations of use of reclaimed water.
(a) Use of reclaimed water shall be limited to irrigation of residential lawns; golf courses; cemeteries; parks; landscaped areas; highway medians and rights-of-way; or other uses specifically approved by the Director and allowed by FDEP.
(b) Reclaimed water shall not be used inside any residential dwelling, or to fill swimming pools, hot tubs, spas, or wading pools.
(c) Reclaimed water shall not be applied to areas within one hundred (100) feet of any public outdoor eating, drinking or bathing facility, unless aerosol formation is minimized, as approved by the director.
(d) Reclaimed water shall not be applied to impervious surfaces that allow drainage to surface waters.

Appendix 2B
City of Fort Lauderdale
Swales

The following figure shows the locations of swales constructed as of 2007 within the City.



FORT LAUDERDALE SWALES

2007

CITY OF FORT LAUDERDALE

N

1 inch equals 1,750 feet

PROPERTIES WITH SWALES
CITY LIMITS
WATER BODIES
FLOOD ZONES
A
AE
AH
AO
VE
X

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Appendix 2C
Fort Lauderdale Code of Ordinances Stormwater Management Program

The following language is from Chapter 28, Article IV Stormwater Management Plan.

ARTICLE IV. STORMWATER MANAGEMENT PROGRAM

Sec. 28-191. Authority and general provisions.

The city is authorized by the Florida Constitution and the provisions of F.S. Ch. 166 and § 403.0893 to construct, reconstruct, repair, improve and extend stormwater management systems and to establish just and equitable rates, fees and charges for the services and facilities provided by the system. This ordinance shall be known and may be cited as the Stormwater Management Program (SMP) Ordinance of the City of Fort Lauderdale.

(Ord. No. C-92-34, § 2, 7-21-92)

Sec. 28-192. Findings of fact and statement of purpose.

(a) The city operates and maintains a system of storm and surface water management facilities, including but not limited to inlets, conduits, manholes, channels, ditches, drainage easements, retention and detention basins, infiltration facilities and other components as well as natural waterways.

(b) Those elements of the city storm and surface water management system that provides for the collection, storage, treatment and conveyance of stormwater are of benefit and provide services to all property within the city.

(c) The cost of operating and maintaining the stormwater management system and the financing of existing and future repairs, replacements, improvements, and extensions thereof should, to the extent practicable, be allocated in relationship to the benefits enjoyed and services received therefrom.

(d) Due to the age of the existing infrastructure, rehabilitation and replacement of some portions may be required.

(e) Water quality is degraded because of erosion and the discharge of nutrients, metals, oil, grease and other substances into and through the stormwater system.

(f) Public health, safety and welfare are adversely affected by poor water quality and flooding resulting from inadequate stormwater management practices.

(g) Real property either uses or benefits from the presence and operation of the stormwater management system.

(h) Florida local governments have authority to establish a stormwater management program pursuant to the home rule powers provided in the Florida Constitution and F.S. Chs. 166 and 403.

(i) The Florida legislature, through the adoption of F.S. § 403.0893, specifically authorizes and encourages local governments to provide stormwater management services as a utility function for which service charges may be levied.

(j) New and dedicated funding for the stormwater management program of the city is needed, and the levy of a stormwater management utility fee is the most equitable method of providing this funding.

(k) The federal Clean Water Act and implementing regulations adopted by the federal Environmental Protection Agency (EPA), requires permitting of certain municipal separate stormwater systems to ensure that minimum water quality standards are met.

(l) The establishment of a stormwater management plan now will mitigate the impact of costs ultimately imposed upon local governments through the adoption by the EPA of permitting standards for separate municipal stormwater systems.

(m) Adoption of a stormwater management program will generate revenues needed to implement the level of service standards contained in the city's comprehensive plan drainage element and the capital improvement element which were adopted in conformance with the requirements of F.S. Ch. 163.

(n) Local natural resource features such as wetlands, lakes and groundwater supplies can be protected and enhanced as part of the stormwater management program.

(Ord. No. C-92-34, § 2, 7-21-92)

Sec. 28-193. Definitions.

Unless specifically defined below, words or phrases shall be interpreted so as to give them the meaning they have in common usage and to give this article its most effective application.

Category I means any lot or parcel developed exclusively for residential purposes limited to, single-family homes, manufactured homes, multifamily, apartment buildings and condominiums designed to accommodate three (3) or fewer dwelling units.

Category II means any developed lot or parcel not in Category I or Category III, as defined herein.

Category III means property which is undeveloped or not significantly altered from its natural state by the addition of improvements such as buildings, structures, impervious surfaces, changes of grade, or landscaping, including but not limited to, vacant property, parks, airports, golf courses and well fields. For purposes of this article, a property shall be considered developed upon issuance of a certificate of occupancy, or upon completion of construction or final inspection if no such certificate is issued.

City shall mean the City of Fort Lauderdale, Florida.

Director shall mean the director of the utilities department or designee.

Dwelling unit means any residential space identified for habitation by members of a single housekeeping unit.

Impervious area shall mean any part of any parcel of land that has been modified to reduce the land's natural ability to absorb and hold rainfall.

Stormwater management plan shall mean a plan for receiving, storing, transporting and treating storm and surface waters within the city stormwater management system.

Stormwater runoff shall mean that part of precipitation that travels over natural, altered or improved surfaces to any stream, channel, canal, river, the Intracoastal Waterway, impoundment area or city owned and maintained rights-of-way.

Stormwater management system shall include all natural and manmade elements used to convey stormwater to a suitable location internal or external to the boundaries of the city. The stormwater management system includes, but is not limited to, all pipes, channels, streams, ditches, wetlands, sinkholes, detention/retention basins, ponds and other stormwater conveyance and percolation or treatment facilities.

(Ord. No. C-92-34, § 2, 7-21-92)

Sec. 28-194. Stormwater management program established; operational status.

There is hereby created and established a stormwater management program, which shall be the operational means of implementing and carrying out the functional requirements of the stormwater management system. The stormwater management program shall be responsible for the city stormwater management system.

(Ord. No. C-92-34, § 2, 7-21-92)

Sec. 28-195. Stormwater management utility fee.

A stormwater fee is hereby imposed upon each and every lot and parcel within the city for services and facilities provided by the stormwater management program. For purposes of imposing the stormwater fee, all lots and parcels within the city shall be classified into one of the following three (3) customer categories:

Category I--As defined herein.

Category II--As defined herein.

Category III--As defined herein.

(Ord. No. C-92-34, § 2, 7-21-92)

Sec. 28-196. Property classification; customer category.

The director shall determine and assign to each and every lot and parcel within the city a customer category as defined in this article.

(Ord. No. C-92-34, § 2, 7-21-92)

Sec. 28-197. Stormwater management program rates.

[The stormwater management program rates shall be as follows:]

TABLE INSET:

Customer Category	Monthly Stormwater Management Fee
Category I	$2.90 (per unit)
Category II	29.37 (per acre)
Category III	9.31 (per acre)

(Ord. No. C-92-34, § 2, 7-21-92; Ord. No. C-93-58, § 5, 9-21-93; Ord. No. C-01-42, § 6, 9-20-01; Ord. No. C-03-39, § 1, 11-18-03; Ord. No. C-04-047, § 6, 9-21-04; Ord. No. C-05-26, § 6, 9-28-05; Ord. No. C-06-29, § 6, 9-19-06)

Sec. 28-198. Billing and payment; penalties.

(a) Bills or statements for the stormwater utility fee shall be rendered monthly, in accordance with the regular utility billing cycle, by the utility billing division of the city for all properties subject to the fee. Bills shall be payable at the same time and in the same manner and subject to the same penalties as set for water in sections 28-188 and 28-190 of the Code of Ordinances. Any unpaid stormwater fees shall constitute a lien against the property, which lien shall be prior to all other liens on suchproperty except the liens of state, county and municipal taxes and shall be on a parity with the lien of such state, county and municipal taxes. Such lien, when delinquent for more than thirty (30) days, may be foreclosed by the city in the manner provided by the laws of Florida for the foreclosure of mortgages on real property.

(b) For properties normally receiving monthly municipal service bills for other services, the stormwater utility fee shall be included in the monthly utility bill rendered to the established customer.

(c) For properties not receiving monthly municipal service bills for other services, the bill or statement for the stormwater utility fee shall be sent to the property owner as determined from the property appraiser tax rolls. In such cases, the utility billing division may render an annual bill or render a special monthly municipal service bill at the option of the property owner.

(d) The owner of a property is ultimately responsible for all fees imposed under this article.

(e) Persons owning property annexed into the City of Fort Lauderdale shall commence payment of the stormwater utility fees after the first year following the date of annexation.

(Ord. No. C-92-34, § 2, 7-21-92; Ord. No. C-96-57, § 3, 10-1-96; Ord. No. C-97-9, § 11, 3-18-97)

Sec. 28-199. Adjustment of customer category or rate based upon property characterization or size.

(a) Requests for adjustment of the assigned customer category or rate paid shall be submitted to the utilities department, on the form provided by them and shall set forth in detail the grounds upon which relief is sought. The city manager shall have the authority to administer the procedures and standards and review criteria for the adjustment of category or fees as established herein. The utilities department may provide technical assistance and input to the city manager's office in the adjustment process. Noadjustment or credit shall be given for the installation of facilities required by city or county development codes or state stormwater rules. The following procedures shall apply to all adjustment requests:

(1) Adjustment requests will be reviewed by the city within a four-month period from the date a completed application including all required documentation that is needed to support the application has been submitted to the utilities department. Adjustments resulting from such request shall be retroactive to the date the application is complete including submission of all documentation but, in any case, shall not exceed one (1) year.

(2) Anyone requesting an adjustment shall be required to provide information along with their application which shall include, but shall not be limited to, survey data and engineering reports, performed by either a registered professional land surveyor currently registered in the State of Florida or a professional engineer currently registered in the State of Florida where appropriate to support their request. Failure to provide such information within four (4) months of date of application form may result in the denial of the adjustment request.

(3) Adjustments to the stormwater management fee to be paid shall be made upon the granting of the adjustment request, in writing, by the city manager or designee. Denials of adjustment requests shall be made in writing by the city manager or designee.

(4) During the period of time that a request for adjustment is made, all fees must be paid and the applicant for an adjustment must be current on the date the application is made.

(b) Category I customers shall be permitted to request a change in category only.

(Ord. No. C-92-34, § 2, 7-21-92)

Sec. 28-200. Stormwater management program enterprise fund.

There shall be established a stormwater management program enterprise fund for the deposit of all fees and charges collected pursuant to the stormwater management program. These funds shall be for the exclusive use of the city's stormwater management program including, but not limited to, the following:

(1) Stormwater management services, such as studies, design, permit review, plan preparation and development review.

(2) Operation, maintenance, repair and replacement of the stormwater collection, storage, treatment and conveyance infrastructure.

(3) Project costs related to constructing major or minor structural improvements to the stormwater-related infrastructure as provided in the city-wide stormwater management plan.

(4) Administrative costs associated with the management of the stormwater management program.

(5) Debt service financing of stormwater-related capital improvements.

(6) Funding of studies associated with the planning of stormwater-related infrastructure.

(Ord. No. C-92-34, § 2, 7-21-92)

Appendix 2D
Supreme Court of Florida
City of Gainesville v. State of Florida

The following language is a summary from court case SC02-1696 in which "stormwater fees constitute valid user fees."

Supreme Court of Florida

No. SC02-1696

CITY OF GAINESVILLE,
Appellant/Cross-Appellee,

vs.

STATE OF FLORIDA, et al.,
Appellees/Cross-Appellants.

[September 4, 2003]

CANTERO, J.

The City of Gainesville appeals a circuit court order dismissing its complaint, which sought validation of a proposed bond issue. We have jurisdiction. See art. V, § 3(b)(2), Fla. Const. The issue is whether the City's stormwater fees constitute a user fee, which are authorized under Florida Statutes, or a special assessment, which generally may not be charged to state agencies. The issue is relevant to the bond validation because the City pledged the stormwater fees as collateral for the bonds. Thus, if the fees are invalid, the bonds cannot be approved. See, e.g., Keys Citizens for Responsible Gov't, Inc. v. Florida Keys Aqueduct Auth., 795 So. 2d 940, 947 (Fla. 2001) (noting that where the municipality's fees are tied to the financing agreement on which the bonds will be secured, the validity of the fees are part of the court's inquiry into whether the public body has the authority to issue the bonds). For the reasons stated below, we find that the stormwater fees constitute valid user fees. Therefore, we reverse the order and remand with directions to enter a judgment validating the bonds.

I. FACTS

Stormwater runoff may cause flooding and threatens water quality in urban areas. See § 403.031(16), Fla. Stat. (2002) (noting that the objective of a stormwater management system is to prevent or reduce flooding and pollution). Therefore, stormwater must be collected, conveyed, treated, and disposed of. Florida law requires local governments to establish stormwater management programs. § 163.3202(2)(d), Fla. Stat. (2002); § 403.0891, Fla. Stat. (2002). To fund such programs, local governments may "[c]reate one or more stormwater utilities and adopt stormwater utility fees sufficient to plan, construct, operate, and maintain stormwater management systems set out in the local program required pursuant to s. 403.0891(3)." § 403.0893(1), Fla. Stat. (2002). A stormwater utility is defined as

> the funding of a stormwater management program by assessing the cost of the program to the beneficiaries based on their relative contribution to its need. It is operated as a typical utility which bills services regularly, similar to water and wastewater services.

§ 403.031(17), Fla. Stat. (2002).

The City created a stormwater utility. It based the rate structure for the utility fee on the "impervious area" of land. Impervious area means that part of the land through which stormwater cannot permeate, thus creating stormwater runoff.[1] The vast majority of stormwater utilities across the country establish their rate structures by measuring impervious area.

Instead of calculating the exact amount of impervious area on each residential parcel, the City used statistical estimates. The most common unit that stormwater utilities use to measure impervious area is the Equivalent Residential Unit (ERU). An ERU is generally established as the average or median impervious area of a single-family home. In this case, the City determined that the median single-family property in the City included 2300 square feet of impervious area. Based on this

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1. The City of Gainesville Code defines "impervious area" as "any part of any parcel of land that has an impermeable cover caused to be erected or constructed by the action of persons, and such covers include, but are not limited to, buildings, parking lots, driveways, patios, decks, walkways, and athletic courts." Gainesville, Fla., Code art. V, § 27-237 (2001).

calculation, the City established 2300 square feet as one ERU. It then created three classes of users and assigned different ERUs to each class. Most single-family properties are assigned one ERU. The City found that the impervious area of multi-family residential units was generally lower than for single-family homes. It therefore assigned .6 ERUs for apartments and mobile homes and 1.0 ERU for condominiums and duplexes.

For nonresidential properties, the City measured each property individually (over 3000 total) and assigned an ERU value to each. The ERU value is determined by measuring the square footage of impervious area on the property and dividing by 2300.

Under the City's rate structure, properties that do not use the stormwater system — that is, that retain all stormwater on-site — are not charged a fee.[2] For example, the City does not impose the fee on undeveloped properties because they contain no impervious area. Also, the University of Florida campus drains into a

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2. In applying the ordinance, the City gives partial credit when properties retain some, but not all, stormwater onsite. The ordinance itself, however, states that "[a] minimum value of 1.0 ERU shall be assigned to each nonresidential/commercial property unless such property has earned a 100-percent retention credit, in which case, the property will be assigned a value of 0.0 ERU." Gainesville, Fla., Code art. V, § 27-241(b)(3) (2002). Therefore, we analyze the City's stormwater management program according to the language of the ordinance.

lake for which the University provides all stormwater management services.

The City charges the fees on a monthly basis. It uses the revenue generated exclusively for stormwater management services. Gainesville, Fla., Code art. V, § 27-242. Delinquent charges may be referred to a collection agency, or to the city attorney. Id. The Code does not permit placement of a lien on property to collect delinquent charges.

The Department of Transportation (DOT) refused to pay the City's stormwater fees, arguing that it was exempt from such charges because the fees constituted either a tax or a special assessment.[3] The City filed a complaint seeking a judgment declaring that the stormwater fees constituted valid user fees and not special assessments, and claiming damages for unpaid fees. The circuit court dismissed the complaint on the DOT's motion, ruling as a matter of law that the City's stormwater fees constituted a special assessment. The First District Court

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3. If the stormwater fees were a tax, they would be illegal because the Florida Constitution authorizes municipalities to impose only ad valorem taxation "except as provided by general law," see art. VII, § 1(a), Fla. Const., and no law has authorized such a tax. Special assessments are not taxes because they confer a special benefit on the land burdened by the assessment. See City of Boca Raton v. State, 595 So. 2d 25, 29 (Fla. 1992). As a state agency, however, DOT would be exempt from special assessments absent a statute specially authorizing, either explicitly or "by necessary implication," special assessments on state property. See City of Gainesville v. State Dep't of Transp., 778 So. 2d 519, 521-22 (Fla. 1st DCA 2001) (quoting Blake v. City of Tampa, 156 So. 97, 99 (Fla. 1934)).

of Appeal reversed. In a thorough opinion, the court held that the City's ordinance, "if it operates as the City has alleged" — that is, if it assesses the cost of the program to the beneficiaries based on their relative contribution to its need and operates as a typical utility which bills services regularly — "imposes utility service fees rather than special assessments." City of Gainesville v. State Dep't of Transp., 778 So. 2d 519, 527 (Fla. 1st DCA 2001). The City, however, did not pursue that litigation and eventually filed a voluntary dismissal.

The issue of DOT's obligation to pay the stormwater fees arose again in 2001, when the City Commission approved issuance of revenue bonds to fund capital improvements to the stormwater system. Revenues from the stormwater fees will pay for the bonds. The City filed a complaint under section 75.04, Florida Statutes (2001), seeking to validate its proposed bond issue. The State and the DOT opposed validation. The DOT again argued that the stormwater fees were invalid — or at least did not apply to state agencies — because they constituted a tax or special assessment. All parties agreed that the only impediment to issuing the bonds was the validity of the underlying ordinance.

The circuit court held an evidentiary hearing. The court dismissed the complaint, finding that the City's fee was not based on the amount of stormwater a customer contributes to the system and that the fee was not voluntary. The court concluded that "the City of Gainesville does not have the authority to incur the obligations which are the subject of this action." The court denied the City's motion for rehearing and clarification. This appeal follows.

II. SCOPE AND STANDARD OF REVIEW

We have previously explained the scope of a bond validation proceeding: "[C]ourts should: (1) determine if a public body has the authority to issue the subject bonds; (2) determine if the purpose of the obligation is legal; and (3) ensure that the authorization of the obligation complies with the requirements of law." State v. City of Port Orange, 650 So. 2d 1, 2 (Fla. 1994). "Subsumed within the inquiry as to whether the public body has the authority to issue the subject bond is the legality of the financing agreement upon which the bond is secured." Id. at 3. In this case, the stormwater fees are pledged to repay the bonds. The validity of those fees is the only issue. We review the trial court's findings of fact for substantial competent evidence and its conclusions of law de novo. City of Boca Raton v. State, 595 So. 2d 25, 31 (Fla. 1992) (upholding trial court findings that were based on competent substantial evidence); Panama City Beach Cmty. Redev. Agency v. State, 831 So.2d 662, 665 (Fla. 2002) ("It is clear that this Court's review of the trial court's conclusions of law is de novo.").

III. ANALYSIS

To determine the legality of the financing agreement we must address two issues: (A) whether the City's fee is a user fee or a special assessment; and (B) the propriety of the City's fee structure. We address these issues in turn.

A. User Fee or Special Assessment?

DOT does not argue that the stormwater fees constitute a tax. Therefore, in determining the validity of the bonds, we must decide whether the City's stormwater fee constitutes a user fee or a special assessment. If the stormwater fee is a user fee, the fee is valid and the State and DOT, as beneficiaries of the system, can be charged. If the fee is a special assessment, however, the State and DOT cannot be assessed the fee absent statutory authorization. See City of Gainesville, 778 So. 2d at 521-22 (noting that state agencies may not be charged special assessments absent a statute specially authorizing special assessments on state property) (quoting Blake v. City of Tampa, 156 So. 97, 99 (Fla. 1934)).

We acknowledge that under the authorizing statute a municipality may fund its stormwater management system either through the use of user fees or through special assessments. See generally § 403.0893, Fla. Stat. (2002). However, when a municipality chooses to fund its stormwater management system through special assessments, it does so pursuant to section 403.0893(3) and therefore does not technically establish a stormwater utility. Compare § 403.0893(1) (authorizing the creation of a stormwater utility and the imposition of stormwater utility fees), with § 403.0893(3) (authorizing special assessments to fund a stormwater management system). Although section 403.0893(3), Florida Statutes, authorizes special assessments, the City has not followed the required procedures under that section. Rather, the City has established a stormwater utility under section 403.0893(1) and has imposed utility fees. Therefore, the stormwater fees are only legal if they constitute user fees.

We have previously recognized that user fees and special assessments are similar. See Collier County v. State, 733 So. 2d 1012, 1018-19 (Fla. 1999). We have defined user fees as

> charges based upon the proprietary right of the governing body permitting the use of the instrumentality involved. Such fees share common traits that distinguish them from taxes: they are charged in exchange for a particular governmental service which benefits the party paying the fee in a manner not shared by other members of society, and they are paid by choice, in that the party paying the fee has the option of not utilizing the governmental service and thereby avoiding the charge.

City of Port Orange, 650 So. 2d at 3 (citations omitted). Similarly, special assessments are "charge[s] assessed against [the] property of some particular locality because that property derives some special benefit [from] the expenditure of [the] money." Workman Enters., Inc. v. Hernando County, 790 So. 2d 598, 599 (Fla. 5th DCA 2001) (quoting Atlantic Coast Line R.R. Co. v. City of Gainesville, 91 So. 118, 121 (Fla. 1922)).

As the First District noted in the related case, "[t]he boundary between special assessments and user fees is not always clear." City of Gainesville, 778 So. 2d at 526. One leading authority has explained the difference between user fees and special assessments as follows:

> In determining whether a charge for connecting property with the municipal water service is a "fee" or an "assessment," the name given to the charge is not controlling; it is the reason for the charge which controls its nature, and if it is a charge made for the improvement of a certain piece of property, it is an assessment. Similarly, charges for connection to or the use of a sewer generally are not deemed taxes.
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> There is no bright-line test for distinguishing between a connection/use fee and a special assessment; generally, a "fee" is exchanged for a service rendered or a benefit conferred, and some reasonable relationship exists between the amount of the fee and the value of the service or benefit, while a "special assessment" is a specific levy designed to recover the costs of improvements that confer local and peculiar benefits upon property within a defined area. "User fees" are those which are charged only to the person actually using the service, and the amount of the charge generally is related to the actual goods or services provided and is a monthly charge rather than a one-time charge.

70C Am. Jur. 2d, Special or Local Assessments § 2, at 631-32 (2000) (footnotes omitted), quoted in City of Gainesville, 778 So.2d at 526.

We therefore consider various factors in determining whether the stormwater fees in this case constitute a user fee or a special assessment. These include: the name given to the charge; the relationship between the amount of the fee and the value of the service or benefit; whether the fee is charged only to users of the service or is charged to all residents of a given area; whether the fee is voluntary—that is, whether a property owner may avoid the fee by refusing the service; whether the fee is a monthly charge or a one-time charge; whether the fee is charged to recover the costs of improvements to a defined area or infrastructure or for the routine provision of a service; whether the fee is for a traditional utility service; and whether the fee is statutorily authorized as a fee. None of these factors is controlling; nor are they necessarily exclusive. Rather, we must consider each factor in light of the circumstances as a whole in each particular case.

In this case, considering all the circumstances, we conclude that the stormwater fees constitute a user fee, not a special assessment. The City itself calls the fee a user fee, which is not dispositive but is relevant. Moreover, the City charges the fees on a monthly basis, not as a one-time charge.

The City's creation of a stormwater utility, as the statute authorized, is a strong factor militating in favor of finding the stormwater fees a user fee. The City "establish[ed] stormwater management as a city utility enterprise in accordance with

F.S. § 403.0893" and "establish[ed] a program of user charges for stormwater management service to be charged to all developed property within the city that contributes stormwater runoff to the city's stormwater management systems to accomplish the functions of such utility." Gainesville, Fla., Code art. V, § 27-236.

We have previously recognized that the creation of a statutorily-authorized utility strongly favors the validity of the fees imposed. In Pinellas County v. State, 776 So. 2d 262, 268 (Fla. 2001) (footnote omitted), we noted that "where a governmental entity provides access to traditional utility services, this Court has not hesitated to uphold local ordinances imposing mandatory fees, regardless of whether the individual customer actually uses or desires the service." In a footnote, we cited stormwater management programs defined under section 403.031(17), Florida Statutes (1997) as one category of many statutorily-authorized programs imposing mandatory fees to recoup the costs of providing water service. Id. at 268 n. 11. In another footnote, we noted that water systems are equivalent to traditional utilities such as sewer systems. Id. at 268 n.10. Also, in City of Port Orange, 650 So. 2d at 4, we distinguished a transportation utility fee that we held to be a tax from stormwater utility fees, noting that "storm-water utility fees are expressly authorized by section 403.031, Florida Statutes (1993)." See also City of Dunedin v. Contractors & Builders Ass'n, 312 So. 2d 763, 766 (Fla. 2d DCA 1975) ("The imposition of fees for the use of a municipal utility system is not an exercise of the taxing power nor is it the levy of a special assessment.") (citing State v. City of Miami, 27 So. 2d 118 (Fla. 1946)), quashed on other grounds, 329 So. 2d 314 (Fla. 1976). Therefore, the fact that the City has created a statutorily-authorized utility to provide stormwater management services militates strongly in favor of finding that the stormwater fees are user fees.

The State and DOT argue that the City's fee constitutes a special assessment because it is not voluntary. The evidence showed, however, that in most cases the fee is voluntary. The City requires only properties that actually use the system to pay the fee. Properties that are either undeveloped or implement ways to retain all stormwater on site are exempted. Therefore, property owners can avoid the fee either by not developing the property or by implementing a system to retain stormwater on site. See City of Gainesville, 778 So. 2d at 525 (holding that "[b]ecause a landowner can refuse the City's stormwater utility service and prevent liability for stormwater utility fees by containing runoff, the fees are neither a tax nor a special assessment").

Nevertheless, the State and DOT argue that regarding apartment complexes in particular, because the City charges the fee to the tenants, not the owners, and because the tenants cannot avoid the fee, the fee is not voluntary as to those tenants. They rely on Port Orange, 650 So. 2d at 3, in which we noted that "[user fees] are paid by choice, in that the party paying the fee has the option of not utilizing the governmental service and thereby avoiding the charge." In this case, however, tenants may avoid the charge by choosing to live in multi-family dwellings that do not use the City's stormwater system.

Even if we accept the proposition that tenants have no choice, although the voluntariness of the fee is one factor to consider, it is not dispositive. In Pinellas County, 776 So. 2d at 268, we noted that we have upheld even mandatory fees for traditional utility services. A stormwater utility is similar to wastewater and sewer systems. Florida courts have upheld mandatory fees for such systems. See State v. City of Miami Springs, 245 So. 2d 80 (Fla.1971) (holding that a municipality may charge a mandatory fee for sewer service unrelated to actual use); Town of Redington Shores v. Redington Towers, Inc., 354 So. 2d 942 (Fla. 2d DCA 1978) (holding that the subject sewer fee applied to unoccupied condominiums without regard to actual use); see also Stone v. Town of Mexico Beach, 348 So. 2d 40 (Fla. 1st DCA 1977) (upholding a mandatory flat rate for garbage service, regardless of use); City of Riviera Beach v. Martinique 2 Owners Ass'n, 596 So. 2d 1164 (Fla. 4th DCA 1992) (holding that the subject solid waste removal ordinance applied to unoccupied condominiums without regard to actual use). Therefore, where a statute authorizes a utility fee, such fees may be considered user fees even though mandatory. In Port Orange, we noted that the transportation utility fee at issue was not statutorily authorized and therefore was not analogous to stormwater utility fees or other utility fees authorized by statute. We did not suggest that utility fees will only be considered user fees if they are voluntary, only that, where not authorized by statute, a valid user fee involves an element of choice. Again, we emphasize that a court must consider all the circumstances together, and none in isolation, in determining whether a particular charge is a user fee or a special assessment.

B. The Propriety of the City's Fee Structure

DOT argues, and the trial court concluded, that the City's ordinance violated section 403.031(17), Florida Statutes, because the fees are not based on the amount of stormwater a customer contributes to the system. We begin with the well-settled principle that the establishment of utility rates is generally a legislative function. Mohme v. City of Cocoa, 328 So. 2d 422, 424 (Fla. 1976). In setting utility rates, municipalities enjoy a certain latitude. City of Gainesville, 778 So. 2d at 525 (citing State v. City of Miami, 27 So. 2d 118, 125 (Fla. 1946)). A city may charge different rates to different classes of users so long as the classifications are not arbitrary, unreasonable, or discriminatory. City of Miami Springs, 245 So.2d at 81.

Section 403.031(17) requires that the fees charged be based on the beneficiaries' "relative contribution" to the need for a stormwater management system. Acting within its legislative discretion, the City determined that rain does not create the need for a stormwater management system. Rather, the need is created by impervious area, which prevents the rain from percolating into the ground. Therefore, the City properly based its fee on the amount of impervious area on each property. Moreover, in calculating the impervious area, the City acted within its discretion by using statistical estimates to determine that the typical single-family home in Gainesville creates a relatively equal need for a stormwater system. The City determined that the median single-family property in the City included 2300 square feet of impervious area, and based its ERUs on that figure. Those single-family homes that create a disproportionately greater need for the system — i.e., homes with more than 50 percent impervious area and situated on lots with more than 10,000 square feet of total area — are billed separately. Thus, the City's approach is reasonable. Section 403.0891(6), Florida Statutes, expressly authorizes this method of apportioning cost.[4] The evidence showed that most

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4. Section 403.0891(6) requires that agencies and local governments develop a model stormwater management program containing dedicated funding options, "including a stormwater utility fee system based upon an equitable unit cost

stormwater utilities across the country use ERUs to estimate stormwater use. Courts in other states have upheld such a measurement. See Teter v. Clark County, 704 P.2d 1171, 1179 (Wash. 1985) (refusing to require the municipality to measure each residential lot to ascertain the exact amount of impervious surface on each one).

DOT takes issue with the City's use of a flat rate that does not account for the particular property's actual use of the system.[5] As the First District recognized in considering this issue, however, stormwater runoff, like wastewater and solid waste — and unlike potable water, gas, and electricity — cannot feasibly be metered. City of Gainesville, 778 So. 2d at 525. In City of Miami Springs, 245 So. 2d at 81, we upheld an ordinance setting a flat sewer fee of $7.00 per month for single-family residences and a variable rate based on use for all other users. Other Florida courts regularly have upheld flat rates for utility services. See City of New Smyrna Beach v. Fish, 384 So. 2d 1272, 1273 (Fla. 1980) (upholding an ordinance setting garbage collection rates that established a flat rate for single-family

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approach."

5. At trial, DOT argued that the City had to measure the precise amount of stormwater runoff from each property, but acknowledged that implementing a system for accurately measuring the runoff was prohibitively expensive, if it was available at all. The DOT has abandoned this argument on appeal.

residences and multifamily residences of a certain size and a variable rate for all others based on the number and size of the containers); Town of Mexico Beach, 348 So. 2d at 42 (upholding an ordinance charging a flat garbage rate for all residential users regardless of whether premises were occupied); Pinellas Apartment Ass'n v. City of St. Petersburg, 294 So.2d 676, 678 (Fla. 2d DCA 1974) (noting that "[t]he setting of utility rates is often a complicated process and mathematical exactitude cannot be required").

Cases in other states also have upheld rates that do not precisely correlate with actual use. See Home Builders Ass'n of Utah v. City of American Fork, 973 P.2d 425, 429 (Utah 1999) (warning that "municipalities must have sufficient flexibility to deal realistically with issues that do not admit of any kind of precise mathematical equality"); McDonald Mobile Homes, Inc. v. Village of Swansea, 371 N.E.2d 1155, 1158 (Ill. App. Ct. 1977) (upholding sewer fees where single-family residences, apartments, motel rooms and mobile homes were all placed in one classification, and commercial in another, noting that "[w]hile we agree with plaintiffs that defendant's method for determining sewer use is not scientifically precise, we believe there is a substantial correlation between water consumption and sewer use and that the Village's scheme for assessing sewer use charges is a reasonable exercise of its legislative authority"); McGrath v. City of Manchester, 398 A.2d 842, 845 (N.H. 1979) (noting that "[t]he fact that absolute mathematical equality is not achieved does not render the system invalid"); Watergate II Apartments v. Buffalo Sewer Auth., 385 N.E.2d 560, 564 (N.Y. 1978) (recognizing that "[w]here only an approximation of cost or value is possible, discrepancies may have to be endured in the name of administrative flexibility so long as there exists some rational underpinning on the charges levied").

The City also acted within its discretion in creating separate categories for multifamily homes and nonresidential property. For commercial properties, the City actually measures both impervious and semi-impervious area to determine the amount of stormwater runoff. We find nothing irrational in the distinction between runoff from single-family residences, for which the amount of runoff will vary but little from home to home, and those for commercial properties, which may vary more significantly. We have upheld such distinctions between residential and commercial properties in setting utility rates. See Miami Springs, 245 So. 2d at 81 (upholding an ordinance setting a flat sewer fee of $7.00 per month for single-family residences and a variable rate based on use for all other users).

IV. ISSUES ON CROSS APPEAL

DOT raises two issues on cross appeal: whether sovereign immunity bars the

City from collecting stormwater fees from DOT; and whether the City must consider the DOT's contribution to the stormwater system in assessing any fee against DOT-owned property. Such issues are beyond the scope of a bond validation proceeding and therefore we do not address them. The DOT is free to assert those arguments in another forum.

V. CONCLUSION

The financing agreement upon which the City's proposed bond issue is secured is legal. Accordingly, we reverse the trial court's dismissal of the City's complaint and remand with instructions for the trial court to enter an order validating the City's bonds. We also reverse the award of costs to DOT.

It is so ordered.

ANSTEAD, C.J., and WELLS, PARIENTE, QUINCE, and BELL, JJ., concur.
LEWIS, J., concurs in result only.

NOT FINAL UNTIL TIME EXPIRES TO FILE REHEARING MOTION, AND IF FILED, DETERMINED.

A Notice and Cross-Notice of Appeal from the Circuit Court in and for Alachua County - Bond Validations

R. A. Green, Jr. - Judge - Case No. 2001-CA-004478

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Appendix 2E
Florida Statute
Uniform Method

The following language is from Chapter 197.363, Florida Statute, which defines the Uniform Method of collecting stormwater utility fees.

CHAPTER 197 TAX COLLECTIONS, SALES, AND LIENS

197.363 Special assessments and service charges;optional method of collection.

(1) At the option of the property appraiser, special assessments collected pursuant to this section prior to January 1, 1990, may be collected pursuant to this section after January 1, 1990. However, any local governing board collecting non-ad valorem assessments pursuant to this section on January 1, 1990, may elect to collect said assessments pursuant to s.197.3632. In the event of such election, the local governing board shall notify the property appraiser and tax collector in writing and comply with s.197.3632(2) and the applicable certification provisions of s. 197.3632(5). If a local governing board amends any non-ad valorem assessment roll certified under this provision, the local governing board shall comply with all applicable provisions of s. 197.3631.

(2) In accordance with subsection (1), special assessments authorized by general or special law or the State Constitution may be collected as provided for ad valorem taxes under this chapter if:

- (a) The entity imposing the special assessment has entered into a written agreement with the property appraiser, at her or his option, providing for reimbursement of administrative costs incurred under this section;
- (b) A resolution authorizing use of this method for collection of special assessments is adopted at a public hearing;
- (c) Affected property owners have been provided by first-class mail prior notice of both the potential for loss of title that exists with use of this collection method and the time and place of the public hearing requiredby paragraph (b);
- (d) The property appraiser has listed on the assessment roll the special assessment for each affected parcel;
- (e) The dollar amount of the special assessment has been included in the notice of proposed property taxes; and
- (f) The dollar amount of the special assessment has been included in the tax notice issued pursuant to s. 197.322.

(3) When collected by using the method provided for ad valorem taxes, special assessments shall be subject to all collection provisions of this chapter, including provisions relating to discount for early payment,prepayment by installment method, penalty for delinquent payment, and issuance of tax certificates and tax deeds for nonpayment, and shall also be subject tothe provisions of s. 192.091(2)(b)2.

(4) If the requirements of subsection (2) which are imposed upon the collection of special assessments are not met, the collection of such special assessments shall be by the manner provided in the ordinance or resolution establishing such special assessments. The manner of collection established in any ordinance or resolution shall be in compliance with all general or special laws authorizing the levy of such special assessments, andin no event shall the ordinance or resolution provide for use of the advalorem collection method.

(5) The tax collector of a county may act as agent for the county in collecting service charges if the board of county commissioners of the county and the tax collector establish by agreement a manner in which service charges may be collected. The board of county

commissioners shall compensate the tax collector for the actual cost of collecting such service charges. However, tax certificates and tax deeds may not be issued for nonpayment of service charges, and such charges shall not be included on a bill for advalorem taxes.

(6) Effective January 1, 1990, no new special assessments may be collected pursuant to this section.

History: s. 162, ch. 85-342; s. 2, ch. 86-141; s. 66, ch. 88-130; s. 5, ch.88-216; s. 1012, ch. 95-147.

197.3631 Non-ad valoremassessments; general provisions.

Non-ad valorem assessments as defined in s. 197.3632 maybe collected pursuant to the method provided for in ss. 197.3632 and 197.3635. Non-ad valorem assessments may also be collected pursuant to any alternative method which is authorized by law, but such alternative method shall not require the tax collector or property appraiser to perform those services as provided for in ss.197.3632 and 197.3635. However, a property appraiser or tax collector may contract with a local government to supply information and services necessary for any such alternative method. Section 197.3632 is additional authority for local governments to impose and collect non-ad valorem assessments supplemental to the home rule powers pursuant to ss. 125.01 and 166.021 and chapter170, or any other law. Any county operating under a charter adopted pursuant to s. 11, Art. VIII of the Constitution of 1885, as amended, as referred to in s. 6(e), Art. VIII of the Constitution of 1968, as amended, may use any method authorized by law for imposing and collecting non-ad valorem assessments.

History: s. 67, ch. 88-130; s. 6, ch. 88-216; s. 7, ch.90-343.

197.3632 Uniform method for the levy, collection, and enforcement of non-ad valorem assessments.

(1) As used in this section:

(a) "Levy" means the imposition of a non-ad valorem assessment, stated in terms of rates, against all appropriately located property by a governmental body authorized by law to impose non-ad valorem assessments.

(b) "Local government" means a county, municipality, or special district levying non-ad valorem assessments.

(c) "Local governing board" means a governing board of a local government.

(d) "Non-ad valorem assessment" means only those assessments which are not based upon millage and which can become a lien against a homestead as permitted in s. 4, Art. X of the State Constitution.

(e) "Non-ad valorem assessment roll" means the roll prepared by a local government and certified to the tax collector for collection.

(f) "Compatible electronic medium" or "media" means machine-readable electronic repositories of data and information, including, but not limited to, magnetic disk, magnetic tape, and magnetic diskette technologies, which provide without modification that the data and information therein are in harmony with and can be used in concert with the data and information on the ad valorem tax roll keyed to the property identification number used by the property appraiser.

(g) "Capital project assessment" means a non-ad valorem assessment levied to fund a capital project, which assessment may be payable in annual payments with interest, over a period of years.

(2) A local governing board shall enter into a written agreement with the property appraiser and tax collector providing for reimbursement of necessary administrative costs incurred under this section. Administrativecosts shall include, but not be limited to, those costs associated with personnel, forms, supplies, data processing, computer equipment, postage, and programming.

(3)

(a) Notwithstanding any other provision of law to the contrary, a local government which is authorized to impose a non-ad valorem assessment and which elects to use the uniform method of collecting such assessment for the first time as authorized in this section shall adopt a resolution at a public hearing prior to January 1 or, if the property appraiser, tax collector, and local government agree, March 1. The resolution shall clearly state its intent to use the uniform method of collecting such assessment. The local government shall publish notice of its intent to use the uniform method for collecting such assessment weekly in a newspaper of general circulation within each county contained in the boundaries of the local government for 4 consecutive weeks preceding the hearing. The resolution shall state the need for the levy and shall include a legal description of the boundaries of thereal property subject to the levy. If the resolution is adopted, the local governing board shall send a copy of it by United States mail to the property appraiser, the tax collector, and the department by January 10 or, if the property appraiser, tax collector, and local government agree, March 10.

(b) Annually by June 1, the property appraiser shall provide each local government using the uniform method with the following information by list or compatible electronic medium: the legal description of the property within the boundaries described in the resolution, and the names and addresses of the owners of such property. Such information shall reference the property identification number and otherwise conform in format to that contained on the ad valorem roll submitted to the department. The property appraiser is not required to submit information which is not on the ad valorem roll or compatible electronic medium submitted to the department. If the local government determines that the information supplied by the property appraiser is insufficient for the local government's purpose, the local government shall obtain additional information from any other source.

(4)

(a) A local government shall adopt a non-ad valorem assessment roll at a public hearing held between June 1 and September 15 if:

1. The non-ad valorem assessment is levied for the first time;
2. The non-ad valorem assessment is increased beyond the maximum rate authorized by law or judicial decree at the time of initial imposition;
3. The local government's boundaries have changed, unless all newly affected property owners have provided written consent for such assessment tothe local governing board; or

4. There is a change in the purpose for such assessment or in the use of the revenue generated by such assessment.

(b) At least 20 days prior to the public hearing, the local government shall notice the hearing by first-class United States mail and by publication in a newspaper generally circulated within each county contained in the boundaries of the local government. The notice by mail shall be sent to each person owning property subject to the assessment and shall include the following information: the purpose of the assessment; the total amount to be levied against each parcel; the unit of measurement to be applied against each parcel to determine the assessment; the number of such units contained within each parcel; the total revenue the local government will collect by the assessment; a statement that failure to pay the assessment will cause a tax certificate to be issued against the property which may result in a loss of title; a statement that all affected property owners have a right to appear at the hearing and to file written objections with the local governing board within 20 days of the notice; and the date, time, and place of the hearing. However, notice by mail shall not be required if notice by mail is otherwise required by general or special law governing a taxing authority and such notice is served at least 30 days prior to the authority's public hearing on adoption of a new or amended non-ad valorem assessment roll. The published notice shall contain at least the following information: the name of the local governing board; a geographic depiction of the property subject to the assessment; the proposed schedule of the assessment; the fact that the assessment will be collected by the tax collector; and a statement that all affected property owners have the right to appear at the public hearing and the right to file written objections within 20 days of the publication of the notice.

(c) At the public hearing, the local governing board shall receivet he written objections and shall hear testimony from all interested persons.The local governing board may adjourn the hearing from time to time. If the local governing board adopts the non-ad valorem assessment roll, it shalls pecify the unit of measurement for the assessment and the amount of the assessment. Notwithstanding the notices provided for in paragraph (b), the local governing board may adjust the assessment or the application of the assessment to any affected property based on the benefit which the board will provide or has provided to the property with the revenue generated by the assessment.

(5) By September 15 of each year, the chair of the local governing board or his or her designee shall certify a non-ad valorem assessment roll on compatible electronic medium to the tax collector. The local government shall post the non-ad valorem assessment for each parcel onthe roll. The tax collector shall not accept any such roll that is not certified on compatible electronic medium and that does not contain the posting of the non-ad valorem assessment for each parcel. It is the responsibility of the local governing board that such roll be free of errors and omissions. Alterations to such roll may be made by the chair or his orher designee up to 10 days before certification. If the tax collector discovers errors or omissions on such roll, he or she may request the local governing board to file a corrected roll or a correction of the amount of any assessment.

(6) If the non-ad valorem assessment is to be collected for a period of more than 1 year or is to be amortized over a number of years, the local governing board shall so specify and shall not be required to annually adopt the non-ad valorem assessment roll. However, the local governing board shall inform the property appraiser, tax collector, and department by January10 if it intends to discontinue using the uniform method of collecting such assessment.

(7) Non-ad valorem assessments collected pursuant to this section shall be included in the combined notice for ad valorem taxes and non-advalorem assessments provided for in s. 197.3635. A separate mailing is authorized only as a solution to the most exigent factual circumstances. However, if a tax collector cannot merge a non-ad valorem assessment roll to produce such a notice, he or she shall mail a separate notice of non-advalorem assessments or shall direct the local government to mail such aseparate notice. In deciding whether a separate mailing is necessary, the tax collector shall consider all costs to the local government and taxpayers of such a separate mailing and the adverse effects to the taxpayers of delayed and multiple notices. The local government whose roll could not be merged shall bear all costs associated with the separate notice.

(8)

(a) Non-ad valorem assessments collected pursuant to this section shall be subject to all collection provisions of this chapter, including provisions relating to discount for early payment, prepayment by installment method, deferred payment, penalty for delinquent payment, and issuance and sale of tax certificates and tax deeds for nonpayment.

(b) Within 30 days following the hearing provided in subsection (4), any person having any right, title, or interest in any parcel against which an assessment has been levied may elect to prepay the same in whole, and the amount of such assessment shall be the full amount levied, reduced, if the local government so provides, by a discount equal to any portion of the assessment which is attributable to the parcel's proportionate share of any bond financing costs, provided the errors and insolvency procedures available for use in the collection of ad valorem taxes pursuant to s. 197.492 are followed.

(c) Non-ad valorem assessments shall also be subject to the provisions of s. 192.091(2)(b), or the tax collector at his or her optionshall be compensated for the collection of non-ad valorem assessments based on the actual cost of collection, whichever is greater. However, a municipal or county government shall only compensate the tax collector for the actual cost of collecting non-ad valorem assessments.

(9)

(a) A local government may elect to use the uniform method of collecting non-ad valorem assessments as authorized by this section for any capital project assessment levied pursuant to general or special law or municipal or county ordinance, whether or not such assessment was initially imposed prior to January 1, 1990, or has previously been collected by another method. Capital project assessments may be levied and collected prior to completion of the capital project.

(b)

1. Except as provided in this subsection, the local government shall comply with all of the requirements set forth in subsections (1) through (8).
2. The requirements set forth in subsection (4) shall be deemed satisfied if:
    a. The local government adopts or reaffirms the non-ad valorem assessment roll at a public hearing held at any time prior to certification of the non-ad valorem assessment roll pursuant to subsection (5) for the first year in which the capital project assessment is to be collected in the manner authorized by this section; and
    b. The local government provides notice of the public hearing in the manner provided in paragraph (4)(b).
3. The local government shall not be required to allow prepayment as set forth in paragraph (8)(b); however, if prepayment is allowed, the errors and insolvency procedures available for use in the collection of ad valorem taxes pursuant to s. 197.492 shall be followed.

(c) Any hearing or notice required by this section may be combined with any other hearing or notice required by this section or by the general or special law or municipal or county ordinance pursuant to which a capital project assessment is levied.

(10) The department shall adopt rules to implement the provisions of this section.

History: s. 68, ch. 88-130; s. 7, ch. 88-216; s. 8, ch. 90-343; s. 2, ch. 91-238;s. 1013, ch. 95-147.

197.3635 Combined notice of advalorem taxes and non-ad valorem assessments; requirements.

A form for the combined notice of ad valorem taxes and non-ad valorem assessments shall be produced and paid for by the tax collector. The form shall meet the requirements of this section and department rules and shall be subject to approval by the department. By rule the department shall provide a format for the form of such combined notice. The form shall meet the following requirements:

(1) It shall contain the title "Notice of AdValorem Taxes and Non-ad Valorem Assessments." It shall also contain a receipt part that can be returned along with the payment to the tax collector.

(2) It shall provide a clear partition between advalorem taxes and non-ad valorem assessments. Such partition shall be a bold horizontal line approximately 1/8 inch thick.

(3) Within the ad valorem part, it shall contain the heading "Ad Valorem Taxes." Within the non-ad valorem assessment part, it shall contain the heading "Non-ad Valorem Assessments."

(4) It shall contain the county name, the assessment year, the mailing address of the tax collector, the mailing address of one property owner, the legal description of the property to at least 25 characters, and the unique parcel or tax identification number of the property.

(5) It shall provide for the labeled disclosure of the total amount of combined levies and the total discounted amount due each month when paid in advance.

(6) It shall provide a field or portion on the front of the notice for official use for data to reflect codes useful to the tax collector.

(7) The combined notice shall be set in type which is 8 points or larger.

(8) The ad valorem part shall contain the following:

(a) A schedule of the assessed value, exempted value, and taxable value of the property.

(b) Subheadings for columns listing taxing authorities ,corresponding millage rates expressed in dollars and cents per $1,000 of taxable value, and the associated tax.

(c) Taxing authorities listed in the same sequence and manner as listed on the notice required by s. 200.069(4)(a), with the exception that independent special districts, municipal service taxing districts, and voted debt service millages for each taxing authority shall be listed separately. If a county has too many municipal service taxing units to list separately, it shall combine them to disclose the total number of such units and the amount of taxes levied.

(9) Within the non-ad valorem assessment part, itshall contain the following:

(a) Subheadings for columns listing the levying authorities, corresponding assessment rates expressed in dollars and cents per unit of assessment, and the associated assessment amount.

(b) The purpose of the assessment, if the purpose is not clearly indicated by the name of the levying authority.

(c) A listing of the levying authorities in the same order as in the ad valorem part to the extent practicable. If a county has too many municipal service benefit units to list separately, it shall combine them by function.

(10) It shall provide instructions and useful information to the taxpayer. Such information and instructions shall be nontechnical to minimize confusion. The information and instructions required by this section shall be provided by department rule and shall include:

(a) Procedures to be followed when the property has been sold or conveyed.

(b) Instruction as to mailing the remittance and receipt along with a brief disclosure of the availability of discounts.

(c) Notification about delinquency and interest for delinquent payment.

(d) Notification that failure to pay the amounts due will result in a tax certificate being issued against the property.

(e) A brief statement outlining the responsibility of the tax collector, the property appraiser, and the taxing authorities.This statement shall be accompanied by directions as to which office to contact for particular questions or problems.

History: s. 69, ch. 88-130; s. 8, ch. 88-216.

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Appendix 3A
Surface Water Management Model Hydrologic Data

The following tables present the existing land use hydrology for the City of Fort Lauderdale regional EPA SWMM Project.

Existing Conditions								
Hydrologic Units	Width	Area	% DCIA	Slope	Manning's Roughness		Initial Abstractions (in)	
(HUs)	(ft)	(Ac)	(%)	(%)	Impervious	Pervious	Impervious	Pervious
HUBROWARD-01	6,144	97.4	53.4	0.78	0.015	0.230	0.1	0.219
HUBROWARD-02	8,996	271.8	35.3	0.14	0.015	0.219	0.1	0.224
HUBROWARD-03	9,938	133.8	39.1	0.82	0.015	0.216	0.1	0.223
HUBROWARD-05	7,288	49.0	73.4	0.24	0.015	0.156	0.1	0.182
HUC12UI-01	32,000	336.0	36.2	1.00	0.015	0.214	0.1	0.224
HUHF-01	23,056	441.1	45.9	0.46	0.016	0.229	0.1	0.219
HUHF-02	60,000	634.9	71.7	0.40	0.016	0.199	0.1	0.194
HUMELROSEPK-01	18,714	379.9	27.0	0.52	0.015	0.213	0.1	0.226
HUMIDLST-01	2,810	11.8	67.7	0.66	0.015	0.133	0.1	0.175
HUNFNR-10	6,526	23.5	51.5	1.66	0.019	0.210	0.1	0.217
HUNFNR-11	13,778	182.5	55.4	0.56	0.016	0.195	0.1	0.210
HUNFNR-12	3,642	53.2	68.7	0.76	0.016	0.206	0.1	0.196
HUNFNR-13	8,696	86.7	59.7	0.78	0.016	0.202	0.1	0.214
HUNFNR-14	40,000	244.3	51.5	1.60	0.017	0.292	0.1	0.227
HUNFNR-15	26,000	296.8	46.0	0.80	0.016	0.216	0.1	0.220
HUNFNR-16	28,000	252.4	39.6	0.80	0.016	0.213	0.1	0.224
HUNW15A-02	5,566	50.3	38.0	0.60	0.015	0.210	0.1	0.220
HUNW15A-03	4,874	96.1	58.7	0.28	0.015	0.173	0.1	0.197
HUNW18A-01	11,268	120.3	48.5	0.64	0.015	0.231	0.1	0.220
HUNW24A-01	4,908	90.5	67.3	0.36	0.015	0.187	0.1	0.201
HUNW8ST-02	10,036	105.5	50.6	0.54	0.015	0.252	0.1	0.211
HUSUNR-05	6,146	187.9	73.0	0.30	0.015	0.152	0.1	0.184
HUSUNR-06	16,000	255.9	32.3	0.80	0.016	0.255	0.1	0.229
HUSW14A-01	2,496	3.8	40.1	1.62	0.015	0.296	0.1	0.220
HUSW7A-01	9,180	84.8	68.1	0.42	0.015	0.149	0.1	0.182
HUSWRIVRS-01	8,030	68.5	66.3	0.72	0.015	0.165	0.1	0.195
HUWSIST-01	4,490	32.2	55.6	0.26	0.015	0.199	0.1	0.208
HUDAVIE-01	9,398	87.9	49.1	0.64	0.015	0.193	0.1	0.214
HUDAVIE-02	3,180	97.9	73.8	0.32	0.015	0.159	0.1	0.191
HUDAVIE-03	6,368	180.3	35.1	0.26	0.015	0.208	0.1	0.223
HUDAVIE-04	6,460	52.1	62.9	0.32	0.015	0.207	0.1	0.212
HUDAVIE-05	3,864	61.9	36.3	0.08	0.015	0.209	0.1	0.223
HUDAVIE-06	4,566	77.9	25.3	0.78	0.015	0.235	0.1	0.228
HUDAVIE-07	3,938	23.2	65.8	1.32	0.015	0.205	0.1	0.204
HUDAVIE-08	3,524	41.3	62.0	0.82	0.015	0.205	0.1	0.205
HUI595-02	3,286	57.2	81.0	0.20	0.015	0.139	0.1	0.179
HUMLK-01	3,088	20.4	43.6	0.68	0.015	0.209	0.1	0.221
HUMLK-02	1,706	12.7	23.4	0.82	0.015	0.213	0.1	0.227
HUMLK-03	16,974	126.4	24.3	0.86	0.015	0.212	0.1	0.226
HUNNRC-03	24,000	538.8	60.0	0.50	0.018	0.217	0.1	0.224
HUNNRC-04	14,906	424.2	50.9	1.10	0.017	0.215	0.1	0.217
HUOC-01	9,496	138.1	42.3	0.96	0.017	0.240	0.1	0.225
HUOC-02	4,678	39.0	64.0	1.66	0.015	0.240	0.1	0.205
HUROL-01	4,526	45.5	44.9	0.50	0.015	0.257	0.1	0.215
HUSFNR-01	12,190	114.8	50.4	0.82	0.017	0.191	0.1	0.213
HUSFNR-02	17,530	103.9	41.5	1.52	0.018	0.223	0.1	0.224
HUSFNR-03	22,188	293.6	40.7	0.56	0.017	0.204	0.1	0.221
HUSFNR-04	21,958	191.5	35.0	0.96	0.020	0.284	0.1	0.233
HUSFNR-05	36,026	245.3	61.3	0.76	0.018	0.226	0.1	0.217

Existing Conditions								
Hydrologic Units (HUs)	Width (ft)	Area (Ac)	% DCIA (%)	Slope (%)	Manning's Roughness		Initial Abstractions (in)	
					Impervious	Pervious	Impervious	Pervious
HUSFNR-06	54,256	310.1	65.1	1.28	0.021	0.213	0.1	0.223
HUSFNR-07	84,666	199.0	50.1	3.88	0.018	0.215	0.1	0.221
HUSFNRSPUR-01	3,180	41.8	27.9	0.60	0.015	0.212	0.1	0.226
HUSFNRSPUR-02	15,436	218.9	23.7	0.72	0.015	0.215	0.1	0.227
HUSFNRSPUR-03	6,176	99.8	28.2	0.20	0.015	0.212	0.1	0.226
HUSFNRSPUR-04	6,312	223.4	37.9	0.48	0.015	0.222	0.1	0.224
HUSNRC-01	18,486	644.1	85.6	0.36	0.020	0.233	0.1	0.206
HUSNRC-02	10,594	382.9	79.1	0.20	0.021	0.313	0.1	0.228
HUSNYDERPK-01	12,108	54.0	27.9	3.22	0.021	0.378	0.1	0.242
HUSNYDERPK-02	7,352	153.9	47.5	0.64	0.015	0.303	0.1	0.227
HUSR84-02	3,988	95.4	23.3	0.20	0.015	0.304	0.1	0.234
HUSR84-03	5,836	152.7	79.0	0.22	0.015	0.168	0.1	0.187
HUSW12A-01	10,090	128.0	41.5	0.52	0.015	0.226	0.1	0.221
HUSW12A-02	6,954	61.2	72.3	0.72	0.015	0.207	0.1	0.202
HUSW14ST-01	2,766	29.6	23.1	0.40	0.015	0.213	0.1	0.227
HUSW15A-01	5,384	40.5	51.1	0.32	0.015	0.197	0.1	0.213
HUSW15CT-01	7,676	125.7	30.4	0.40	0.015	0.211	0.1	0.225
HUSW20ST-01	7,226	114.7	33.2	0.48	0.015	0.247	0.1	0.227
HUSW20ST-02	4,762	73.1	49.3	0.78	0.015	0.214	0.1	0.214
HUSW24ST-01	2,888	22.3	62.0	0.84	0.015	0.172	0.1	0.186
HUSW27A-01	8,920	271.1	37.9	0.16	0.015	0.214	0.1	0.222
HUBROWARD-06	2,466	29.2	76.6	0.38	0.015	0.196	0.1	0.194
HUELOSO-01	907	15.6	71.6	0.13	0.015	0.240	0.1	0.206
HUFLAGLER-01	2,373	15.8	67.3	0.16	0.015	0.266	0.1	0.213
HUFLAGLER-02	2,974	60.6	78.1	0.12	0.015	0.179	0.1	0.190
HUNANDR-02	1,790	22.6	76.2	0.05	0.015	0.184	0.1	0.191
HUNANDR-03	1,604	23.7	73.7	0.20	0.015	0.223	0.1	0.201
HUNE3A-01	2,742	39.7	75.1	0.26	0.015	0.157	0.1	0.183
HUNE3A-02	2,311	41.8	64.6	0.15	0.015	0.178	0.1	0.188
HUNE3A-03	3,600	47.9	74.8	0.33	0.015	0.180	0.1	0.189
HUNFED-13	2,791	117.9	42.0	0.17	0.015	0.277	0.1	0.222
HUNFED-14	2,142	68.9	55.0	0.19	0.015	0.213	0.1	0.212
HUNFNR-01	4,013	76.9	32.1	0.87	0.018	0.213	0.1	0.227
HUNFNR-02	4,018	67.9	70.4	0.67	0.016	0.184	0.1	0.206
HUNFNR-03	4,666	103.4	71.4	0.49	0.016	0.191	0.1	0.202
HUNFNR-04	1,763	25.0	82.2	0.35	0.016	0.141	0.1	0.179
HUNFNR-05	2,188	14.8	70.2	0.51	0.018	0.291	0.1	0.219
HUNFNR-06	4,049	62.9	62.2	0.31	0.017	0.181	0.1	0.206
HUNFNR-07	2,575	26.1	78.1	0.46	0.016	0.199	0.1	0.195
HUNFNR-08	506	11.6	81.5	0.22	0.016	0.157	0.1	0.184
HUNFNR-09	2,792	30.1	44.4	0.51	0.018	0.266	0.1	0.225
HUNFNRSPUR-01	3,941	103.0	73.9	0.75	0.015	0.142	0.1	0.179
HUNW4A-01	4,849	96.0	72.5	0.34	0.015	0.171	0.1	0.186
HUNW4A-02	4,393	68.4	69.7	0.22	0.015	0.179	0.1	0.188
HUNW5A-02	5,796	84.2	70.4	0.23	0.015	0.195	0.1	0.193
HUNW7A-01	1,453	14.3	66.4	0.15	0.015	0.268	0.1	0.213
HUNW7A-02	2,539	30.8	54.1	0.23	0.015	0.265	0.1	0.212
HUNW8ST-01	3,657	91.3	72.3	0.15	0.015	0.181	0.1	0.189
HUNW9A-01	2,002	33.3	66.3	0.08	0.015	0.182	0.1	0.189

Existing Conditions								
Hydrologic Units (HUs)	Width (ft)	Area (Ac)	% DCIA (%)	Slope (%)	Manning's Roughness		Initial Abstractions (in)	
					Impervious	Pervious	Impervious	Pervious
HUNW9A-02	1,245	25.2	68.6	0.24	0.015	0.145	0.1	0.181
HUSANDR-01	2,349	35.9	76.4	0.31	0.015	0.174	0.1	0.193
HUSE3A-01	3,322	26.6	78.7	0.60	0.015	0.171	0.1	0.188
HUSE3A-02	2,222	29.0	78.5	0.23	0.015	0.151	0.1	0.182
HUSE5A-05	1,850	17.3	81.0	0.86	0.015	0.139	0.1	0.179
HUSFED-01	1,673	41.9	41.7	0.33	0.015	0.206	0.1	0.222
HUSUNR-01	2,871	144.0	35.2	0.29	0.015	0.279	0.1	0.223
HUSW4A-01	2,741	48.5	52.5	0.12	0.015	0.192	0.1	0.208
HUSW4A-02	1,660	26.7	48.0	0.37	0.015	0.194	0.1	0.214
HUSW4A-03	3,754	104.9	43.4	0.11	0.015	0.207	0.1	0.221
HUTR-01	3,565	84.8	44.5	0.73	0.015	0.224	0.1	0.219
HUTR-02	2,526	43.2	37.4	0.80	0.017	0.213	0.1	0.224
HUTR-03	2,716	40.9	70.0	1.95	0.015	0.177	0.1	0.203
HUTR-04	2,113	21.6	52.1	0.75	0.016	0.208	0.1	0.219
HUTR-05	6,087	110.1	32.2	0.31	0.016	0.210	0.1	0.225
HUC13IC-01	11,611	76.0	52.2	1.22	0.019	0.212	0.1	0.223
HUC13IC-02	14,842	131.0	54.8	1.16	0.019	0.207	0.1	0.222
HUC13IC-03	10,120	143.3	64.9	1.10	0.018	0.257	0.1	0.220
HUC13MR-01	4,711	149.0	52.0	0.26	0.018	0.305	0.1	0.227
HUC13MR-02	4,681	136.8	59.0	0.39	0.021	0.275	0.1	0.230
HUC13MR-03	4,019	142.9	50.4	0.51	0.015	0.220	0.1	0.215
HUC13MR-04	6,189	171.0	56.2	0.33	0.016	0.186	0.1	0.207
HUC13MR-05	3,357	167.2	28.9	0.10	0.016	0.212	0.1	0.226
HUC13MR-06	1,231	23.7	44.1	0.75	0.017	0.221	0.1	0.224
HUC13MR-07	11,973	164.6	51.1	0.20	0.018	0.211	0.1	0.218
HUC13MR-08	7,780	245.4	46.6	0.34	0.016	0.227	0.1	0.219
HUC13MR-09	4,515	145.5	29.3	0.23	0.016	0.220	0.1	0.226
HUC13MRC-01	6,356	25.9	32.7	3.48	0.020	0.350	0.1	0.237
HUC13MRC-02	12,406	404.3	44.3	0.40	0.016	0.239	0.1	0.223
HUC13MRC-03	11,592	705.4	64.5	0.24	0.018	0.244	0.1	0.211
HUC13MRC-04	7,302	359.3	60.5	0.34	0.016	0.207	0.1	0.214
HUC13MRC-05	9,367	76.7	60.0	0.91	0.020	0.202	0.1	0.219
HUC13MRC-07	10,021	448.3	55.6	0.15	0.016	0.191	0.1	0.211
HUC13MRC-08	4,936	111.0	41.7	0.57	0.016	0.207	0.1	0.222
HUC13MRC-11	6,920	272.3	51.2	0.23	0.016	0.203	0.1	0.218
HUC13MRC-12	3,814	53.2	38.1	0.30	0.019	0.213	0.1	0.226
HUC13MRC-13	5,671	98.4	52.2	0.50	0.016	0.206	0.1	0.218
HUC14CCC-01	4,000	1014.5	51.7	0.05	0.017	0.203	0.1	0.217
HUC14CCC-02	2,000	814.5	63.4	0.02	0.016	0.282	0.1	0.217
HUC14CCC-03	3,400	427.9	35.7	0.05	0.016	0.322	0.1	0.228
HUC14CCC-04	2,200	177.6	36.6	0.05	0.016	0.320	0.1	0.226
HUC14CCC-05	8,606	61.9	81.6	0.24	0.017	0.169	0.1	0.187
HUC14CCC-06	4,050	54.5	83.2	0.12	0.016	0.139	0.1	0.179
HUC14CCC-07	5,325	145.7	75.2	0.21	0.015	0.213	0.1	0.198
HUC14CCC-08	4,915	189.6	80.0	0.10	0.016	0.156	0.1	0.183
HUC14CCC-09	4,300	167.0	76.7	0.24	0.017	0.183	0.1	0.190
HUC14CCC-10	3,768	106.4	56.2	0.10	0.017	0.196	0.1	0.215
HUC14CCC-11	3,789	293.7	34.4	0.17	0.017	0.209	0.1	0.224
HUCCCSPUR-01	5,966	349.2	41.9	0.23	0.017	0.209	0.1	0.222

Existing Conditions								
Hydrologic Units (HUs)	Width (ft)	Area (Ac)	% DCIA (%)	Slope (%)	Manning's Roughness		Initial Abstractions (in)	
					Impervious	Pervious	Impervious	Pervious
HUCCCSPUR-02	7,889	734.7	69.5	0.06	0.015	0.146	0.1	0.179
HUCCCSPUR-03	2,257	111.8	45.0	0.34	0.015	0.199	0.1	0.217
HUCRCC-01	5,830	313.4	12.5	0.36	0.015	0.336	0.1	0.238
HUECOMM-01	1,047	44.2	41.2	0.05	0.015	0.204	0.1	0.221
HUECOMM-02	2,110	39.7	60.3	0.64	0.015	0.238	0.1	0.211
HUEOAKPRK-01	7,778	208.9	31.6	0.65	0.015	0.212	0.1	0.225
HUFLEA-01	6,180	311.4	76.7	0.28	0.015	0.158	0.1	0.186
HUFLEA-02	8,512	327.4	77.1	0.17	0.015	0.190	0.1	0.193
HUG16-01	3,777	816.0	60.2	0.10	0.017	0.182	0.1	0.207
HUGALT-01	5,788	52.1	72.8	2.44	0.015	0.135	0.1	0.176
HUI595-01	5,259	61.9	68.8	0.10	0.015	0.258	0.1	0.211
HUIC-01	80,609	436.5	51.8	0.70	0.019	0.204	0.1	0.220
HUIC-02	16,999	282.3	46.5	0.76	0.018	0.216	0.1	0.222
HUIC-03	11,158	205.4	60.2	1.32	0.018	0.197	0.1	0.212
HUIC-04	2,991	296.1	54.6	0.10	0.018	0.223	0.1	0.217
HUIC-05	48,464	272.1	48.6	0.13	0.019	0.207	0.1	0.222
HUIC-06	26,020	235.5	44.9	1.87	0.022	0.361	0.1	0.238
HUIC-07	13,979	263.6	46.1	0.70	0.019	0.211	0.1	0.224
HUIC-08	8,219	183.8	61.4	0.16	0.018	0.199	0.1	0.217
HUIC-09	7,832	204.4	62.5	0.83	0.018	0.250	0.1	0.207
HUIC-10	2,984	155.6	59.6	0.10	0.018	0.305	0.1	0.222
HUIC-11	42,350	536.0	53.7	0.49	0.020	0.205	0.1	0.221
HUIC-12	66,755	318.3	47.7	1.13	0.020	0.211	0.1	0.225
HUIC-13	44,301	590.5	51.2	0.84	0.019	0.241	0.1	0.224
HUIC-14	77,956	312.5	52.7	1.25	0.021	0.217	0.1	0.224
HUIC-15	10,018	199.0	80.5	0.27	0.016	0.170	0.1	0.187
HULEMERALD-01	19,769	640.6	62.1	0.13	0.020	0.299	0.1	0.223
HULKMELVA-01	6,799	58.0	61.0	0.94	0.017	0.207	0.1	0.216
HULL-01	1,952	52.0	79.3	0.23	0.015	0.162	0.1	0.185
HULL-02	1,597	21.0	81.0	0.55	0.015	0.139	0.1	0.179
HULL-03	2,090	25.5	80.9	0.38	0.015	0.139	0.1	0.179
HULL-04	6,769	152.1	82.8	0.31	0.018	0.188	0.1	0.192
HULL-05	11,892	155.2	73.1	0.59	0.019	0.239	0.1	0.205
HULL-06	9,019	64.9	77.4	1.45	0.015	0.187	0.1	0.192
HULL-07	4,468	131.8	67.2	0.35	0.015	0.222	0.1	0.200
HULL-08	28,315	510.8	42.5	0.50	0.017	0.247	0.1	0.226
HUMLKPOND-01	7,066	141.3	41.7	0.49	0.019	0.246	0.1	0.228
HUNANDR-01	2,663	77.4	29.6	0.15	0.015	0.211	0.1	0.225
HUNDIX-01	8,362	897.5	68.0	0.11	0.015	0.174	0.1	0.188
HUNE11ST-01	1,703	33.1	62.5	0.21	0.015	0.171	0.1	0.186
HUNE13ST-01	3,775	103.9	53.6	0.20	0.015	0.179	0.1	0.204
HUNE13ST-02	3,545	41.3	64.7	0.32	0.015	0.148	0.1	0.185
HUNE13ST-03	3,599	60.0	75.5	0.15	0.015	0.145	0.1	0.180
HUNE15A-01	3,639	74.1	33.9	0.66	0.015	0.213	0.1	0.224
HUNE3CT-01	4,657	173.3	53.7	0.26	0.015	0.176	0.1	0.201
HUNE4A-01	3,440	143.4	59.8	0.15	0.015	0.179	0.1	0.195
HUNE4A-02	2,657	43.2	46.7	0.14	0.015	0.203	0.1	0.216
HUNE4A-03	1,983	36.7	57.0	0.09	0.015	0.209	0.1	0.213
HUNE65-01	1,564	23.3	65.9	0.34	0.015	0.138	0.1	0.177

Existing Conditions								
Hydrologic Units	Width	Area	% DCIA	Slope	Manning's Roughness		Initial Abstractions (in)	
(HUs)	(ft)	(Ac)	(%)	(%)	Impervious	Pervious	Impervious	Pervious
HUNFED-01	1,739	83.4	67.1	0.14	0.015	0.181	0.1	0.198
HUNFED-02	2,143	78.2	51.0	0.17	0.015	0.207	0.1	0.218
HUNFED-03	1,652	60.4	41.8	0.15	0.015	0.207	0.1	0.222
HUNFED-04	2,261	116.5	40.5	0.22	0.015	0.205	0.1	0.220
HUNFED-05	2,257	100.2	45.5	0.35	0.015	0.200	0.1	0.217
HUNFED-06	1,999	53.8	79.7	0.55	0.015	0.157	0.1	0.184
HUNFED-07	2,737	45.6	51.5	0.77	0.015	0.197	0.1	0.213
HUNFED-08	3,356	58.5	45.0	1.05	0.015	0.264	0.1	0.225
HUNFED-09	1,494	20.9	81.0	3.63	0.015	0.139	0.1	0.179
HUNFED-10	2,191	26.1	69.9	0.57	0.015	0.191	0.1	0.199
HUNFED-11	3,995	39.2	78.1	0.48	0.015	0.155	0.1	0.184
HUNFED-12	2,230	25.0	78.9	0.26	0.015	0.169	0.1	0.187
HUNPOWR-01	6,075	268.7	78.5	0.33	0.015	0.177	0.1	0.189
HUNW10T-01	5,786	299.8	65.2	0.05	0.015	0.277	0.1	0.216
HUNW15A-01	7,780	503.8	27.6	0.18	0.015	0.212	0.1	0.226
HUNW22ST-01	5,903	239.4	31.8	0.22	0.015	0.217	0.1	0.225
HUNW22ST-02	5,624	286.0	57.9	0.22	0.015	0.256	0.1	0.219
HUNW5A-01	3,734	134.9	28.6	0.12	0.015	0.209	0.1	0.224
HUOP-01	9,655	530.0	55.4	0.25	0.015	0.196	0.1	0.212
HUOPEB-01	4,638	172.8	41.0	0.55	0.016	0.214	0.1	0.223
HUOPEB-02	10,014	310.9	40.4	0.21	0.016	0.210	0.1	0.223
HUOPEB-03	8,157	165.1	39.4	0.51	0.016	0.213	0.1	0.223
HUOPL-01	6,101	268.4	72.3	0.44	0.015	0.223	0.1	0.201
HUOPL-02	5,816	203.7	56.2	0.22	0.015	0.202	0.1	0.215
HUOPL-03	2,137	44.4	29.1	0.34	0.015	0.211	0.1	0.225
HUOPL-04	11,130	310.2	55.6	0.64	0.017	0.216	0.1	0.220
HUOPL-05	7,951	185.9	62.6	0.24	0.020	0.250	0.1	0.221
HUPAG-01	2,846	76.6	44.8	0.10	0.017	0.298	0.1	0.220
HUPAG-02	10,947	186.9	48.9	0.45	0.017	0.283	0.1	0.217
HUPOWRLN-02	3,120	76.6	35.1	0.23	0.015	0.204	0.1	0.220
HUPOWRLN-03	2,591	60.3	52.1	0.08	0.015	0.198	0.1	0.216
HUPRL-01	6,527	69.1	75.4	0.48	0.019	0.239	0.1	0.207
HUPRN-01	1,735	192.2	54.4	0.10	0.016	0.283	0.1	0.216
HUPRN-02	9,404	235.4	54.8	0.22	0.016	0.261	0.1	0.210
HUPRN-03	7,794	160.6	38.5	0.17	0.017	0.208	0.1	0.223
HUPRN-04	3,744	58.1	71.8	0.49	0.016	0.156	0.1	0.188
HUPRN-05	2,495	51.3	33.6	0.11	0.015	0.203	0.1	0.220
HUPRN-06	1,987	41.9	81.0	0.28	0.015	0.139	0.1	0.179
HUPRN-07	6,716	147.2	39.8	0.51	0.015	0.262	0.1	0.227
HUPRN-08	6,951	169.0	66.6	0.44	0.015	0.273	0.1	0.215
HUPRN-09	5,107	143.3	67.5	0.29	0.015	0.267	0.1	0.213
HUPRN-10	5,808	215.4	84.0	0.31	0.017	0.142	0.1	0.180
HUPRSW-01	13,802	169.6	43.4	0.75	0.023	0.380	0.1	0.243
HUPRSW-02	9,411	142.2	38.3	1.31	0.020	0.358	0.1	0.237
HUSE10A-01	5,587	185.3	78.0	0.33	0.015	0.164	0.1	0.185
HUSE3A-03	3,993	77.4	69.8	0.32	0.015	0.166	0.1	0.196
HUSE4A-02	2,489	72.4	72.1	0.23	0.015	0.235	0.1	0.205
HUSFED-02	1,775	28.7	75.0	0.54	0.015	0.144	0.1	0.182
HUSFED-03	1,548	13.1	73.4	0.49	0.015	0.135	0.1	0.176

Existing Conditions								
Hydrologic Units (HUs)	Width (ft)	Area (Ac)	% DCIA (%)	Slope (%)	Manning's Roughness		Initial Abstractions (in)	
					Impervious	Pervious	Impervious	Pervious
HUSFED-04	1,928	33.6	71.5	0.29	0.015	0.185	0.1	0.190
HUSFED-05	2,012	58.7	72.5	0.34	0.015	0.155	0.1	0.182
HUSMIAMI-01	1,903	25.2	54.8	0.23	0.015	0.221	0.1	0.199
HUSMIAMI-02	1,552	13.2	74.7	0.62	0.015	0.136	0.1	0.177
HUSR84-01	4,576	91.3	72.7	0.40	0.015	0.190	0.1	0.192
HUSUNR-02	4,285	24.0	78.5	0.53	0.015	0.160	0.1	0.187
HUSUNR-03	7,206	20.0	73.3	0.18	0.015	0.185	0.1	0.198
HUSUNR-04	2,596	52.2	74.6	0.24	0.016	0.225	0.1	0.203
HUSUNREX-01	7,907	84.0	60.4	0.40	0.015	0.252	0.1	0.208
HUSUNREX-02	1,160	18.3	78.9	0.15	0.015	0.137	0.1	0.178

Appendix 3B
Surface Water Management Model Hydraulic Data

The following tables present the existing hydraulic link and hydraulic node data for the City of Fort Lauderdale regional EPA SWMM Project.

Existing Conditions - Conduits								
Link Name	Link Type	No. of Barrels	Depth (ft)	Width (ft)	Length (ft)	Manning's Roughness	U/S Inv. (ft NGVD)	D/S Inv. (ft NGVD)
BC13IC011	Box Culvert	1	22.5	170	450	0.019	-13.6	-13.5
BCCCSPUR010	Box Culvert	1	15.0	50	300	0.020	-9.9	-10.0
BSFNRSPUR014	Box Culvert	1	13.0	40	300	0.014	-8.0	-8.0
BTR006	Box Culvert	1	15.0	80	200	0.018	-8.1	-8.0
BTR011	Box Culvert	1	14.0	40	200	0.018	-8.1	-8.0
BTR016	Box Culvert	1	16.0	30	200	0.028	-8.1	-8.0
BTR021	Box Culvert	1	14.0	40	200	0.025	-8.1	-8.0
BTR026	Box Culvert	1	14.0	40	200	0.028	-8.1	-8.0
BTR031	Box Culvert	1	14.0	25	200	0.019	-8.1	-8.0
BTR036	Box Culvert	1	14.0	45	200	0.028	-8.1	-8.0
C12UI015AP	Box Culvert	2	7.0	7	50	0.014	-3.0	-3.0
C12UICS18	Box Culvert	2	7.0	7	150	0.014	-7.0	-7.3
IC032	Box Culvert	1	15.0	25	40	0.015	-10.0	-10.0
IC042	Box Culvert	1	15.0	25	40	0.015	-10.0	-10.0
LL020AP	Box Culvert	1	6.0	N/A	150	0.015	0.0	-0.4
MELROSEPK-06AP	Box Culvert	1	3.0	6	50	0.024	1.9	1.9
OC010AP	Box Culvert	2	6.0	8	300	0.015	-4.0	-4.0
OP015AP	Box Culvert	2	8.0	20	300	0.015	-2.0	-4.4
OPEB002	Box Culvert	1	16.0	25	200	0.015	-12.0	-11.9
OPEB004	Box Culvert	1	16.0	25	50	0.015	-11.9	-11.9
OPEB007	Box Culvert	1	16.0	25	50	0.015	-12.0	-11.8
OPEB009	Box Culvert	1	16.0	20	50	0.015	-11.9	-11.9
OPEB011	Box Culvert	1	16.0	20	50	0.015	-12.0	-11.8
OPL030AP	Box Culvert	1	6.0	N/A	1100	0.010	-5.0	-5.0
PRN020AP	Box Culvert	1	10.0	20	300	0.008	-10.0	-10.1
SR84LAKE005	Box Culvert	1	12.0	20	250	0.015	-8.7	-8.7
BC13MR001	Bridge	N/A	17.9	N/A	370	0.022	-11.9	-11.9
BC13MR016	Bridge	N/A	18.5	N/A	350	0.030	-13.5	-13.5
BC13MR021	Bridge	N/A	18.5	N/A	375	0.020	-13.6	-13.5
BC13MR025	Bridge	N/A	18.5	N/A	380	0.020	-13.5	-13.5
BC13MR031	Bridge	N/A	19.5	N/A	370	0.026	-13.5	-13.6
BC13MRC007	Bridge	N/A	17.9	N/A	350	0.020	-12.0	-11.9
BC13MRC009	Bridge	N/A	17.9	N/A	370	0.039	-11.9	-11.9
BC13MRC012	Bridge	N/A	17.9	N/A	350	0.020	-11.9	-11.8
BC13MRC015	Bridge	N/A	17.9	N/A	380	0.027	-11.9	-11.9
BC13MRC018	Bridge	N/A	17.9	N/A	350	0.027	-11.9	-11.9
BC13MRC023	Bridge	N/A	23.5	N/A	450	0.034	-13.5	-13.5
BC13MRC025	Bridge	N/A	21.5	N/A	300	0.050	-13.6	-13.5
BC13MRC043	Bridge	N/A	20.5	N/A	420	0.022	-13.5	-13.6
BC14CCC010	Bridge	N/A	23.8	N/A	450	0.017	-17.8	-17.9
BC14CCC022	Bridge	N/A	22.8	N/A	350	0.011	-17.8	-17.9

Existing Conditions - Conduits								
Link Name	Link Type	No. of Barrels	Depth (ft)	Width (ft)	Length (ft)	Manning's Roughness	U/S Inv. (ft NGVD)	D/S Inv. (ft NGVD)
BC14CCC027	Bridge	N/A	23.8	N/A	380	0.014	-17.9	-17.9
BC14CCC039	Bridge	N/A	23.8	N/A	400	0.040	-17.7	-17.8
BG16007	Bridge	N/A	19.5	N/A	340	0.018	-14.6	-14.6
BNFNR011	Bridge	N/A	23.7	N/A	360	0.017	-8.7	-8.8
BNFNR016	Bridge	N/A	23.7	N/A	370	0.017	-8.8	-8.7
BNFNR021	Bridge	N/A	23.7	N/A	380	0.018	-8.8	-8.7
BNFNR040	Bridge	N/A	14.3	N/A	370	0.028	-8.3	-8.3
BNFNR043	Bridge	N/A	16.3	N/A	500	0.050	-8.3	-8.3
BNFNR046	Bridge	N/A	15.3	N/A	380	0.023	-8.3	-8.3
BNFNR051	Bridge	N/A	15.3	N/A	380	0.023	-8.3	-8.3
BNFNR055	Bridge	N/A	15.3	N/A	350	0.027	-8.3	-8.3
BNNRC015	Bridge	N/A	23.7	N/A	730	0.060	-8.8	-8.7
BNRNRSPUR005	Bridge	N/A	9.5	N/A	200	0.027	-5.0	-5.0
BSFNR006	Bridge	N/A	17.7	N/A	400	0.025	-8.7	-8.7
BSFNR020	Bridge	N/A	23.7	N/A	300	0.040	-8.8	-8.7
BSFNRC005	Bridge	N/A	23.7	N/A	420	0.027	-8.7	-8.7
BTR038	Bridge	N/A	14.0	N/A	240	0.017	-8.0	-8.0
C12PC005	Channel	N/A	N/A	N/A	2900	0.050	-8.3	-8.3
C12UI010	Channel	N/A	N/A	N/A	2400	0.040	1.7	1.6
C12UI015NAT	Channel	N/A	N/A	N/A	2300	0.100	6.3	6.0
C12UI020	Channel	N/A	N/A	N/A	2400	0.040	2.3	2.2
C13IC005	Channel	N/A	N/A	N/A	500	0.030	-10.0	-10.1
C13IC010	Channel	N/A	N/A	N/A	5500	0.030	-10.0	-10.0
C13IC015	Channel	N/A	N/A	N/A	1550	0.040	-13.5	-13.6
C13IC020	Channel	N/A	N/A	N/A	4300	0.040	-13.6	-13.5
C13IC025	Channel	N/A	N/A	N/A	3600	0.045	-13.5	-13.6
C13ICSPUR002	Channel	N/A	N/A	N/A	2200	0.030	-10.0	-10.0
C13ICSPUR005	Channel	N/A	N/A	N/A	2350	0.030	-9.9	-10.0
C13MR005	Channel	N/A	N/A	N/A	700	0.050	-11.9	-12.0
C13MR010	Channel	N/A	N/A	N/A	2450	0.045	-13.6	-13.5
C13MR015	Channel	N/A	N/A	N/A	3000	0.045	-13.5	-13.6
C13MR020	Channel	N/A	N/A	N/A	3300	0.045	-13.5	-13.5
C13MR024	Channel	N/A	N/A	N/A	1300	0.045	-13.5	-13.6
C13MR030	Channel	N/A	N/A	N/A	3000	0.050	-13.6	-13.5
C13MR035	Channel	N/A	N/A	N/A	3250	0.045	-13.5	-13.5
C13MRC005	Channel	N/A	N/A	N/A	2200	0.050	-11.9	-11.9
C13MRC006	Channel	N/A	N/A	N/A	1700	0.050	-11.9	-11.9
C13MRC008	Channel	N/A	N/A	N/A	2800	0.050	-11.9	-12.0
C13MRC010	Channel	N/A	N/A	N/A	2050	0.050	-11.8	-11.9
C13MRC014	Channel	N/A	N/A	N/A	2500	0.050	-11.9	-11.9
C13MRC017	Channel	N/A	N/A	N/A	1600	0.050	-11.9	-11.9

Existing Conditions - Conduits								
Link Name	**Link Type**	**No. of Barrels**	**Depth (ft)**	**Width (ft)**	**Length (ft)**	**Manning's Roughness**	**U/S Inv. (ft NGVD)**	**D/S Inv. (ft NGVD)**
C13MRC020	Channel	N/A	N/A	N/A	2100	0.050	-12.0	-11.9
C13MRC022	Channel	N/A	N/A	N/A	1000	0.045	-13.5	-13.5
C13MRC024	Channel	N/A	N/A	N/A	1000	0.045	-13.5	-13.5
C13MRC035	Channel	N/A	N/A	N/A	3850	0.045	-13.5	-13.6
C13MRC042	Channel	N/A	N/A	N/A	2200	0.045	-13.6	-13.5
C13MRC045	Channel	N/A	N/A	N/A	2550	0.045	-13.5	-13.5
C13MRSPUR005	Channel	N/A	N/A	N/A	1500	0.040	-11.9	-11.9
C14CCC005	Channel	N/A	N/A	N/A	1600	0.030	-19.9	-20.0
C14CCC010	Channel	N/A	N/A	N/A	1600	0.030	-17.9	-19.9
C14CCC020	Channel	N/A	N/A	N/A	6000	0.030	-17.9	-17.8
C14CCC025	Channel	N/A	N/A	N/A	1300	0.030	-17.9	-17.8
C14CCC030	Channel	N/A	N/A	N/A	2900	0.030	-17.8	-17.9
C14CCC038	Channel	N/A	N/A	N/A	3300	0.045	-17.8	-17.9
C14CCC040	Channel	N/A	N/A	N/A	1600	0.045	-17.6	-17.7
C14CCC045	Channel	N/A	N/A	N/A	8400	0.060	-16.6	-16.5
C14CCC050	Channel	N/A	N/A	N/A	2400	0.060	-16.7	-16.6
C14CCC055	Channel	N/A	N/A	N/A	2400	0.060	-16.6	-16.7
CCCSPUR020	Channel	N/A	N/A	N/A	1500	0.040	-2.5	-2.5
G16005	Channel	N/A	N/A	N/A	2700	0.050	-14.6	-14.5
G16010	Channel	N/A	N/A	N/A	3850	0.060	-14.5	-14.6
HF010	Channel	N/A	N/A	N/A	3300	0.040	-2.1	-2.0
HF020	Channel	N/A	N/A	N/A	3200	0.040	-2.0	-2.1
IC006	Channel	N/A	N/A	N/A	500	0.030	-19.9	-20.0
IC022	Channel	N/A	N/A	N/A	2000	0.030	-20.0	-20.0
IC025	Channel	N/A	N/A	N/A	6850	0.030	-20.0	-20.0
IC030	Channel	N/A	N/A	N/A	3350	0.030	-20.0	-20.0
IC035	Channel	N/A	N/A	N/A	2250	0.030	-10.0	-10.0
IC040	Channel	N/A	N/A	N/A	2300	0.030	-10.0	-10.0
IC043	Channel	N/A	N/A	N/A	2050	0.030	-20.0	-20.0
IC044	Channel	N/A	N/A	N/A	4150	0.030	-20.0	-20.0
IC045	Channel	N/A	N/A	N/A	1300	0.040	-10.0	-10.0
IC050	Channel	N/A	N/A	N/A	1850	0.040	-10.0	-10.0
LL015	Channel	N/A	N/A	N/A	4750	0.050	-1.9	-2.1
LL025	Channel	N/A	N/A	N/A	1700	0.050	0.1	0.0
LL030	Channel	N/A	N/A	N/A	1100	0.050	0.2	0.2
MELROSEPK-05	Channel	N/A	N/A	N/A	1800	0.040	1.9	1.8
MELROSEPK-10	Channel	N/A	N/A	N/A	2400	0.040	5.0	5.0
NFNR001	Channel	N/A	N/A	N/A	500	0.030	-10.1	-10.0
NFNR005	Channel	N/A	N/A	N/A	2500	0.030	-10.0	-10.1
NFNR008	Channel	N/A	N/A	N/A	2500	0.040	-8.7	-8.8
NFNR010	Channel	N/A	N/A	N/A	1500	0.040	-8.8	-8.7

Existing Conditions - Conduits								
Link Name	Link Type	No. of Barrels	Depth (ft)	Width (ft)	Length (ft)	Manning's Roughness	U/S Inv. (ft NGVD)	D/S Inv. (ft NGVD)
NFNR015	Channel	N/A	N/A	N/A	1300	0.040	-8.7	-8.7
NFNR020	Channel	N/A	N/A	N/A	1550	0.040	-8.7	-8.8
NFNR025	Channel	N/A	N/A	N/A	1700	0.040	-8.7	-8.8
NFNR030	Channel	N/A	N/A	N/A	2600	0.050	-8.3	-8.4
NFNR035	Channel	N/A	N/A	N/A	3000	0.050	-8.3	-8.3
NFNR042	Channel	N/A	N/A	N/A	2050	0.050	-8.3	-8.3
NFNR045	Channel	N/A	N/A	N/A	2800	0.050	-8.3	-8.3
NFNR050	Channel	N/A	N/A	N/A	1900	0.050	-8.3	-8.3
NFNR054	Channel	N/A	N/A	N/A	2550	0.050	-8.3	-8.3
NFSPUR005	Channel	N/A	N/A	N/A	1800	0.040	-8.3	-8.3
NNRC005	Channel	N/A	N/A	N/A	1900	0.040	-8.7	-8.7
NNRC010	Channel	N/A	N/A	N/A	4300	0.040	-8.7	-8.7
NNRC020	Channel	N/A	N/A	N/A	4500	0.040	-8.7	-8.8
NNRC025	Channel	N/A	N/A	N/A	3550	0.040	-8.7	-8.7
NRNRSPUR004	Channel	N/A	N/A	N/A	800	0.050	-5.0	-5.1
NRNRSPUR007	Channel	N/A	N/A	N/A	2100	0.050	-5.1	-5.0
NW22ST-05NAT	Channel	N/A	N/A	N/A	3550	0.100	4.9	4.9
OC005	Channel	N/A	N/A	N/A	2900	0.040	-2.3	-2.3
OC015	Channel	N/A	N/A	N/A	1300	0.060	-2.5	-2.5
OC021	Channel	N/A	N/A	N/A	550	0.040	-2.5	-2.6
OPEB001	Channel	N/A	N/A	N/A	500	0.040	-11.9	-11.9
OPEB003	Channel	N/A	N/A	N/A	1400	0.040	-11.9	-12.0
OPEB005	Channel	N/A	N/A	N/A	500	0.040	-11.8	-11.9
OPEB006	Channel	N/A	N/A	N/A	750	0.040	-4.9	-4.9
OPEB008	Channel	N/A	N/A	N/A	1250	0.040	-11.9	-12.0
OPEB010	Channel	N/A	N/A	N/A	900	0.040	-11.8	-11.9
OPEB015	Channel	N/A	N/A	N/A	900	0.040	-11.9	-12.0
OPL010	Channel	N/A	N/A	N/A	2000	0.040	-10.0	-10.0
OPL020	Channel	N/A	N/A	N/A	1000	0.040	-10.0	-10.0
OPL035AP	Channel	N/A	N/A	N/A	1800	0.040	-5.0	-5.0
PAG005	Channel	N/A	N/A	N/A	2200	0.060	-5.0	-5.0
PORTSPUR005	Channel	N/A	N/A	N/A	3400	0.040	-10.0	-10.1
PRN010	Channel	N/A	N/A	N/A	6700	0.060	-13.0	-13.1
PRN015	Channel	N/A	N/A	N/A	2200	0.060	-12.9	-13.0
PRN018	Channel	N/A	N/A	N/A	1160	0.060	-12.8	-12.9
PRN030	Channel	N/A	N/A	N/A	5150	0.060	-4.0	-4.0
PRN038	Channel	N/A	N/A	N/A	1900	0.060	-4.0	-4.0
PRN039	Channel	N/A	N/A	N/A	1250	0.060	-4.0	-4.0
PRN1005	Channel	N/A	N/A	N/A	1300	0.060	-13.0	-13.0
PRN1010	Channel	N/A	N/A	N/A	2000	0.060	-5.0	-5.0
S36MRC038	Channel	N/A	N/A	N/A	2700	0.045	-13.5	-13.5

Existing Conditions - Conduits								
Link Name	Link Type	No. of Barrels	Depth (ft)	Width (ft)	Length (ft)	Manning's Roughness	U/S Inv. (ft NGVD)	D/S Inv. (ft NGVD)
SFNR005	Channel	N/A	N/A	N/A	4500	0.040	-8.7	-8.7
SFNR010	Channel	N/A	N/A	N/A	2600	0.040	-8.7	-8.7
SFNR015	Channel	N/A	N/A	N/A	2500	0.040	-8.7	-8.7
SFNR025	Channel	N/A	N/A	N/A	4300	0.040	-8.7	-8.8
SFNR030	Channel	N/A	N/A	N/A	1950	0.040	-8.7	-8.7
SFNRSPUR005	Channel	N/A	N/A	N/A	1150	0.040	-8.0	-8.0
SFNRSPUR010	Channel	N/A	N/A	N/A	2150	0.040	-8.0	-8.1
SFNRSPUR013	Channel	N/A	N/A	N/A	650	0.040	-8.0	-8.0
SFNRSPUR015	Channel	N/A	N/A	N/A	950	0.040	-5.0	-5.0
SFNRSPUR018	Channel	N/A	N/A	N/A	1900	0.040	-5.0	-5.0
SR84LAKE010	Channel	N/A	N/A	N/A	950	0.050	-8.0	-8.0
SW14ST-10NAT	Channel	N/A	N/A	N/A	1300	0.100	6.2	6.2
SW15CT-05NAT	Channel	N/A	N/A	N/A	3900	0.100	6.9	6.9
SW3A-05NAT	Channel	N/A	N/A	N/A	450	0.100	3.9	3.9
TR005	Channel	N/A	N/A	N/A	1400	0.040	-8.0	-8.1
TR010	Channel	N/A	N/A	N/A	1400	0.040	-8.0	-8.1
TR015	Channel	N/A	N/A	N/A	1000	0.040	-8.0	-8.1
TR020	Channel	N/A	N/A	N/A	850	0.040	-8.0	-8.1
TR025	Channel	N/A	N/A	N/A	1050	0.040	-8.0	-8.1
TR030	Channel	N/A	N/A	N/A	650	0.040	-8.0	-8.1
TR035	Channel	N/A	N/A	N/A	600	0.040	-8.0	-8.1
TR037	Channel	N/A	N/A	N/A	2550	0.040	-8.1	-8.0
TR040	Channel	N/A	N/A	N/A	870	0.040	-8.0	-8.1
CCCSPUR021	Circular	1	N/A	4	70	0.014	-2.5	-3.0
TWNLKS-05AP	Circular	1	4.0	N/A	1700	0.014	-5.0	-5.5
C13MRC-02AP	Circular	1	3.0	N/A	50	0.024	0.0	-1.5
C13MRC-03	Circular	2	3.0	N/A	100	0.024	1.4	1.4
CRDVA-05	Circular	1	8.0	N/A	900	0.015	-6.0	-8.0
CS55B	Circular	1	3.0	N/A	160	0.014	-1.9	-2.0
EBROW-05	Circular	1	4.5	N/A	1000	0.015	-4.0	-4.0
EBROW-06	Circular	1	2.5	N/A	950	0.015	-3.0	-3.0
EBROW-07	Circular	1	2.0	N/A	700	0.015	-4.0	-4.0
ECOMM-05	Circular	1	3.0	N/A	800	0.015	-1.0	-2.0
ECOMM-10	Circular	1	4.5	N/A	600	0.015	-2.0	-4.5
ECOMM-20	Circular	1	5.0	N/A	2800	0.015	-2.0	-4.0
ELOSO-05	Circular	1	6.0	N/A	450	0.015	-4.0	-5.7
EOAKPRK-05	Circular	1	4.0	N/A	1500	0.015	0.0	-4.0
ESUNR-05	Circular	1	5.0	N/A	3300	0.015	0.0	-6.0
ESUNR-07	Circular	1	4.0	N/A	2750	0.015	0.0	0.0
ESUNR-10	Circular	1	4.0	N/A	1400	0.015	0.0	-2.0
GALT-05	Circular	2	4.0	N/A	1000	0.015	0.0	-4.0

Existing Conditions - Conduits								
Link Name	**Link Type**	**No. of Barrels**	**Depth (ft)**	**Width (ft)**	**Length (ft)**	**Manning's Roughness**	**U/S Inv. (ft NGVD)**	**D/S Inv. (ft NGVD)**
HF015AP	Circular	2	3.0	N/A	50	0.024	-2.1	-2.1
HFCS17005	Circular	1	5.5	N/A	734	0.013	-2.0	-4.0
LL005AP	Circular	1	3.0	N/A	50	0.024	-1.0	-1.5
LL026AP	Circular	2	5.0	N/A	150	0.024	0.2	0.1
LL035-OPL035AP	Circular	2	3.0	N/A	150	0.015	-5.0	-5.0
LL038	Circular	1	3.0	N/A	250	0.015	1.9	1.8
MIDLST-05	Circular	1	4.5	N/A	650	0.015	-2.0	-3.3
NANDR-05	Circular	1	3.5	N/A	3350	0.015	0.0	-3.5
NANDR-10	Circular	1	3.0	N/A	1000	0.015	0.0	-3.0
NANDR-15	Circular	1	5.5	N/A	800	0.015	-3.0	-3.0
NDIXIE-OL1	Circular	1	1.0	N/A	200	0.010	-11.9	-11.9
NE11ST-04	Circular	1	3.5	N/A	1150	0.015	0.0	0.0
NE11ST-05	Circular	1	3.0	N/A	1350	0.015	0.0	0.0
NE13ST-05	Circular	1	6.0	N/A	1500	0.015	-2.0	-6.5
NE13ST-10	Circular	1	5.0	N/A	1800	0.015	0.0	-2.0
NE13ST-15	Circular	1	3.5	N/A	2900	0.015	0.0	0.0
NE15A-05	Circular	1	5.0	N/A	1750	0.015	-3.0	-5.5
NE15A-10	Circular	1	3.5	N/A	1600	0.015	-2.0	-3.0
NE3A-05	Circular	1	3.5	N/A	650	0.015	0.0	-2.0
NE3A-07	Circular	1	4.5	N/A	1700	0.015	-2.0	-3.0
NE3A-10	Circular	1	5.0	N/A	1000	0.015	-3.0	-3.0
NE3CT-05	Circular	1	3.5	N/A	1100	0.015	0.0	-3.9
NE4A-05	Circular	1	4.0	N/A	1300	0.015	0.0	-13.5
NE4A-10	Circular	1	3.5	N/A	1350	0.015	0.0	0.0
NE4A-15	Circular	1	3.0	N/A	1800	0.015	0.0	0.0
NE65-05	Circular	1	4.0	N/A	700	0.015	-2.0	-4.0
NFED-05	Circular	1	3.5	N/A	1500	0.015	-2.0	-2.0
NFED-10	Circular	1	4.5	N/A	625	0.015	-2.0	-2.0
NFED-12	Circular	1	5.0	N/A	900	0.015	-2.0	-5.0
NFED-15	Circular	1	3.0	N/A	950	0.015	0.0	-2.0
NFED-20	Circular	1	4.0	N/A	480	0.015	-2.0	-4.0
NFED-22	Circular	1	3.5	N/A	900	0.015	0.0	-2.0
NFED-25	Circular	1	3.0	N/A	1000	0.015	0.0	0.0
NFED-30	Circular	1	4.0	N/A	1850	0.015	0.0	-2.0
NFED-35	Circular	1	4.5	N/A	1500	0.015	0.0	-2.0
NFED-37	Circular	1	6.0	N/A	2000	0.015	-2.0	-6.0
NFED-40	Circular	1	4.5	N/A	1500	0.015	0.0	-2.0
NFED-45	Circular	1	3.5	N/A	950	0.010	0.0	-3.9
NFED-50	Circular	1	3.5	N/A	1000	0.015	0.0	-2.0
NFED-52	Circular	1	4.5	N/A	1150	0.015	-2.0	-4.5
NFED-53	Circular	1	4.5	N/A	900	0.015	-2.0	-4.5

Existing Conditions - Conduits								
Link Name	Link Type	No. of Barrels	Depth (ft)	Width (ft)	Length (ft)	Manning's Roughness	U/S Inv. (ft NGVD)	D/S Inv. (ft NGVD)
NFED-55	Circular	1	3.5	N/A	1100	0.015	-2.0	-2.0
NFED-60	Circular	1	3.0	N/A	700	0.015	0.0	0.0
NFED-65	Circular	1	3.0	N/A	700	0.015	0.0	-1.0
NFED-67	Circular	1	3.5	N/A	1150	0.015	-1.0	-2.0
NFED-70	Circular	1	4.5	N/A	1700	0.015	-2.0	-2.1
NPOWRL-03	Circular	1	4.5	N/A	2600	0.015	0.0	-13.6
NPOWRL-05	Circular	1	4.0	N/A	2400	0.015	0.0	0.0
NW15A-05	Circular	1	2.5	N/A	3200	0.015	0.0	-3.5
NW15A-10	Circular	1	5.5	N/A	900	0.015	-2.0	-3.0
NW15A-15	Circular	1	6.0	N/A	1400	0.015	-3.0	-4.3
NW18A-05	Circular	1	3.0	N/A	1550	0.015	0.0	0.0
NW22ST-10	Circular	1	3.0	N/A	1700	0.015	0.0	-1.0
NW24A-05	Circular	1	3.5	N/A	1150	0.015	0.0	-2.3
NW28-05	Circular	2	3.0	N/A	500	0.015	-4.0	-4.0
NW29-05	Circular	1	3.5	N/A	750	0.015	-4.0	-4.0
NW31ST-05	Circular	1	5.0	N/A	4800	0.015	-1.0	-2.0
NW35-05	Circular	1	4.0	N/A	1150	0.015	2.5	1.0
NW35-10	Circular	1	4.0	N/A	1450	0.015	2.5	1.3
NW35-15	Circular	1	4.5	N/A	1800	0.015	2.8	1.0
NW4A-05	Circular	1	3.0	N/A	1550	0.015	0.0	0.0
NW4A-10	Circular	1	4.0	N/A	1450	0.015	0.0	0.0
NW5A-05	Circular	1	7.0	N/A	3550	0.015	-4.0	-7.5
NW5A-07	Circular	1	4.0	N/A	700	0.015	0.0	-1.0
NW5A-10	Circular	1	6.0	N/A	1550	0.015	-2.0	-3.0
NW7A-05	Circular	1	3.0	N/A	750	0.015	0.0	-0.5
NW7A-10	Circular	1	4.5	N/A	2000	0.015	-2.0	-2.0
NW8ST-05	Circular	1	2.8	N/A	900	0.015	0.0	0.0
NW8ST-10	Circular	1	2.8	N/A	1250	0.015	0.0	0.0
NW8ST-11	Circular	1	2.3	N/A	2250	0.015	0.0	0.0
NW9A-05	Circular	1	3.5	N/A	700	0.015	0.0	0.0
NW9A-10	Circular	1	4.0	N/A	1300	0.015	0.0	-1.0
NWFLAG-05	Circular	1	5.5	N/A	950	0.015	-3.0	-3.0
OC020	Circular	4	5.0	N/A	350	0.015	-2.5	-2.5
OPL005AP	Circular	1	5.0	N/A	400	0.014	-10.0	-13.6
OPL015AP	Circular	1	4.0	N/A	200	0.024	-5.0	-5.0
OPL025AP	Circular	1	3.0	N/A	120	0.015	-2.5	-10.0
PRL010	Circular	1	5.0	N/A	700	0.013	2.3	2.2
PRN025AP	Circular	1	6.0	N/A	200	0.024	-2.0	-2.0
PRN035AP	Circular	1	5.0	N/A	80	0.015	-4.0	-4.0
PRN040AP	Circular	1	4.0	N/A	150	0.015	-4.0	-4.0
PRN045AP	Circular	1	5.0	N/A	100	0.015	-4.0	-4.0

Existing Conditions - Conduits								
Link Name	Link Type	No. of Barrels	Depth (ft)	Width (ft)	Length (ft)	Manning's Roughness	U/S Inv. (ft NGVD)	D/S Inv. (ft NGVD)
PRN1006AP	Circular	1	4.0	N/A	120	0.015	-13.0	-13.0
PRN1011AP	Circular	1	4.0	N/A	70	0.015	-5.0	-5.0
PRSW020	Circular	1	3.0	N/A	850	0.015	-5.0	-5.0
PRSW025	Circular	1	3.0	N/A	200	0.015	-5.0	-5.0
SANDR-05	Circular	1	3.0	N/A	975	0.015	-2.0	-3.1
SE10A-05	Circular	1	7.0	N/A	2700	0.015	-5.0	-6.0
SE3A-05	Circular	1	5.5	N/A	1050	0.015	-4.0	-5.1
SE3A-10	Circular	1	3.0	N/A	415	0.015	-2.0	-3.1
SE3A-15	Circular	1	3.0	N/A	1750	0.015	0.0	0.0
SE4A-10	Circular	1	7.0	N/A	1750	0.015	-2.0	-2.0
SE5A-05	Circular	1	3.0	N/A	800	0.015	-2.0	-3.1
SFED-05	Circular	1	3.5	N/A	950	0.015	0.0	-3.0
SFED-10	Circular	1	4.0	N/A	1000	0.015	-2.0	-4.1
SFED-15	Circular	1	3.5	N/A	1600	0.015	0.0	-2.0
SFED-20	Circular	1	4.5	N/A	1950	0.015	0.0	-3.0
SFED-25	Circular	1	3.5	N/A	700	0.015	0.0	0.0
SMIAMI-05	Circular	1	3.5	N/A	1100	0.015	0.0	0.0
SMIAMI-10	Circular	1	4.0	N/A	1100	0.015	0.0	-6.0
SR84-01	Circular	1	7.0	N/A	1550	0.015	-2.0	-5.0
SR84-02	Circular	1	1.5	N/A	1350	0.015	0.0	0.0
SR84-05	Circular	1	5.0	N/A	3950	0.015	-2.0	-5.0
SR84-10	Circular	1	4.0	N/A	1050	0.015	0.0	0.0
SR84-14	Circular	1	2.5	N/A	1700	0.015	0.0	0.0
SR84-15	Circular	1	4.5	N/A	3350	0.015	0.0	-2.0
SR84-20	Circular	1	6.0	N/A	1600	0.015	-2.0	-4.0
SW14A-05	Circular	1	3.0	N/A	800	0.015	-2.0	-2.3
SW14ST-05	Circular	1	6.0	N/A	900	0.015	-2.0	-4.0
SW14ST-10	Circular	1	6.0	N/A	1050	0.015	-2.0	-2.0
SW15CT-05	Circular	1	4.5	N/A	850	0.015	0.0	-2.0
SW15CT-06	Circular	6	2.0	N/A	1500	0.015	2.0	-2.0
SW16ST-05AP	Circular	1	6.0	N/A	650	0.015	-4.0	-5.0
SW20ST-05	Circular	1	6.0	N/A	1370	0.015	-4.0	-8.0
SW20ST-10	Circular	1	6.0	N/A	1150	0.015	-4.0	-4.0
SW24ST-05	Circular	1	3.0	N/A	550	0.015	-2.0	-2.5
SW27A-05	Circular	1	3.0	N/A	1350	0.015	0.0	0.0
SW3A-05	Circular	1	4.5	N/A	600	0.015	0.0	-4.8
SW4A-05	Circular	1	3.5	N/A	1900	0.015	0.0	-3.7
SW4A-10	Circular	1	3.0	N/A	850	0.015	0.0	-3.0
SW4A-15	Circular	1	2.5	N/A	1950	0.015	0.0	0.0
SW7A-05	Circular	1	4.0	N/A	900	0.015	-2.0	-2.0
SW7A-06	Circular	1	2.5	N/A	2150	0.015	0.0	-2.7

Existing Conditions - Conduits								
Link Name	Link Type	No. of Barrels	Depth (ft)	Width (ft)	Length (ft)	Manning's Roughness	U/S Inv. (ft NGVD)	D/S Inv. (ft NGVD)
SWFLAG-05	Circular	1	5.5	N/A	950	0.015	-3.0	-3.0
SWFLAG-10	Circular	1	4.5	N/A	1300	0.015	0.0	-5.0
SWFLAG-15	Circular	1	4.0	N/A	1600	0.015	0.0	0.0
SWMLK-05	Circular	1	5.0	N/A	750	0.015	-2.0	-4.0
SWMLK-10	Circular	1	5.0	N/A	1400	0.015	-4.0	-5.0
SWMLK-11	Circular	1	4.5	N/A	2000	0.015	-4.0	-1.0
SWMLK-12	Circular	1	5.0	N/A	2000	0.015	-4.0	-5.7
SWRIVRS-05	Circular	1	3.5	N/A	1300	0.015	0.0	-2.3
W5A-15	Circular	1	6.0	N/A	160	0.015	-3.0	-4.7
WBROW-05	Circular	1	3.0	N/A	2100	0.015	0.0	-2.3
WBROW-10	Circular	1	6.0	N/A	1100	0.015	-3.0	-4.3
WBROW-20AP	Circular	1	6.0	N/A	800	0.015	-2.0	-2.9
WDAV-05	Circular	1	3.0	N/A	950	0.015	0.0	-3.7
WDAV-10	Circular	1	3.0	N/A	800	0.015	0.0	0.0
WDAV-12	Circular	1	4.5	N/A	2150	0.015	0.0	-4.5
WDAV-15	Circular	1	3.5	N/A	1850	0.015	0.0	0.0
WDAV-20	Circular	1	4.0	N/A	1250	0.015	0.0	-2.0
WDAV-25	Circular	1	6.0	N/A	800	0.015	-2.0	-2.0
WDAV-30	Circular	1	4.5	N/A	2900	0.015	0.0	-2.0
WSIST-05	Circular	1	3.0	N/A	1050	0.015	0.0	0.0
WSIST-10	Circular	1	5.0	N/A	800	0.015	-2.0	-2.0
WSUNR-05	Circular	1	7.0	N/A	1950	0.015	-4.0	-4.0
WSUNR-10	Circular	1	4.5	N/A	1600	0.015	0.0	-2.0
WSUNR-15	Circular	1	2.5	N/A	1200	0.015	0.0	0.0
WSUNR-18	Circular	1	4.5	N/A	3550	0.015	0.0	-2.0
WSUNR-20	Circular	1	6.0	N/A	400	0.015	-2.0	-4.3
C12UI015OL	Overflow	N/A	N/A	N/A	200	0.020	6.5	6.5
C13MRC-02OL	Overflow	N/A	N/A	N/A	200	0.020	6.9	6.9
C13MRC-03OL	Overflow	N/A	N/A	N/A	200	0.020	4.4	4.4
CCCSPUR010OL	Overflow	N/A	N/A	N/A	200	0.020	6.1	6.0
CCCSPUR021OL	Overflow	N/A	N/A	N/A	200	0.020	7.7	7.9
CRCC-05OL	Overflow	N/A	N/A	N/A	200	0.020	4.1	4.1
CS55OL	Overflow	N/A	N/A	N/A	200	0.020	7.8	7.8
EBROW-05OL1	Overflow	N/A	N/A	N/A	200	0.020	3.3	3.3
EBROW-05OL2	Overflow	N/A	N/A	N/A	200	0.020	4.5	4.5
ECOMM-05OL	Overflow	N/A	N/A	N/A	200	0.020	5.7	5.7
ECOMM-10OL	Overflow	N/A	N/A	N/A	200	0.020	5.7	5.7
ECOMM-20OL	Overflow	N/A	N/A	N/A	200	0.020	6.5	7.5
ECOMM-20OL2	Overflow	N/A	N/A	N/A	200	0.020	5.9	5.8
ELOSO-05OL	Overflow	N/A	N/A	N/A	200	0.020	4.7	4.7
EOAKPRK-05OL	Overflow	N/A	N/A	N/A	200	0.020	4.3	4.3

Existing Conditions - Conduits								
Link Name	Link Type	No. of Barrels	Depth (ft)	Width (ft)	Length (ft)	Manning's Roughness	U/S Inv. (ft NGVD)	D/S Inv. (ft NGVD)
ESUNR-01OL1	Overflow	N/A	N/A	N/A	200	0.020	6.1	6.1
ESUNR-01OL2	Overflow	N/A	N/A	N/A	200	0.020	6.1	6.1
ESUNR-07OL	Overflow	N/A	N/A	N/A	200	0.020	6.7	6.7
FLEA-OL1	Overflow	N/A	N/A	N/A	200	0.020	9.6	9.6
FLEA-OL2	Overflow	N/A	N/A	N/A	200	0.020	11.5	11.5
FLEA-OL3	Overflow	N/A	N/A	N/A	200	0.020	11.5	11.5
FLEA-OL4	Overflow	N/A	N/A	N/A	200	0.020	11.5	11.5
GALT-05OL	Overflow	N/A	N/A	N/A	200	0.020	9.0	9.0
HF015OL	Overflow	N/A	N/A	N/A	200	0.020	5.4	5.5
HFCS17005OL	Overflow	N/A	N/A	N/A	200	0.020	6.9	7.0
I595-05_O	Overflow	N/A	N/A	N/A	200	0.020	7.0	6.9
I595-10_O	Overflow	N/A	N/A	N/A	200	0.020	4.9	4.8
I595-15OL	Overflow	N/A	N/A	N/A	200	0.020	5.7	5.8
IC032OL	Overflow	N/A	N/A	N/A	200	0.020	6.3	6.3
IC042OL	Overflow	N/A	N/A	N/A	200	0.020	6.0	6.0
LAKEEMERALD-OL	Overflow	N/A	N/A	N/A	200	0.020	6.4	6.4
LKMELVA-05OL	Overflow	N/A	N/A	N/A	200	0.020	7.4	7.4
LL005OL	Overflow	N/A	N/A	N/A	200	0.020	6.6	6.7
LL020_OL	Overflow	N/A	N/A	N/A	200	0.020	8.7	8.8
LL026OL	Overflow	N/A	N/A	N/A	200	0.020	9.8	9.7
LL035_OL	Overflow	N/A	N/A	N/A	200	0.020	8.2	8.2
LL035-OPL035OL	Overflow	N/A	N/A	N/A	200	0.020	-5.0	-5.0
LL040_OL	Overflow	N/A	N/A	N/A	200	0.020	7.9	7.9
MELROSEPK-06OL	Overflow	N/A	N/A	N/A	200	0.020	8.1	8.1
MIDLST-05OL	Overflow	N/A	N/A	N/A	200	0.020	4.8	4.8
MLKPOND-OL	Overflow	N/A	N/A	N/A	200	0.020	8.3	8.3
NANDR-05OL	Overflow	N/A	N/A	N/A	200	0.020	6.5	6.5
NANDR-10OL	Overflow	N/A	N/A	N/A	200	0.020	5.8	5.8
NANDR-15OL	Overflow	N/A	N/A	N/A	200	0.020	4.6	4.6
NDIXIE02-OL1	Overflow	N/A	N/A	N/A	200	0.020	6.3	6.4
NDIXIE-OL	Overflow	N/A	N/A	N/A	200	0.020	6.0	6.0
NDIXIE-OL2	Overflow	N/A	N/A	N/A	200	0.020	6.0	6.0
NE11ST-04OL	Overflow	N/A	N/A	N/A	200	0.020	6.7	6.7
NE11ST-05OL	Overflow	N/A	N/A	N/A	200	0.020	6.9	6.9
NE13ST-05OL	Overflow	N/A	N/A	N/A	200	0.020	6.7	6.7
NE13ST-15OL	Overflow	N/A	N/A	N/A	200	0.020	5.6	5.6
NE15A-10OL	Overflow	N/A	N/A	N/A	200	0.020	5.5	5.5
NE3A-05OL	Overflow	N/A	N/A	N/A	200	0.020	6.0	6.0
NE3A-07OL	Overflow	N/A	N/A	N/A	200	0.020	5.8	5.8
NE3A-10OL	Overflow	N/A	N/A	N/A	200	0.020	4.7	4.7
NE3CT-05OL	Overflow	N/A	N/A	N/A	200	0.020	7.3	7.3

Existing Conditions - Conduits								
Link Name	Link Type	No. of Barrels	Depth (ft)	Width (ft)	Length (ft)	Manning's Roughness	U/S Inv. (ft NGVD)	D/S Inv. (ft NGVD)
NE4A-05OL	Overflow	N/A	N/A	N/A	200	0.020	5.8	5.8
NE4A-10OL	Overflow	N/A	N/A	N/A	200	0.020	5.7	5.7
NE4A-15OL1	Overflow	N/A	N/A	N/A	200	0.020	6.4	6.4
NE4A-15OL2	Overflow	N/A	N/A	N/A	200	0.020	6.6	6.6
NE65-05OL	Overflow	N/A	N/A	N/A	200	0.020	6.8	6.8
NFED-05OL	Overflow	N/A	N/A	N/A	200	0.020	6.1	6.1
NFED-12OL	Overflow	N/A	N/A	N/A	200	0.020	6.3	6.3
NFED-15OL	Overflow	N/A	N/A	N/A	200	0.020	5.9	5.9
NFED-20OL	Overflow	N/A	N/A	N/A	200	0.020	5.8	5.8
NFED-25OL	Overflow	N/A	N/A	N/A	200	0.020	6.5	6.5
NFED-30OL	Overflow	N/A	N/A	N/A	200	0.020	8.2	8.2
NFED-35OL	Overflow	N/A	N/A	N/A	200	0.020	5.9	5.9
NFED-40OL	Overflow	N/A	N/A	N/A	200	0.020	5.7	6.0
NFED-45OL	Overflow	N/A	N/A	N/A	200	0.020	8.8	8.8
NFED-50OL	Overflow	N/A	N/A	N/A	200	0.020	7.5	7.5
NFED-55OL	Overflow	N/A	N/A	N/A	200	0.020	5.7	5.7
NFED-60OL	Overflow	N/A	N/A	N/A	200	0.020	6.3	6.3
NFED-65OL	Overflow	N/A	N/A	N/A	200	0.020	5.7	5.7
NFED-70OL	Overflow	N/A	N/A	N/A	200	0.020	5.7	2.6
NPOWRL-03OL	Overflow	N/A	N/A	N/A	200	0.020	7.8	7.8
NPOWRL-05OL1	Overflow	N/A	N/A	N/A	200	0.020	7.0	7.0
NPOWRL-05OL2	Overflow	N/A	N/A	N/A	200	0.020	6.0	6.0
NPOWRL-OL1	Overflow	N/A	N/A	N/A	200	0.020	8.7	8.7
NW10TR-OL1	Overflow	N/A	N/A	N/A	200	0.020	9.6	9.6
NW15A-05OL	Overflow	N/A	N/A	N/A	200	0.020	6.9	6.9
NW15A-10OL	Overflow	N/A	N/A	N/A	200	0.020	5.9	5.9
NW15A-15OL	Overflow	N/A	N/A	N/A	200	0.020	5.6	5.6
NW18A-05OL	Overflow	N/A	N/A	N/A	200	0.020	6.1	6.1
NW22ST-OL	Overflow	N/A	N/A	N/A	200	0.020	7.5	7.5
NW24A-05OL	Overflow	N/A	N/A	N/A	200	0.020	6.2	6.3
NW29-05OL	Overflow	N/A	N/A	N/A	200	0.020	10.5	10.5
NW4A-05OL1	Overflow	N/A	N/A	N/A	200	0.020	5.7	5.7
NW4A-05OL2	Overflow	N/A	N/A	N/A	200	0.020	5.9	5.9
NW4A-10OL	Overflow	N/A	N/A	N/A	200	0.020	6.4	6.4
NW5A-05OL	Overflow	N/A	N/A	N/A	200	0.020	6.3	6.3
NW5A-10OL	Overflow	N/A	N/A	N/A	200	0.020	5.7	5.7
NW7A-05OL	Overflow	N/A	N/A	N/A	200	0.020	6.3	6.3
NW7A-10OL	Overflow	N/A	N/A	N/A	200	0.020	6.2	6.2
NW8ST-05OL	Overflow	N/A	N/A	N/A	200	0.020	6.1	6.1
NW8ST-10OL1	Overflow	N/A	N/A	N/A	200	0.020	6.1	6.1
NW8ST-10OL2	Overflow	N/A	N/A	N/A	200	0.020	5.7	5.7

Existing Conditions - Conduits								
Link Name	**Link Type**	**No. of Barrels**	**Depth (ft)**	**Width (ft)**	**Length (ft)**	**Manning's Roughness**	**U/S Inv. (ft NGVD)**	**D/S Inv. (ft NGVD)**
NW9A-10OL	Overflow	N/A	N/A	N/A	200	0.020	6.4	6.4
OP015OL	Overflow	N/A	N/A	N/A	200	0.020	7.7	5.8
OPEB002OL	Overflow	N/A	N/A	N/A	200	0.020	4.6	4.6
OPEB004OL	Overflow	N/A	N/A	N/A	200	0.020	4.2	4.2
OPEB007OL	Overflow	N/A	N/A	N/A	200	0.020	6.0	6.0
OPEB009OL	Overflow	N/A	N/A	N/A	200	0.020	6.5	6.5
OPEB011OL	Overflow	N/A	N/A	N/A	200	0.020	5.7	5.6
OPL005OL	Overflow	N/A	N/A	N/A	200	0.020	3.8	3.8
OPL015OL	Overflow	N/A	N/A	N/A	200	0.020	5.2	5.2
OPL025OL	Overflow	N/A	N/A	N/A	200	0.020	9.5	9.5
OPL030APO	Overflow	N/A	N/A	N/A	200	0.020	8.7	8.7
PRL010OL	Overflow	N/A	N/A	N/A	200	0.020	10.4	10.5
PRN020OL	Overflow	N/A	N/A	N/A	200	0.020	9.9	9.9
PRN025OL	Overflow	N/A	N/A	N/A	200	0.020	11.7	11.7
PRN035OL	Overflow	N/A	N/A	N/A	200	0.020	8.8	8.8
PRN040_OL1	Overflow	N/A	N/A	N/A	200	0.020	6.7	6.7
PRN040OL	Overflow	N/A	N/A	N/A	200	0.020	6.8	6.8
PRN045OL	Overflow	N/A	N/A	N/A	200	0.020	7.4	7.4
PRN1006OL	Overflow	N/A	N/A	N/A	200	0.020	11.6	11.6
PRN1011OL	Overflow	N/A	N/A	N/A	200	0.020	8.7	8.7
PRN1011OL2	Overflow	N/A	N/A	N/A	200	0.020	8.4	8.4
PRSW020OL	Overflow	N/A	N/A	N/A	200	0.020	10.6	10.6
PRSW025OL	Overflow	N/A	N/A	N/A	200	0.020	8.6	8.6
ROL-05OL	Overflow	N/A	N/A	N/A	200	0.020	4.4	4.4
RVRLND-05OL	Overflow	N/A	N/A	N/A	200	0.020	6.6	5.9
SANDR-05OL	Overflow	N/A	N/A	N/A	200	0.020	5.4	5.3
SE10A-05OL	Overflow	N/A	N/A	N/A	200	0.020	6.3	6.3
SE3A-05OL	Overflow	N/A	N/A	N/A	200	0.020	3.6	3.6
SE3A-10OL	Overflow	N/A	N/A	N/A	200	0.020	4.6	4.6
SE4A-10OL	Overflow	N/A	N/A	N/A	200	0.020	8.1	8.1
SE5A-05OL	Overflow	N/A	N/A	N/A	200	0.020	4.6	4.6
SFED-05OL	Overflow	N/A	N/A	N/A	200	0.020	5.9	5.9
SFED-10OL	Overflow	N/A	N/A	N/A	200	0.020	5.6	5.5
SFED-15OL	Overflow	N/A	N/A	N/A	200	0.020	6.7	6.7
SFED-20OL	Overflow	N/A	N/A	N/A	200	0.020	6.7	6.7
SFED-25OL	Overflow	N/A	N/A	N/A	200	0.020	0.0	6.0
SFNRSPUR014OL	Overflow	N/A	N/A	N/A	200	0.020	3.8	3.8
SMIAMI-05OL	Overflow	N/A	N/A	N/A	200	0.020	8.0	8.0
SMIAMI-10OL	Overflow	N/A	N/A	N/A	200	0.020	7.8	7.8
SNYDERPK-OL1	Overflow	N/A	N/A	N/A	200	0.020	6.9	6.9
SNYDERPK-OL2	Overflow	N/A	N/A	N/A	200	0.020	5.0	5.0

Existing Conditions - Conduits								
Link Name	**Link Type**	**No. of Barrels**	**Depth (ft)**	**Width (ft)**	**Length (ft)**	**Manning's Roughness**	**U/S Inv. (ft NGVD)**	**D/S Inv. (ft NGVD)**
SNYDERPK-OL3	Overflow	N/A	N/A	N/A	200	0.020	5.5	5.5
SR84-02OL	Overflow	N/A	N/A	N/A	200	0.020	7.8	7.7
SR84-10OL	Overflow	N/A	N/A	N/A	200	0.020	8.4	8.4
SR84-15OL	Overflow	N/A	N/A	N/A	200	0.020	8.3	8.3
SW12A-10OL1	Overflow	N/A	N/A	N/A	200	0.020	5.8	5.8
SW12A-10OL2	Overflow	N/A	N/A	N/A	200	0.020	5.7	5.7
SW14A-05OL	Overflow	N/A	N/A	N/A	200	0.020	5.0	5.0
SW14ST-05OL	Overflow	N/A	N/A	N/A	200	0.020	7.4	7.4
SW15A-05OL	Overflow	N/A	N/A	N/A	200	0.020	6.1	6.1
SW15A-05OL2	Overflow	N/A	N/A	N/A	200	0.020	6.8	6.8
SW20ST-05OL	Overflow	N/A	N/A	N/A	200	0.020	4.9	4.9
SW20ST-10OL	Overflow	N/A	N/A	N/A	200	0.020	4.7	4.7
SW24ST-05OL	Overflow	N/A	N/A	N/A	200	0.020	4.3	4.3
SW24ST-05OL2	Overflow	N/A	N/A	N/A	200	0.020	4.7	4.7
SW27A-OL1	Overflow	N/A	N/A	N/A	200	0.020	7.5	7.5
SW27A-OL2	Overflow	N/A	N/A	N/A	200	0.020	7.9	7.9
SW4A-05OL	Overflow	N/A	N/A	N/A	200	0.020	6.2	6.2
SW4A-10OL	Overflow	N/A	N/A	N/A	200	0.020	6.5	6.5
SW4A-15OL	Overflow	N/A	N/A	N/A	200	0.020	6.8	6.8
SW7A-05OL	Overflow	N/A	N/A	N/A	200	0.020	5.6	5.6
SWFLAG-15OL	Overflow	N/A	N/A	N/A	200	0.020	6.7	6.7
SWMLK-05OL	Overflow	N/A	N/A	N/A	200	0.020	5.8	5.8
SWMLK-10OL	Overflow	N/A	N/A	N/A	200	0.020	5.0	5.0
SWMLK-12OL	Overflow	N/A	N/A	N/A	200	0.020	5.9	5.9
SWRIVRS-05OL	Overflow	N/A	N/A	N/A	200	0.020	6.6	6.6
TWNLKS-OL	Overflow	N/A	N/A	N/A	200	0.020	9.8	9.8
TWNLKS-OL1	Overflow	N/A	N/A	N/A	200	0.020	9.8	9.8
WBROW-05OL1	Overflow	N/A	N/A	N/A	200	0.020	5.8	5.8
WBROW-05OL2	Overflow	N/A	N/A	N/A	200	0.020	5.6	5.6
WBROW-10OL	Overflow	N/A	N/A	N/A	200	0.020	7.2	7.2
WBROW-15OL	Overflow	N/A	N/A	N/A	200	0.020	7.9	7.9
WBROW-15OL2	Overflow	N/A	N/A	N/A	200	0.020	8.0	8.0
WBROW-20OL	Overflow	N/A	N/A	N/A	200	0.020	8.8	8.8
WDAV-05OL	Overflow	N/A	N/A	N/A	200	0.020	5.7	5.7
WDAV-10OL1	Overflow	N/A	N/A	N/A	200	0.020	5.2	5.2
WDAV-10OL2	Overflow	N/A	N/A	N/A	200	0.020	7.1	7.1
WDAV-15OL	Overflow	N/A	N/A	N/A	200	0.020	7.7	7.7
WDAV-20OL	Overflow	N/A	N/A	N/A	200	0.020	7.7	7.7
WDAV-25OL	Overflow	N/A	N/A	N/A	200	0.020	7.7	7.7
WDAV-30OL	Overflow	N/A	N/A	N/A	200	0.020	10.6	10.6
WESTLL-OL1	Overflow	N/A	N/A	N/A	200	0.020	8.8	8.8

Existing Conditions - Conduits								
Link Name	**Link Type**	**No. of Barrels**	**Depth (ft)**	**Width (ft)**	**Length (ft)**	**Manning's Roughness**	**U/S Inv. (ft NGVD)**	**D/S Inv. (ft NGVD)**
WESTLL-OL2	Overflow	N/A	N/A	N/A	200	0.020	9.2	9.2
WESTLL-OL3	Overflow	N/A	N/A	N/A	200	0.020	8.8	8.8
WSIST-05OL	Overflow	N/A	N/A	N/A	200	0.020	5.7	5.7
WSUNR-05OL	Overflow	N/A	N/A	N/A	200	0.020	5.8	5.8
WSUNR-15OL	Overflow	N/A	N/A	N/A	200	0.020	7.1	7.1
WSUNR-20OL	Overflow	N/A	N/A	N/A	200	0.020	6.8	6.8
CCCSPUR005	Trapezoidal	N/A	15.0	40	780	0.040	-10.0	-10.5
CCCSPUR015	Trapezoidal	N/A	15.0	40	4850	0.040	-9.0	-9.9

Existing Conditions - Weirs					
Weir Name	**Weir Type**	**Width (ft)**	**Depth (ft)**	**Weir Coef.**	**Weir Crest (NGVD ft)**
CS55A	Transverse	4.0	3	3.20	5.50
PRN005AP	Transverse	20.0	10	3.33	6.00
LL040	Transverse	5.0	10	3.30	5.00
S-36	Transverse	25.0	14	3.15	-7.00
S37A	Transverse	51.6	12.8	3.30	-7.90
S37B	Transverse	60.0	6.6	3.33	0.00

Existing Conditions - Pumps	
Pump Name	**Max Capacity (cfs)**
RIVRPUMP	150

Existing Conditions- Nodes			
Node Name	**Node Type**	**Invert (ft NGVD)**	**Initial Stage (ft NGVD)**
C12UI010	Junction	-3.0	2.5
C12UI015	Storage Junction	-3.0	2.5
C12UI020	Junction	-2.9	2.5
C12UICS18005	Junction	-7.0	2.5
C13IC005	Storage Junction	-10.0	2.5
C13IC010	Junction	-13.5	2.6
C13IC011	Junction	-13.6	2.5
C13IC015	Storage Junction	-13.5	2.5
C13IC020	Storage Junction	-13.6	2.5
C13IC025	Junction	-13.5	2.5
C13ICSPUR002	Storage Junction	-10.0	2.6
C13ICSPUR005	Junction	-9.9	2.6
C13MR001	Junction	-11.9	2.6
C13MR005	Storage Junction	-11.9	2.5
C13MR010	Storage Junction	-13.6	2.5
C13MR015	Storage Junction	-13.5	2.5
C13MR016	Junction	-13.5	2.6
C13MR020	Storage Junction	-13.5	2.5
C13MR021	Junction	-13.6	2.5
C13MR024	Junction	-13.5	2.6
C13MR025	Storage Junction	-13.5	2.5
C13MR030	Storage Junction	-13.6	2.5
C13MR031	Storage Junction	-13.5	2.6
C13MRC005	Storage Junction	-11.9	2.5
C13MRC006	Junction	-11.9	2.6
C13MRC007	Junction	-12.0	2.5
C13MRC008	Junction	-11.9	2.5
C13MRC009	Junction	-11.9	2.6
C13MRC010	Junction	-11.8	2.6
C13MRC012	Storage Junction	-11.9	2.5
C13MRC014	Junction	-11.9	2.6
C13MRC015	Storage Junction	-11.9	2.5
C13MRC017	Junction	-11.9	2.6
C13MRC018	Junction	-11.9	2.5
C13MRC-02	Storage Junction	0.0	4.5
C13MRC020	Storage Junction	-13.5	2.5
C13MRC022	Junction	-13.5	2.6
C13MRC023	Junction	-13.5	2.5
C13MRC024	Junction	-13.5	2.6
C13MRC025	Junction	-13.6	2.5
C13MRC-03	Storage Junction	-5.0	3.0
C13MRC035	Storage Junction	-13.5	2.5
C13MRC042	Junction	-13.6	4.5
C13MRC043	Junction	-13.5	4.5
C13MRC045	Junction	-13.5	4.6
C13MRSPUR005	Storage Junction	-11.9	2.5
C14CCC005	Junction	-19.9	2.5
C14CCC008	Junction	-17.9	2.5
C14CCC010	Storage Junction	-17.8	2.5

Existing Conditions- Nodes			
Node Name	**Node Type**	**Invert (ft NGVD)**	**Initial Stage (ft NGVD)**
C14CCC020	Storage Junction	-17.9	2.5
C14CCC022	Junction	-17.8	2.5
C14CCC025	Junction	-17.9	2.5
C14CCC027	Junction	-17.9	2.5
C14CCC038	Storage Junction	-17.8	3.4
C14CCC039	Junction	-17.7	3.4
C14CCC040	Storage Junction	-17.6	3.4
C14CCC045	Junction	-16.6	3.4
CCCSPUR005	Junction	-10.0	2.5
CCCSPUR010	Junction	-9.9	2.5
CCCSPUR015	Junction	-9.0	2.5
CCCSPUR020	Storage Junction	-2.5	2.5
CCCSPUR021	Junction	-2.5	2.5
CRCC-05	Storage Junction	0.0	2.5
CRDVA-05	Junction	-6.0	2.5
DUM_IC006	Storage Junction	-20.0	2.5
EBROW-05	Storage Junction	-4.0	2.5
ECOMM-05	Storage Junction	-1.0	2.5
ECOMM-10	Storage Junction	-2.0	2.5
ECOMM-20	Storage Junction	-2.0	2.5
ELOSO-05	Storage Junction	-4.0	2.5
EOAKPRK-05	Storage Junction	0.0	2.5
ESUNR-01	Storage Junction	0.0	2.5
ESUNR-05	Storage Junction	0.0	2.5
ESUNR-07	Storage Junction	0.0	2.5
ESUNR-10	Storage Junction	0.0	2.5
FLEA-05	Storage Junction	0.0	2.5
FLEA-10	Storage Junction	5.0	5.0
G16005	Junction	-14.6	2.5
G16007	Junction	-14.6	2.5
G54_HW	Junction	-4.0	2.5
G54_TW	Storage Junction	-8.7	2.5
G57_TW	Junction	-14.5	2.5
GALT-05	Storage Junction	0.0	2.5
HCOPWCD2005	Junction	-8.0	2.5
HF010	Junction	-2.1	2.5
HF015	Junction	-2.1	2.4
HF020	Junction	-2.0	2.5
HFCS17005	Storage Junction	-2.0	2.5
HFCS55025	Storage Junction	-5.0	2.5
I595-05	Storage Junction	0.0	2.5
I595-10	Storage Junction	0.0	2.5
I595-15	Storage Junction	-2.0	2.5
IC022	Storage Junction	-20.0	2.5
IC025	Storage Junction	-20.0	2.5
IC030	Junction	-20.0	2.5
IC032	Junction	-10.0	2.5
IC035	Junction	-10.0	2.5
IC040	Junction	-10.0	2.5

Existing Conditions- Nodes			
Node Name	Node Type	Invert (ft NGVD)	Initial Stage (ft NGVD)
IC042	Junction	-10.0	2.5
IC043	Storage Junction	-20.0	2.5
IC044	Junction	-20.0	2.5
IC045	Junction	-10.0	2.5
IC050	Junction	-10.0	2.5
LAKEEMERALD-05	Storage Junction	-5.0	3.0
LKMELVA-05	Storage Junction	-2.0	2.5
LL005	Storage Junction	-5.0	5.0
LL015	Junction	-1.9	5.1
LL020	Storage Junction	0.0	5.0
LL025	Junction	0.1	5.1
LL026	Junction	0.2	5.2
LL030	Junction	0.2	5.2
LL035	Storage Junction	-5.0	2.5
LL038	Junction	0.2	5.2
LLAKE040	Storage Junction	-5.0	5.0
MELROSEPK-05	Junction	1.9	2.4
MELROSEPK-06	Junction	1.9	2.4
MELROSEPK-10	Storage Junction	0.0	2.5
MIDLST-05	Junction	-2.0	2.5
MLKPOND-05	Storage Junction	-5.0	2.5
NANDR-05	Storage Junction	0.0	2.5
NANDR-10	Storage Junction	0.0	2.5
NANDR-15	Storage Junction	-3.0	2.5
NDIXIE-02	Storage Junction	0.0	2.5
NDIXIE-05	Storage Junction	0.0	2.5
NE11ST-04	Storage Junction	0.0	2.5
NE11ST-05	Storage Junction	0.0	2.5
NE13ST-05	Storage Junction	-2.0	2.5
NE13ST-10	Junction	0.0	2.5
NE13ST-15	Storage Junction	0.0	2.5
NE15A-05	Junction	-3.0	2.5
NE15A-10	Storage Junction	-2.0	2.5
NE3A-05	Storage Junction	0.0	2.5
NE3A-07	Storage Junction	-2.0	2.5
NE3A-10	Storage Junction	-3.0	2.5
NE3CT-05	Storage Junction	0.0	2.5
NE4A-05	Storage Junction	0.0	2.5
NE4A-10	Storage Junction	0.0	2.5
NE4A-15	Storage Junction	0.0	2.5
NE65-05	Storage Junction	-2.0	2.5
NFED-05	Storage Junction	-2.0	2.5
NFED-10	Junction	-2.0	2.5
NFED-12	Storage Junction	-2.0	2.5
NFED-15	Storage Junction	0.0	2.5
NFED-20	Storage Junction	-2.0	2.5
NFED-22	Junction	0.0	2.5
NFED-25	Storage Junction	0.0	2.5
NFED-30	Storage Junction	0.0	2.5

Existing Conditions- Nodes			
Node Name	**Node Type**	**Invert (ft NGVD)**	**Initial Stage (ft NGVD)**
NFED-35	Storage Junction	0.0	2.5
NFED-37	Junction	-2.0	2.5
NFED-40	Storage Junction	0.0	2.5
NFED-45	Storage Junction	0.0	2.5
NFED-50	Storage Junction	0.0	2.5
NFED-52	Junction	-2.0	2.5
NFED-53	Junction	-2.0	2.5
NFED-55	Storage Junction	-2.0	2.5
NFED-60	Storage Junction	0.0	2.5
NFED-65	Storage Junction	0.0	2.5
NFED-67	Junction	-1.0	2.5
NFED-70	Storage Junction	-2.0	2.5
NFNR001	Storage Junction	-10.1	2.4
NFNR005	Storage Junction	-10.0	2.5
NFNR008	Storage Junction	-8.7	2.5
NFNR010	Junction	-8.8	2.5
NFNR011	Junction	-8.7	2.5
NFNR015	Junction	-8.7	2.5
NFNR016	Junction	-8.8	2.5
NFNR020	Junction	-8.7	2.5
NFNR021	Junction	-8.8	2.5
NFNR025	Storage Junction	-8.7	2.5
NFNR030	Storage Junction	-8.3	2.5
NFNR035	Storage Junction	-8.3	2.5
NFNR040	Storage Junction	-8.3	2.5
NFNR042	Junction	-8.3	2.6
NFNR043	Storage Junction	-8.3	2.5
NFNR045	Junction	-8.3	2.6
NFNR046	Storage Junction	-8.3	2.5
NFNR050	Junction	-8.3	2.6
NFNR051	Junction	-8.3	2.5
NFNR054	Junction	-8.3	2.6
NFNR055	Storage Junction	-8.3	2.5
NFNRSPUR004	Junction	-5.0	2.5
NFNRSPUR005	Storage Junction	-5.0	2.5
NFNRSPUR010	Junction	-5.1	2.4
NFSPUR005	Junction	-8.3	2.5
NNRC005	Storage Junction	-8.7	2.5
NNRC010	Junction	-8.7	2.5
NNRC015	Junction	-8.8	2.5
NNRC020	Junction	-8.7	2.5
NPOWRL-03	Storage Junction	0.0	2.5
NPOWRL-05	Storage Junction	0.0	2.5
NPOWRL-10	Storage Junction	-5.0	2.5
NW10TR-05	Storage Junction	0.0	2.5
NW15A-05	Storage Junction	0.0	2.5
NW15A-10	Storage Junction	-2.0	2.5
NW15A-15	Storage Junction	-3.0	2.5
NW18A-05	Storage Junction	0.0	2.5

Existing Conditions- Nodes			
Node Name	**Node Type**	**Invert (ft NGVD)**	**Initial Stage (ft NGVD)**
NW22ST-05	Storage Junction	0.0	2.5
NW22ST-10	Storage Junction	0.0	2.5
NW24A-05	Storage Junction	0.0	2.5
NW28-05	Storage Junction	-4.0	2.5
NW29-05	Junction	-4.0	7.0
NW31ST-05	Junction	-1.0	2.5
NW35-05	Storage Junction	0.0	5.0
NW35-10	Storage Junction	0.0	5.0
NW35-15	Storage Junction	0.0	5.0
NW4A-05	Storage Junction	0.0	2.5
NW4A-10	Storage Junction	0.0	2.5
NW5A-05	Storage Junction	-4.0	2.5
NW5A-07	Junction	0.0	2.5
NW5A-10	Storage Junction	-2.0	2.5
NW7A-05	Storage Junction	0.0	2.5
NW7A-10	Storage Junction	-2.0	2.5
NW8ST-05	Storage Junction	0.0	2.5
NW8ST-10	Storage Junction	0.0	2.5
NW9A-05	Storage Junction	0.0	2.5
NW9A-10	Storage Junction	0.0	2.5
NWFLAG-05	Junction	-3.0	2.5
OC005	Junction	-2.3	2.5
OC010	Storage Junction	-4.0	2.5
OC015	Junction	-4.0	2.5
OC020	Storage Junction	-2.5	2.5
OC021	Junction	-2.5	2.5
OP015	Storage Junction	-2.0	2.5
OPEB001	Junction	-11.9	2.6
OPEB002	Junction	-12.0	2.5
OPEB003	Storage Junction	-11.9	2.5
OPEB004	Junction	-11.9	2.6
OPEB005	Junction	-11.8	2.6
OPEB006	Junction	-11.8	2.6
OPEB007	Junction	-12.0	2.5
OPEB008	Storage Junction	-11.9	2.5
OPEB009	Junction	-11.9	2.6
OPEB010	Junction	-11.8	2.6
OPEB011	Junction	-12.0	2.5
OPEB015	Storage Junction	-11.9	2.5
OPL005	Storage Junction	-10.0	2.5
OPL010	Junction	-10.0	2.5
OPL015	Storage Junction	-10.0	2.5
OPL020	Storage Junction	-10.0	2.5
OPL025	Storage Junction	-5.0	2.5
OPL030	Junction	-5.0	2.5
OPL035	Junction	-5.0	2.5
OUT_IC005	Outfall	-20.0	-17.5
OUT_IC010	Outfall	-10.0	-7.5
OUT_IC015	Outfall	-10.1	-7.6

Existing Conditions- Nodes			
Node Name	**Node Type**	**Invert (ft NGVD)**	**Initial Stage (ft NGVD)**
OUT_IC020	Outfall	-20.0	-17.5
OUT_IC055	Outfall	-20.0	-17.5
PAG005	Junction	-5.0	7.0
PORTSPUR005	Junction	-10.0	2.5
PRLAKE010	Storage Junction	-5.0	7.0
PRN001	Junction	-16.6	3.4
PRN005	Junction	-13.1	6.9
PRN010	Junction	-13.0	7.0
PRN015	Junction	-12.9	7.0
PRN018	Junction	-12.8	7.0
PRN020	Storage Junction	-10.0	7.0
PRN025	Storage Junction	-4.0	7.0
PRN030	Junction	-4.0	7.0
PRN035	Junction	-4.0	2.5
PRN038	Storage Junction	-4.0	2.5
PRN039	Junction	-4.0	2.5
PRN040	Storage Junction	-5.0	2.5
PRN045	Storage Junction	-5.0	2.5
PRN1005	Junction	-13.0	7.0
PRN1006	Junction	-13.0	7.0
PRN1010	Junction	-5.0	7.0
PRN1011	Storage Junction	-5.0	7.0
PRSWLAKE020	Storage Junction	-5.0	7.0
PRSWLAKE025	Storage Junction	-5.0	7.0
RIVRPS	Storage Junction	-3.0	2.5
ROL-05	Storage Junction	0.0	2.5
RVRLND-05	Storage Junction	0.0	2.5
S33_HW	Junction	-8.3	2.6
S33_TW	Junction	-8.3	2.6
S36_TW	Junction	-13.5	2.6
S36-HW	Junction	-13.5	2.6
S37A_TW	Storage Junction	-17.8	2.5
S37A-HW	Storage Junction	-17.9	3.4
S37B_HW	Junction	-16.7	3.4
S37B_TW	Junction	-16.7	3.4
SANDR-05	Storage Junction	-2.0	2.5
SE10A-05	Storage Junction	-5.0	2.5
SE3A-05	Storage Junction	-4.0	2.5
SE3A-10	Storage Junction	-2.0	2.5
SE3A-15	Storage Junction	0.0	2.5
SE4A-10	Storage Junction	-2.0	2.5
SE5A-05	Storage Junction	-2.0	2.5
SFED-05	Storage Junction	0.0	2.5
SFED-10	Storage Junction	-2.0	2.5
SFED-15	Storage Junction	0.0	2.5
SFED-20	Storage Junction	0.0	2.5
SFED-25	Storage Junction	0.0	2.5
SFNR005	Junction	-8.7	2.6
SFNR006	Storage Junction	-8.7	2.5

Existing Conditions- Nodes			
Node Name	**Node Type**	**Invert (ft NGVD)**	**Initial Stage (ft NGVD)**
SFNR010	Storage Junction	-8.7	2.5
SFNR015	Junction	-8.7	2.5
SFNR020	Junction	-8.8	2.5
SFNR025	Junction	-8.7	2.5
SFNR030	Storage Junction	-8.7	2.5
SFNRC005	Storage Junction	-8.7	2.5
SFNRSPUR005	Junction	-8.0	2.5
SFNRSPUR010	Storage Junction	-8.0	2.5
SFNRSPUR013	Junction	-8.0	2.5
SFNRSPUR014	Junction	-8.0	2.5
SFNRSPUR015	Storage Junction	-5.0	2.5
SFNRSPUR018	Junction	-5.0	2.5
SMIAMI-05	Storage Junction	0.0	2.5
SMIAMI-10	Storage Junction	0.0	2.5
SNYDERPK-05	Storage Junction	-2.0	2.5
SNYDERPK-10	Storage Junction	0.0	2.5
SR84-02	Storage Junction	0.0	2.5
SR84-05	Junction	-2.0	2.5
SR84-10	Storage Junction	0.0	2.5
SR84-15	Storage Junction	0.0	2.5
SR84-20	Junction	-2.0	2.5
SR84LAKE005	Junction	-8.7	2.5
SR84LAKE010	Storage Junction	-8.7	2.6
SW12A-05	Storage Junction	0.0	2.5
SW12A-10	Storage Junction	0.0	2.5
SW14A-05	Junction	-2.0	2.5
SW14ST-05	Storage Junction	-2.0	2.5
SW14ST-10	Junction	-2.0	2.5
SW15A-05	Storage Junction	0.0	2.5
SW15CT-05	Storage Junction	0.0	2.5
SW16ST-05	Junction	-4.0	2.5
SW20ST-05	Storage Junction	-4.0	2.5
SW20ST-10	Storage Junction	-4.0	2.5
SW24ST-05	Storage Junction	-2.0	2.5
SW27A-05	Storage Junction	0.0	2.5
SW3A-05	Junction	0.0	2.5
SW4A-05	Storage Junction	0.0	2.5
SW4A-10	Storage Junction	0.0	2.5
SW4A-15	Storage Junction	0.0	2.5
SW7A-05	Storage Junction	-2.0	2.5
SWFLAG-05	Junction	-3.0	2.5
SWFLAG-10	Junction	0.0	2.5
SWFLAG-15	Storage Junction	0.0	2.5
SWMLK-05	Junction	-2.0	2.5
SWMLK-10	Storage Junction	-4.0	2.5
SWMLK-12	Storage Junction	-4.0	2.5
SWRIVRS-05	Storage Junction	0.0	2.5
TR005	Junction	-8.0	2.5
TR006	Junction	-8.1	2.4

Existing Conditions- Nodes			
Node Name	**Node Type**	**Invert (ft NGVD)**	**Initial Stage (ft NGVD)**
TR010	Storage Junction	-8.0	2.5
TR011	Junction	-8.1	2.4
TR015	Junction	-8.0	2.5
TR016	Junction	-8.1	2.4
TR020	Junction	-8.0	2.5
TR021	Junction	-8.1	2.4
TR025	Storage Junction	-8.0	2.5
TR026	Junction	-8.1	2.4
TR030	Junction	-8.0	2.5
TR031	Junction	-8.1	2.4
TR035	Junction	-8.0	2.5
TR037	Junction	-8.1	2.4
TR038	Storage Junction	-8.0	2.5
TR040	Junction	-8.0	2.5
TWNLKS-05	Storage Junction	-5.0	2.5
TWNLKS-10	Storage Junction	-5.0	2.5
W5A-15	Junction	-3.0	2.5
WBROW-05	Storage Junction	0.0	2.5
WBROW-10	Storage Junction	-3.0	2.5
WBROW-15	Storage Junction	0.0	2.5
WBROW-20	Storage Junction	-2.0	2.5
WDAV-05	Storage Junction	0.0	2.5
WDAV-10	Storage Junction	0.0	2.5
WDAV-12	Storage Junction	0.0	2.5
WDAV-15	Storage Junction	0.0	2.5
WDAV-20	Storage Junction	0.0	2.5
WDAV-25	Storage Junction	-2.0	2.5
WDAV-30	Storage Junction	0.0	2.5
WESTLL-05	Storage Junction	5.0	5.0
WSIST-05	Storage Junction	0.0	2.5
WSIST-10	Junction	-2.0	2.5
WSUNR-05	Storage Junction	-4.0	2.5
WSUNR-10	Storage Junction	0.0	2.5
WSUNR-15	Storage Junction	0.0	2.5
WSUNR-20	Storage Junction	-2.0	2.5

Appendix 3C
Surface Water Management Model Results

The following tables present the base model results for simulations of the City of Fort Lauderdale regional EPA SWMM Project.

Model Node	State Planar Coordinates (Easting ft)	State Planar Coordinates (Northing ft)	Design Storm Peak Stages (ft NGVD)				
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
C12UI010	920499	653689	6.6	7.3	7.5	8.2	8.6
C12UI015	920509	653289	6.8	7.4	7.5	8.2	8.6
C12UI020	920595	650966	6.9	7.4	7.6	8.2	8.6
C12UICS18005	920365	655595	5.5	6.7	7.1	8.2	8.6
C13IC005	948586	653234	2.5	2.5	2.5	2.5	2.5
C13IC010	945445	656617	2.6	2.7	2.8	2.9	3.0
C13IC011	945444	656868	2.6	2.8	2.8	3.0	3.2
C13IC015	945414	658542	2.7	2.8	2.9	3.1	3.2
C13IC020	946771	662582	2.8	3.0	3.1	3.4	3.6
C13IC025	945329	664016	3.5	4.1	4.4	5.2	5.6
C13ICSPUR002	944741	653603	2.6	2.6	2.6	2.6	2.6
C13ICSPUR005	943555	652447	2.6	2.6	2.6	2.6	2.6
C13MR001	945528	665252	3.5	4.3	4.6	5.4	5.9
C13MR005	945553	664975	3.5	4.3	4.5	5.4	5.8
C13MR010	944104	662809	3.6	4.3	4.6	5.5	5.9
C13MR015	941840	662393	3.7	4.5	4.8	5.7	6.1
C13MR016	940671	662435	3.7	4.6	4.9	5.8	6.2
C13MR020	938031	661614	3.9	4.7	5.1	6.1	6.5
C13MR021	937809	661602	3.9	4.7	5.1	6.1	6.6
C13MR024	936485	661589	3.9	4.8	5.2	6.2	6.6
C13MR025	936279	661589	3.9	4.8	5.2	6.3	6.7
C13MR030	933659	663175	4.0	4.9	5.3	6.5	6.9
C13MR031	933479	663283	4.0	4.9	5.3	6.5	6.9
C13MRC005	944159	666469	3.7	4.6	4.9	5.9	6.3
C13MRC006	942870	666192	3.8	4.6	5.0	6.0	6.4
C13MRC007	942681	666183	3.8	4.7	5.0	6.0	6.4
C13MRC008	941114	665869	3.9	4.7	5.2	6.2	6.6
C13MRC009	940783	665941	3.9	4.8	5.2	6.3	6.7
C13MRC010	938877	666189	4.0	4.8	5.3	6.4	6.8
C13MRC012	938660	666165	4.0	4.8	5.3	6.4	6.8
C13MRC014	936244	666592	4.0	4.9	5.4	6.6	6.9
C13MRC015	935998	666612	4.0	4.9	5.4	6.6	7.0
C13MRC017	933596	666455	4.0	4.9	5.4	6.6	7.0
C13MRC018	933368	666442	4.0	4.9	5.4	6.6	7.0
C13MRC-02	921283	668851	7.6	8.0	8.1	8.4	9.2
C13MRC020	931718	666333	4.0	4.9	5.4	6.6	7.0
C13MRC022	931067	665563	4.0	5.0	5.4	6.7	7.1
C13MRC023	930792	665741	4.0	5.0	5.5	6.8	7.2
C13MRC024	931249	666820	4.0	5.0	5.5	6.8	7.3
C13MRC025	931166	667046	4.1	5.0	5.6	6.9	7.4
C13MRC-03	927020	669133	4.2	5.1	5.6	7.0	7.6

Model Node	State Planar Coordinates (Easting ft)	State Planar Coordinates (Northing ft)	Design Storm Peak Stages (ft NGVD)				
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
C13MRC035	928138	669440	4.1	5.1	5.6	7.0	7.6
C13MRC042	922290	669510	4.5	5.5	6.1	8.4	9.2
C13MRC043	921891	669516	4.5	5.5	6.1	8.4	9.2
C13MRC045	920067	669428	4.6	5.5	6.1	8.4	9.2
C13MRSPUR005	945566	666285	3.5	4.3	4.6	5.4	5.9
C14CCC005	950982	687707	2.5	2.5	2.5	2.5	2.5
C14CCC008	949622	687198	2.6	2.7	2.7	2.9	3.1
C14CCC010	949062	687245	2.7	2.8	2.8	3.1	3.5
C14CCC020	944805	683511	2.8	3.0	3.1	3.6	4.1
C14CCC022	944659	683074	2.8	3.0	3.2	3.6	4.2
C14CCC025	943639	682426	2.9	3.1	3.3	3.8	4.5
C14CCC027	943315	682296	2.9	3.1	3.3	3.9	4.5
C14CCC038	937221	683084	3.4	4.1	4.6	6.5	7.9
C14CCC039	936587	683303	3.4	4.1	4.6	6.6	8.1
C14CCC040	935553	683651	3.4	4.2	4.7	6.8	8.2
C14CCC045	928224	685592	3.5	4.4	4.9	7.3	8.8
CCCSPUR005	940989	680044	3.0	3.3	3.5	4.2	4.9
CCCSPUR010	940992	679668	3.0	3.3	3.5	4.2	5.1
CCCSPUR015	942244	676955	3.1	3.3	3.5	4.2	5.1
CCCSPUR020	934000	682481	5.7	6.7	7.1	8.4	8.7
CCCSPUR021	935357	683188	5.7	6.7	7.1	8.3	8.6
CRCC-05	948463	670433	4.9	5.3	5.4	5.8	5.9
CRDVA-05	941472	643125	3.6	3.8	3.8	3.9	4.0
DUM_IC006	945176	640468	2.5	2.5	2.5	2.5	2.5
EBROW-05	937509	650926	4.1	4.6	4.8	5.2	5.5
ECOMM-05	948630	675593	6.0	6.2	6.2	6.3	6.4
ECOMM-10	947856	675593	6.2	6.6	6.8	7.0	7.1
ECOMM-20	943885	675406	6.4	6.7	6.8	7.0	7.1
ELOSO-05	937549	649895	3.6	4.5	4.7	5.2	5.5
EOAKPRK-05	947416	667508	4.9	5.1	5.2	5.4	5.5
ESUNR-01	940634	655598	6.6	7.0	7.1	7.4	7.6
ESUNR-05	941983	656497	6.6	7.0	7.1	7.4	7.6
ESUNR-07	939691	656272	7.1	7.3	7.3	7.5	7.6
ESUNR-10	938260	656395	6.8	7.0	7.1	7.2	7.3
FLEA-05	923831	678011	10.1	10.4	10.6	11.2	11.4
FLEA-10	927769	679502	11.9	12.1	12.2	12.4	12.5
G16005	947263	688968	2.7	2.8	3.0	3.4	4.0
G16007	946857	689187	2.7	2.8	3.0	3.4	4.0
G54_HW	909208	640833	2.5	2.5	2.5	2.5	2.5
G54_TW	909892	640658	3.9	4.6	4.9	6.0	6.7
G57_TW	943847	690575	2.8	2.9	3.0	3.5	4.1

Model Node	State Planar Coordinates (Easting ft)	State Planar Coordinates (Northing ft)	Design Storm Peak Stages (ft NGVD)				
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
GALT-05	951822	670635	8.3	9.4	9.6	9.8	10.0
HCOPWCD2005	907787	642098	2.5	2.5	2.5	2.5	2.5
HF010	920999	658995	6.8	7.5	7.6	8.3	8.7
HF015	921036	659681	6.8	7.5	7.6	8.3	8.7
HF020	918951	661118	6.8	7.5	7.6	8.3	8.8
HFCS17005	921092	656662	6.8	7.5	7.6	8.2	8.7
HFCS55025	919153	662029	7.4	8.2	8.4	8.9	9.1
I595-05	939417	636773	7.4	7.7	7.8	8.0	8.1
I595-10	929276	636552	5.3	5.5	5.6	6.9	7.4
I595-15	930684	664804	5.5	6.6	6.8	7.5	7.8
IC022	949824	666135	2.5	2.6	2.6	2.7	2.8
IC025	950152	672963	2.6	2.7	2.8	3.0	3.1
IC030	950301	676293	2.7	2.8	2.9	3.0	3.2
IC032	949926	676303	2.7	2.8	2.9	3.1	3.4
IC035	948077	676258	2.7	2.9	3.0	3.2	3.6
IC040	948092	678152	2.7	2.9	3.0	3.3	3.6
IC042	950017	678177	2.7	2.9	3.0	3.2	3.4
IC043	950370	678169	2.7	2.8	2.9	3.1	3.3
IC044	951436	682240	2.7	2.8	2.9	3.1	3.3
IC045	949281	680923	2.7	2.9	3.0	3.1	3.4
IC050	949518	682221	2.7	2.9	3.0	3.1	3.4
LAKEEMERALD-05	926845	670562	4.1	4.7	5.0	6.8	7.6
LKMELVA-05	944343	660532	4.4	5.5	5.9	7.7	7.9
LL005	920048	669718	6.0	7.3	7.6	8.4	9.2
LL015	920039	674027	6.0	7.3	7.6	8.5	9.3
LL020	920040	674390	6.0	7.3	7.7	8.6	9.3
LL025	921188	674761	6.0	7.3	7.7	8.6	9.3
LL026	921411	674769	6.0	7.3	7.8	9.1	9.9
LL030	922760	674769	6.0	7.3	7.8	9.1	9.9
LL035	926835	675445	4.7	6.2	6.9	9.1	9.9
LL038	922387	675591	6.5	8.1	8.3	10.0	10.7
LLAKE040	922061	676350	6.7	8.2	8.7	9.1	9.9
MELROSEPK-05	919651	650309	7.5	8.3	8.6	9.1	9.4
MELROSEPK-06	918985	650307	7.6	8.3	8.5	9.1	9.5
MELROSEPK-10	920205	648221	7.7	8.4	8.6	9.2	9.5
MIDLST-05	932083	649659	4.1	5.0	5.2	5.8	6.2
MLKPOND-05	924425	660238	4.0	5.0	5.4	7.7	8.5
NANDR-05	936863	658288	6.6	6.9	7.0	7.2	7.3
NANDR-10	937099	652853	6.2	6.3	6.4	6.4	6.5
NANDR-15	937137	652020	5.0	5.3	5.3	5.5	5.6
NDIXIE-02	940288	679559	7.0	7.3	7.4	7.7	7.8

Model Node	State Planar Coordinates (Easting ft)	State Planar Coordinates (Northing ft)	Design Storm Peak Stages (ft NGVD)				
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
NDIXIE-05	939958	671705	6.5	6.7	6.8	7.1	7.2
NE11ST-04	942004	657204	7.0	7.3	7.4	7.5	7.6
NE11ST-05	940669	657156	7.3	7.4	7.4	7.5	7.6
NE13ST-05	943270	658450	6.2	6.9	7.1	7.6	7.7
NE13ST-10	941980	658392	6.4	7.0	7.1	7.5	7.6
NE13ST-15	939098	658326	6.4	6.6	6.6	6.8	6.8
NE15A-05	941914	660619	3.9	4.7	5.0	5.8	6.1
NE15A-10	941932	659066	5.3	5.8	5.9	6.1	6.2
NE3A-05	938049	654466	6.4	6.5	6.6	6.7	6.7
NE3A-07	938104	653568	6.1	6.3	6.4	6.5	6.6
NE3A-10	938097	652027	5.3	5.5	5.6	5.7	5.8
NE3CT-05	942417	652457	7.6	7.9	8.0	8.3	8.4
NE4A-05	938035	660218	6.1	6.3	6.4	6.5	6.6
NE4A-10	938107	658865	6.5	6.7	6.7	6.8	6.9
NE4A-15	938202	657104	6.8	7.0	7.1	7.2	7.3
NE65-05	949494	682964	5.0	5.7	6.0	6.6	7.0
NFED-05	948898	682855	5.8	6.3	6.5	6.7	7.0
NFED-10	948558	681509	5.6	6.3	6.6	6.9	7.2
NFED-12	948391	680885	5.7	6.3	6.6	7.0	7.2
NFED-15	947878	679061	6.4	6.6	6.6	6.8	6.9
NFED-20	947582	678145	6.4	6.6	6.7	6.9	7.1
NFED-22	947226	677301	6.6	6.8	6.9	7.2	7.4
NFED-25	946769	676411	7.2	7.5	7.7	8.0	8.2
NFED-30	946186	675224	9.1	9.3	9.4	9.5	9.6
NFED-35	944934	672102	6.3	6.6	6.7	6.8	6.9
NFED-37	945036	670553	5.1	5.6	5.9	6.4	6.7
NFED-40	945186	669346	6.3	6.6	6.7	7.0	7.1
NFED-45	946126	667533	8.3	9.0	9.1	9.2	9.3
NFED-50	946247	666067	8.0	8.2	8.3	8.4	8.4
NFED-52	945975	665071	4.5	5.0	5.2	5.7	5.9
NFED-53	945469	663043	4.0	4.6	4.8	5.4	5.7
NFED-55	945198	661962	6.1	6.4	6.5	6.6	6.8
NFED-60	939129	655677	7.1	7.2	7.2	7.3	7.4
NFED-65	939113	654431	6.2	6.4	6.5	6.7	7.0
NFED-67	939156	653681	5.0	5.7	6.0	6.7	6.9
NFED-70	939200	652597	4.3	5.4	6.0	6.7	6.9
NFNR001	945178	647959	2.6	2.6	2.6	2.6	2.6
NFNR005	941826	648839	2.6	2.6	2.6	2.7	2.8
NFNR008	939662	649367	2.9	3.1	3.3	3.6	3.9
NFNR010	938459	649151	3.1	3.5	3.6	4.1	4.5
NFNR011	938215	649200	3.1	3.5	3.7	4.2	4.6

Model Node	State Planar Coordinates (Easting ft)	State Planar Coordinates (Northing ft)	Design Storm Peak Stages (ft NGVD)				
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
NFNR015	936702	649705	3.2	3.7	3.9	4.5	4.9
NFNR016	936530	649700	3.3	3.8	4.0	4.6	5.0
NFNR020	935546	649435	3.3	3.9	4.1	4.8	5.2
NFNR021	935445	649225	3.4	3.9	4.2	4.9	5.3
NFNR025	933950	648533	3.4	4.0	4.2	5.0	5.4
NFNR030	932060	648780	3.9	4.7	5.0	5.8	6.2
NFNR035	930799	650718	4.3	5.2	5.6	6.4	6.7
NFNR040	930778	650962	4.3	5.3	5.6	6.6	6.9
NFNR042	928927	651890	4.5	5.5	5.9	6.8	7.1
NFNR043	928600	651971	4.6	5.6	6.0	6.9	7.3
NFNR045	926832	653294	4.8	5.8	6.2	7.2	7.5
NFNR046	926724	653489	4.8	5.8	6.2	7.2	7.6
NFNR050	925762	654792	5.2	6.3	6.7	7.8	8.3
NFNR051	925548	654838	5.2	6.3	6.7	7.9	8.3
NFNR054	923277	655218	5.3	6.4	6.9	8.0	8.5
NFNR055	923005	655294	5.3	6.4	6.9	8.1	8.6
NFNRSPUR004	941142	649919	2.6	2.8	2.8	3.0	3.2
NFNRSPUR005	941070	650205	2.7	2.9	2.9	3.2	3.4
NFNRSPUR010	939338	650694	2.8	2.9	3.0	3.6	4.8
NFSPUR005	930131	648346	3.9	4.7	5.0	5.8	6.2
NNRC005	920940	637560	3.6	4.2	4.5	5.6	6.1
NNRC010	918334	638439	3.8	4.5	4.7	5.9	6.5
NNRC015	917650	638660	3.8	4.5	4.8	5.9	6.6
NNRC020	913085	639842	3.8	4.6	4.8	6.0	6.6
NPOWRL-03	933620	660487	7.1	7.5	7.6	7.9	8.0
NPOWRL-05	933644	657433	7.0	7.2	7.2	7.4	7.5
NPOWRL-10	933046	679498	8.8	9.2	9.2	9.7	9.9
NW10TR-05	932419	676914	10.3	10.5	10.6	11.0	11.1
NW15A-05	931487	660681	7.5	7.7	7.8	8.1	8.2
NW15A-10	931167	652793	6.1	6.4	6.5	6.7	6.9
NW15A-15	931200	651868	5.9	6.3	6.4	6.6	6.9
NW18A-05	929759	653717	6.6	6.8	6.9	7.1	7.2
NW22ST-05	928200	662840	6.2	6.7	6.8	7.5	7.9
NW22ST-10	925025	662745	7.4	8.0	8.1	8.4	8.5
NW24A-05	927097	655196	6.5	6.9	7.0	7.8	8.3
NW28-05	923909	680663	9.8	10.2	10.4	10.6	10.9
NW29-05	924076	681913	11.2	11.4	11.4	11.5	11.5
NW31ST-05	922867	661131	6.0	7.1	7.3	8.1	8.5
NW35-05	920095	676981	9.1	10.1	10.3	10.7	11.1
NW35-10	919410	676073	9.0	9.5	9.6	10.0	10.1
NW35-15	920076	675521	8.6	9.2	9.4	10.0	10.1

Model Node	State Planar Coordinates (Easting ft)	State Planar Coordinates (Northing ft)	Design Storm Peak Stages (ft NGVD)				
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
NW4A-05	935730	655003	6.5	6.9	7.0	7.2	7.3
NW4A-10	935813	653459	6.5	6.9	7.0	7.2	7.3
NW5A-05	935294	658233	6.4	6.9	7.0	7.2	7.3
NW5A-07	935484	652367	6.3	6.5	6.6	6.9	7.0
NW5A-10	935496	651658	6.2	6.5	6.6	6.7	6.9
NW7A-05	934816	653757	6.7	6.9	6.9	7.1	7.2
NW7A-10	934847	653015	6.6	6.8	6.9	7.1	7.2
NW8ST-05	933812	654934	6.4	6.7	6.7	6.9	7.1
NW8ST-10	932044	654878	6.4	6.7	6.7	6.9	7.1
NW9A-05	933855	654007	6.7	6.9	6.9	7.0	7.1
NW9A-10	933867	653326	6.8	7.0	7.0	7.1	7.2
NWFLAG-05	936645	651670	4.3	4.7	4.9	5.3	5.6
OC005	930393	636416	3.9	4.7	5.2	6.9	7.4
OC010	929627	638616	3.8	4.6	5.0	6.5	6.9
OC015	929646	639165	3.8	4.6	4.9	6.1	6.5
OC020	929351	640115	3.6	4.4	4.7	5.8	6.1
OC021	928935	640142	3.6	4.3	4.6	5.5	6.0
OP015	935101	668175	4.1	5.1	5.6	6.8	7.1
OPEB001	944132	667275	3.7	4.6	5.0	5.9	6.3
OPEB002	944132	667562	3.7	4.6	5.0	5.9	6.4
OPEB003	943925	668524	3.7	4.7	5.1	6.0	6.4
OPEB004	943830	668768	3.7	4.7	5.1	6.0	6.4
OPEB005	943350	669330	3.7	4.7	5.1	6.0	6.5
OPEB006	943008	669935	3.8	4.8	5.3	6.2	6.6
OPEB007	942897	670167	3.8	4.8	5.3	6.3	6.7
OPEB008	942878	671190	3.8	4.8	5.3	6.3	6.7
OPEB009	942680	671721	3.8	4.8	5.4	6.4	6.8
OPEB010	942186	673226	3.8	4.8	5.4	6.4	6.8
OPEB011	942180	673473	3.8	4.8	5.4	6.4	6.8
OPEB015	942174	674154	3.8	4.8	5.4	6.4	6.8
OPL005	930741	667756	4.1	5.1	5.6	6.9	7.4
OPL010	930681	669630	4.1	5.1	5.6	7.0	7.4
OPL015	929709	671051	4.6	5.7	5.8	7.0	7.4
OPL020	929229	672860	4.6	5.7	5.8	7.0	7.4
OPL025	929227	673267	4.9	6.6	7.3	9.0	9.9
OPL030	928060	673640	4.7	6.2	6.9	9.1	9.9
OPL035	926981	674800	4.7	6.2	6.9	9.1	9.9
OUT_IC005	946081	640470	2.5	2.5	2.5	2.5	2.5
OUT_IC010	945365	647314	2.5	2.5	2.5	2.5	2.5
OUT_IC015	949257	652320	2.5	2.5	2.5	2.5	2.5
OUT_IC020	949577	663175	2.5	2.5	2.5	2.5	2.5

Model Node	State Planar Coordinates (Easting ft)	State Planar Coordinates (Northing ft)	Design Storm Peak Stages (ft NGVD)				
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
OUT_IC055	952743	687508	2.5	2.5	2.5	2.5	2.5
PAG005	925447	685324	8.6	9.0	9.1	9.3	9.5
PORTSPUR005	941457	644103	2.5	2.5	2.5	2.5	2.5
PRLAKE010	919483	681397	8.3	8.9	9.2	10.0	10.7
PRN001	925263	690102	4.1	4.9	5.4	7.8	9.4
PRN005	924770	689158	8.4	9.4	9.9	10.7	11.3
PRN010	921321	684330	8.4	9.4	9.9	10.7	11.3
PRN015	920009	682591	8.4	9.4	9.9	10.7	11.3
PRN018	921103	682379	8.5	9.4	9.9	10.7	11.3
PRN020	921109	681474	8.5	9.4	9.9	10.7	11.3
PRN025	922536	681288	9.2	9.7	9.9	10.3	10.5
PRN030	927543	681510	9.2	9.7	9.9	10.2	10.4
PRN035	927917	681527	6.9	7.7	8.0	8.7	9.1
PRN038	929683	681626	6.9	7.7	8.0	8.6	9.0
PRN039	929783	682777	6.9	7.7	8.0	8.6	8.9
PRN040	929809	683659	6.8	7.7	8.0	8.5	8.8
PRN045	930514	681630	7.0	7.7	8.0	8.6	9.0
PRN1005	922452	683377	8.4	9.4	9.9	10.7	11.3
PRN1006	922728	683350	8.4	9.0	9.2	9.4	9.5
PRN1010	924662	683201	8.4	9.0	9.2	9.4	9.5
PRN1011	924893	683197	8.6	9.0	9.1	9.3	9.5
PRSWLAKE020	920686	679382	7.9	8.5	8.8	9.4	10.0
PRSWLAKE025	918538	678570	7.8	8.2	8.5	9.4	10.0
RIVRPS	936712	650137	2.5	3.3	4.0	4.8	5.5
ROL-05	929488	640847	4.7	5.0	5.1	5.5	6.0
RVRLND-05	920916	640084	7.3	7.4	7.5	7.7	7.8
S33_HW	919865	655912	2.6	2.6	2.6	2.6	2.6
S33_TW	920401	655930	5.3	6.5	7.0	8.2	8.7
S36_TW	925917	669628	4.1	5.2	5.7	7.1	7.7
S36-HW	924533	669612	4.3	5.4	6.0	8.3	9.1
S37A_TW	940940	681619	2.9	3.2	3.5	4.1	4.8
S37A-HW	940246	681602	3.4	3.9	4.4	6.2	7.6
S37B_HW	928196	688853	4.0	4.9	5.4	7.8	9.4
S37B_TW	928196	688259	3.6	4.4	5.0	7.4	8.9
SANDR-05	937446	647080	5.8	6.0	6.0	6.1	6.2
SE10A-05	940826	641103	5.4	6.0	6.2	6.5	6.7
SE3A-05	938298	651030	3.8	4.5	4.7	5.2	5.5
SE3A-10	938318	647116	5.0	5.2	5.3	5.3	5.4
SE3A-15	938496	643717	7.3	7.6	7.8	8.0	8.2
SE4A-10	938769	639304	7.5	8.3	8.6	8.9	9.1
SE5A-05	938845	650490	4.2	4.5	4.6	4.9	5.0

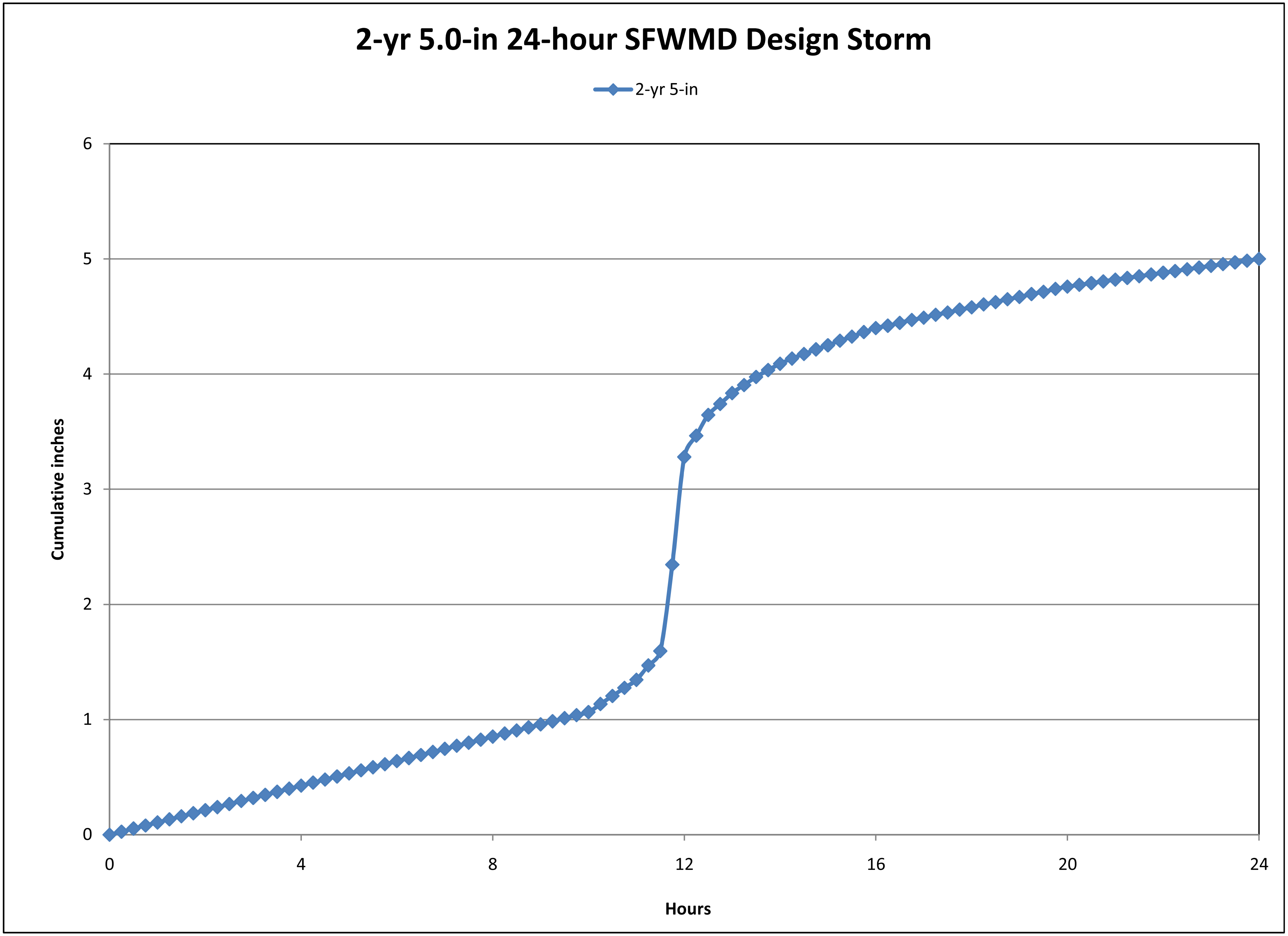
Model Node	State Planar Coordinates (Easting ft)	State Planar Coordinates (Northing ft)	Design Storm Peak Stages (ft NGVD)				
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
SeepOut	939790	682749	0.0	0.0	0.0	0.0	0.0
SFED-05	939371	647762	5.7	6.1	6.2	6.5	6.6
SFED-10	939335	645738	6.1	6.4	6.5	6.6	6.7
SFED-15	939422	644150	7.3	7.6	7.8	8.0	8.2
SFED-20	939516	643062	7.3	7.6	7.8	8.0	8.2
SFED-25	939501	642383	7.3	7.6	7.8	8.0	8.2
SFNR005	932111	645705	3.4	4.0	4.2	5.1	5.7
SFNR006	932106	645482	3.4	4.0	4.3	5.2	5.7
SFNR010	931706	642877	3.5	4.1	4.3	5.3	5.8
SFNR015	929125	642061	3.5	4.1	4.4	5.4	6.0
SFNR020	928811	641673	3.5	4.1	4.4	5.4	6.0
SFNR025	925563	639555	3.5	4.2	4.5	5.5	6.1
SFNR030	924118	638664	3.6	4.2	4.5	5.6	6.1
SFNRC005	923783	637334	3.6	4.2	4.5	5.6	6.1
SFNRSPUR005	932828	642951	3.5	4.1	4.3	5.3	5.8
SFNRSPUR010	927509	643173	3.5	4.1	4.4	5.4	6.0
SFNRSPUR013	925538	640500	3.5	4.2	4.5	5.5	6.1
SFNRSPUR014	925530	640752	3.5	4.2	4.5	5.5	6.1
SFNRSPUR015	925488	641410	3.5	4.2	4.5	5.5	6.1
SFNRSPUR018	924785	642591	3.5	4.2	4.5	5.6	6.1
SMIAMI-05	939923	645074	7.9	8.3	8.3	8.5	8.6
SMIAMI-10	940416	644134	6.7	7.9	8.0	8.2	8.3
SNYDERPK-05	934629	637350	6.1	6.5	6.6	7.1	7.4
SNYDERPK-10	935054	637877	6.1	6.5	6.6	7.1	7.4
SR84-02	936313	641088	8.0	8.1	8.2	8.5	8.6
SR84-05	939899	640334	6.3	7.0	7.2	7.5	7.6
SR84-10	938617	640357	8.3	8.6	8.7	8.9	9.1
SR84-15	936451	640296	7.8	8.0	8.1	8.3	8.5
SR84-20	932907	639985	4.6	5.4	5.6	6.2	6.4
SR84LAKE005	924706	637454	3.6	4.2	4.5	5.6	6.1
SR84LAKE010	924203	636446	3.6	4.2	4.5	5.6	6.1
SW12A-05	933394	638818	6.1	6.5	6.6	7.1	7.4
SW12A-10	932969	637037	6.2	6.5	6.6	7.1	7.4
SW14A-05	931717	649539	4.1	5.1	5.2	5.8	6.2
SW14ST-05	923869	643973	5.6	6.2	6.4	7.7	8.0
SW14ST-10	922795	643976	6.7	7.1	7.3	8.3	8.6
SW15A-05	931189	638885	6.4	6.6	6.6	6.9	7.0
SW15CT-05	921700	643396	6.8	7.2	7.3	8.3	8.6
SW16ST-05	924199	643251	4.3	4.9	5.2	6.4	6.8
SW20ST-05	932840	641572	4.3	5.1	5.4	5.9	6.2
SW20ST-10	931692	641563	4.3	5.1	5.3	5.9	6.2

Model Node	State Planar Coordinates (Easting ft)	State Planar Coordinates (Northing ft)	Design Storm Peak Stages (ft NGVD)				
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
SW24ST-05	929869	640123	4.7	5.0	5.1	5.5	6.0
SW27A-05	925861	649158	8.0	8.2	8.3	8.6	8.8
SW3A-05	936209	650696	4.3	4.9	5.1	5.5	5.7
SW4A-05	935983	647605	6.2	6.5	6.5	6.6	6.7
SW4A-10	936093	644970	6.4	6.7	6.8	7.0	7.1
SW4A-15	936170	643019	6.8	7.1	7.2	7.5	7.6
SW7A-05	934914	650339	5.7	6.0	6.1	6.3	6.6
SWFLAG-05	936675	650940	3.3	4.1	4.5	5.0	5.5
SWFLAG-10	937024	644623	4.6	5.1	5.3	5.8	6.1
SWFLAG-15	937303	643087	7.3	7.6	7.8	8.0	8.2
SWMLK-05	923395	643393	4.8	5.2	5.5	6.5	6.6
SWMLK-10	923442	642620	4.8	5.2	5.5	6.0	6.2
SWMLK-12	923543	640566	5.0	5.4	5.6	6.8	7.1
SWRIVRS-05	929578	647336	6.4	6.9	7.0	7.2	7.3
TR005	941793	647226	2.7	2.8	2.9	3.2	3.4
TR006	941741	647090	2.7	2.8	2.9	3.2	3.4
TR010	940427	646468	2.7	3.0	3.1	3.6	3.9
TR011	940327	646439	2.7	3.0	3.1	3.6	4.0
TR015	939388	646761	2.9	3.2	3.4	4.0	4.4
TR016	939243	646752	2.9	3.4	3.6	4.2	4.6
TR020	938399	646706	3.2	3.7	3.9	4.6	5.1
TR021	938269	646696	3.2	3.7	4.0	4.7	5.1
TR025	937438	646012	3.2	3.8	4.0	4.8	5.2
TR026	937327	645960	3.3	3.8	4.1	4.8	5.2
TR030	936766	645849	3.3	3.9	4.1	4.8	5.2
TR031	936657	645850	3.3	3.9	4.1	4.9	5.2
TR035	936088	645847	3.3	3.9	4.1	4.9	5.3
TR037	935967	645846	3.3	3.9	4.1	4.9	5.3
TR038	934428	647541	3.4	4.0	4.2	5.0	5.4
TR040	934436	647651	3.4	4.0	4.2	5.0	5.4
TWNLKS-05	931362	672794	8.7	9.6	10.0	10.5	10.7
TWNLKS-10	931012	672374	8.5	8.6	8.7	9.6	9.9
W5A-15	935608	650087	4.1	4.6	4.8	5.3	5.7
WBROW-05	932903	650901	6.1	6.3	6.3	6.4	6.7
WBROW-10	927664	650735	6.1	6.8	7.0	7.5	7.6
WBROW-15	925896	650612	8.1	8.3	8.4	8.7	8.8
WBROW-20	920624	650326	7.5	8.3	8.6	9.1	9.4
WDAV-05	931058	645546	5.7	6.3	6.4	6.6	6.7
WDAV-10	928316	645412	7.1	7.5	7.7	8.2	8.4
WDAV-12	927502	645339	7.1	7.5	7.7	8.2	8.4
WDAV-15	925666	645160	8.1	8.3	8.3	8.5	8.6

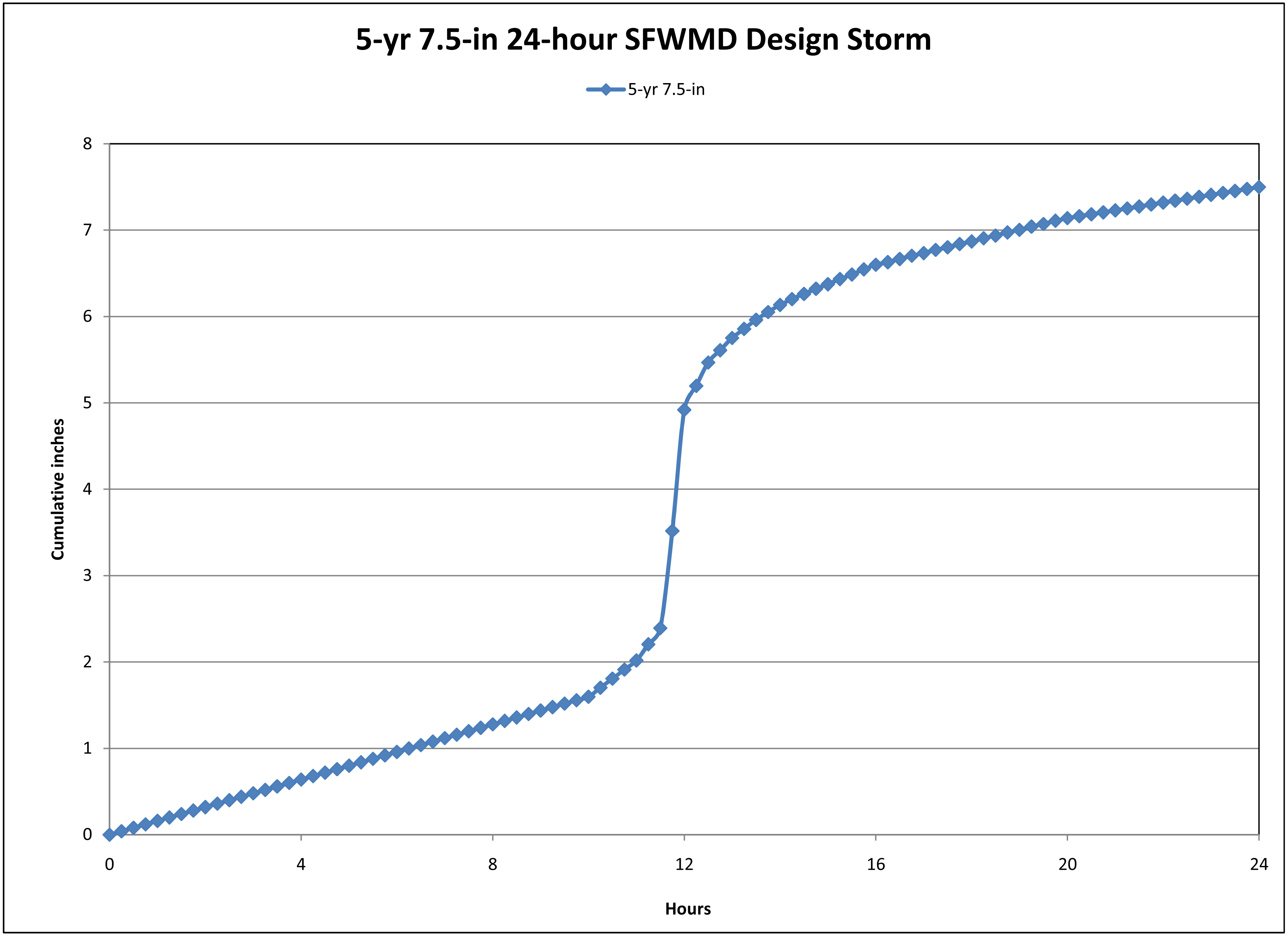
Model Node	State Planar Coordinates (Easting ft)	State Planar Coordinates (Northing ft)	Design Storm Peak Stages (ft NGVD)				
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
WDAV-20	924042	645002	7.5	8.1	8.2	8.6	8.8
WDAV-25	922767	644749	7.4	7.7	7.9	8.6	8.7
WDAV-30	919877	644513	11.0	11.5	11.6	11.9	12.0
WESTLL-05	918537	675246	9.0	9.2	9.4	10.0	10.1
WSIST-05	932158	653624	6.1	6.3	6.4	6.6	6.9
WSIST-10	931138	653609	6.1	6.4	6.5	6.7	6.9
WSUNR-05	935374	656313	6.5	6.9	7.0	7.2	7.3
WSUNR-10	932258	656231	6.6	7.0	7.2	7.6	7.9
WSUNR-15	927098	656498	7.4	7.7	7.8	8.1	8.3
WSUNR-20	923571	656327	5.7	6.9	7.2	8.1	8.6

Appendix 3D
Surface Water Management Model Rainfall Hyetographs

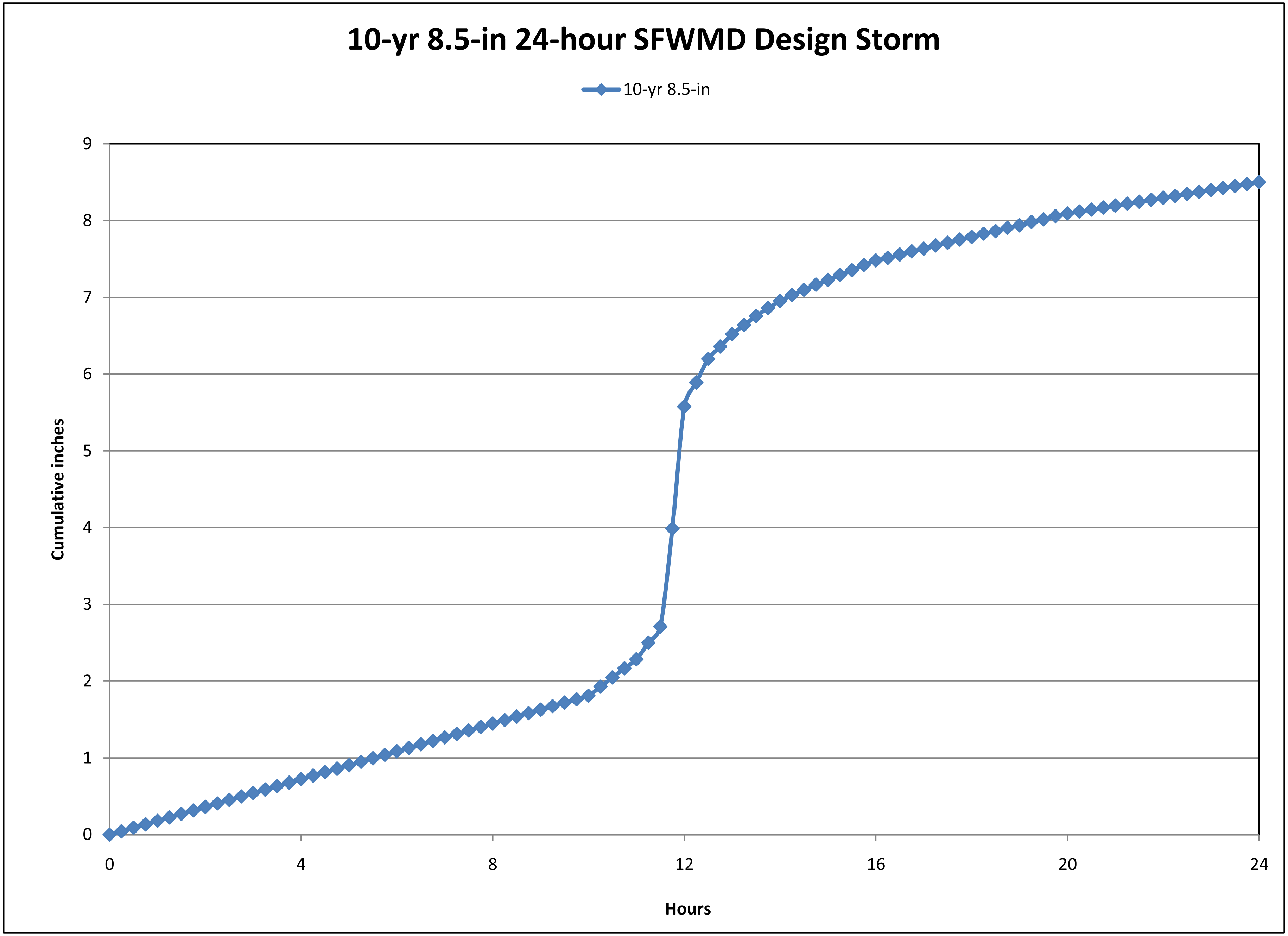
The following figures show the South Florida Water Management Districts' design storm rainfall distribution with the various design storm volumes used for this project.

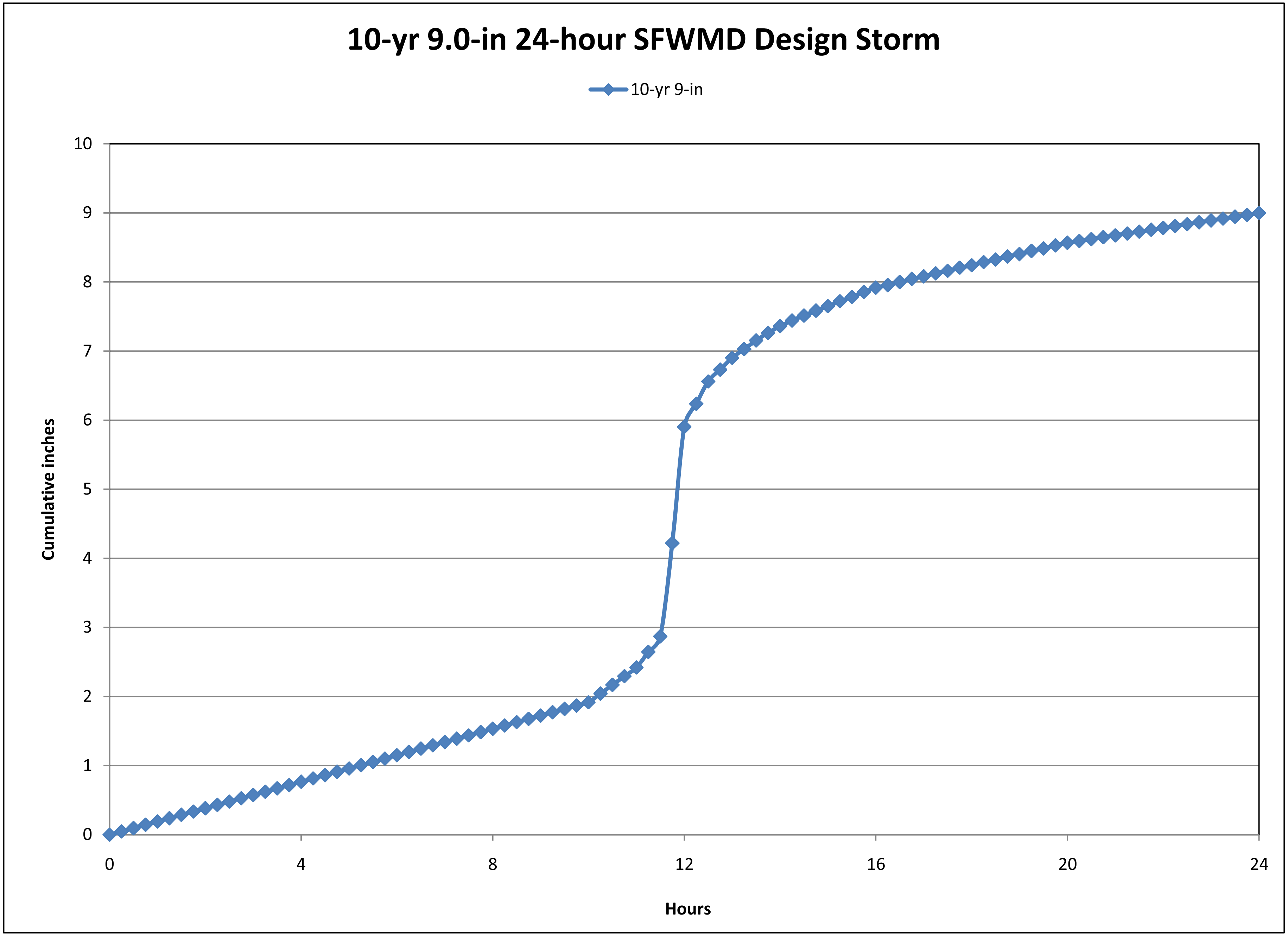

2-yr 5.0-in 24-hour SFWMD Design Storm
2-yr 5-in
Cumulative inches
0
1
2
3
4
5
6
Hours
0
4
8
12
16
20
24

CDM

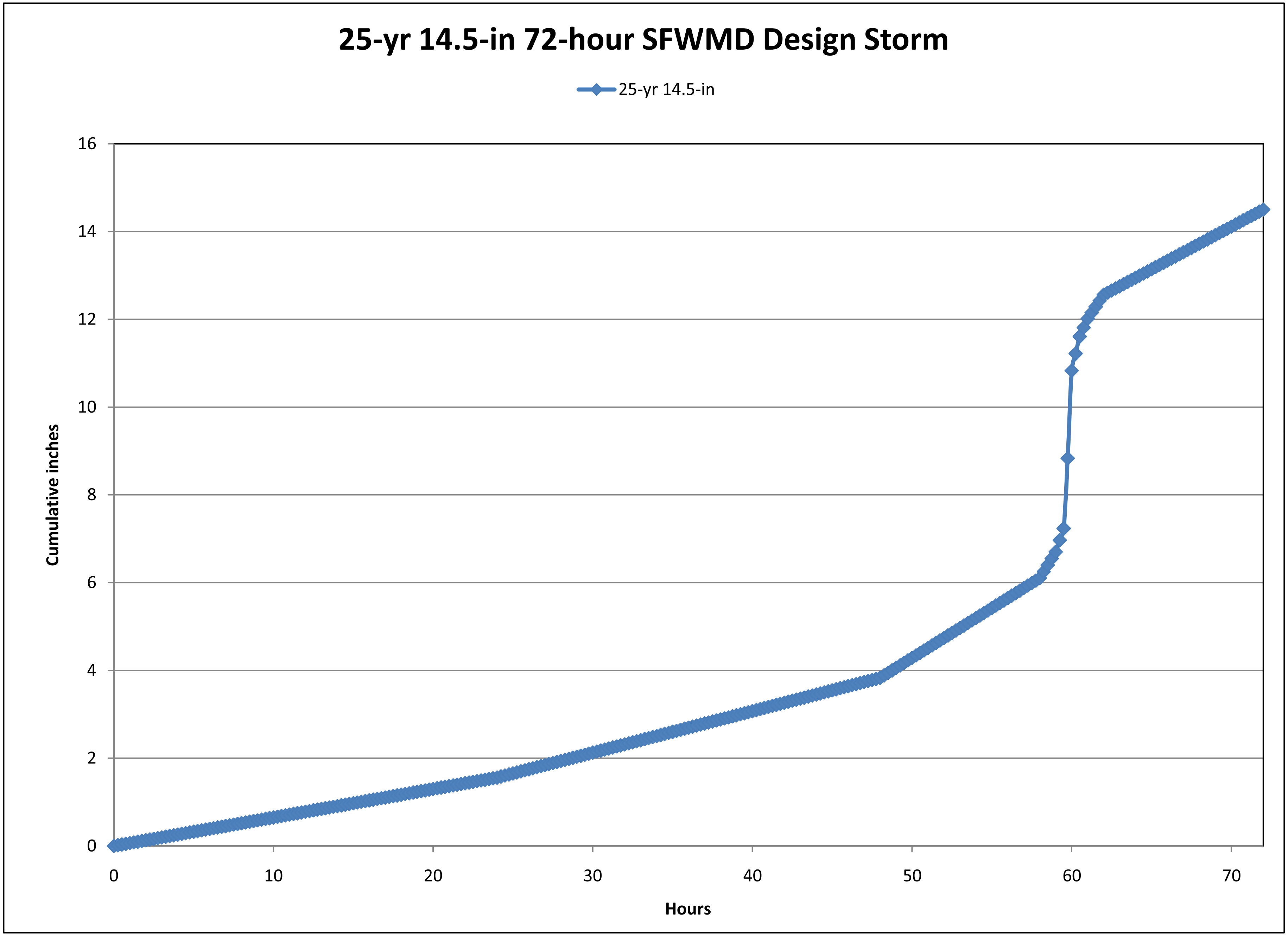

5-yr 7.5-in 24-hour SFWMD Design Storm
5-yr 7.5-in
Cumulative inches
0
1
2
3
4
5
6
7
8
Hours
0
4
8
12
16
20
24

CDM

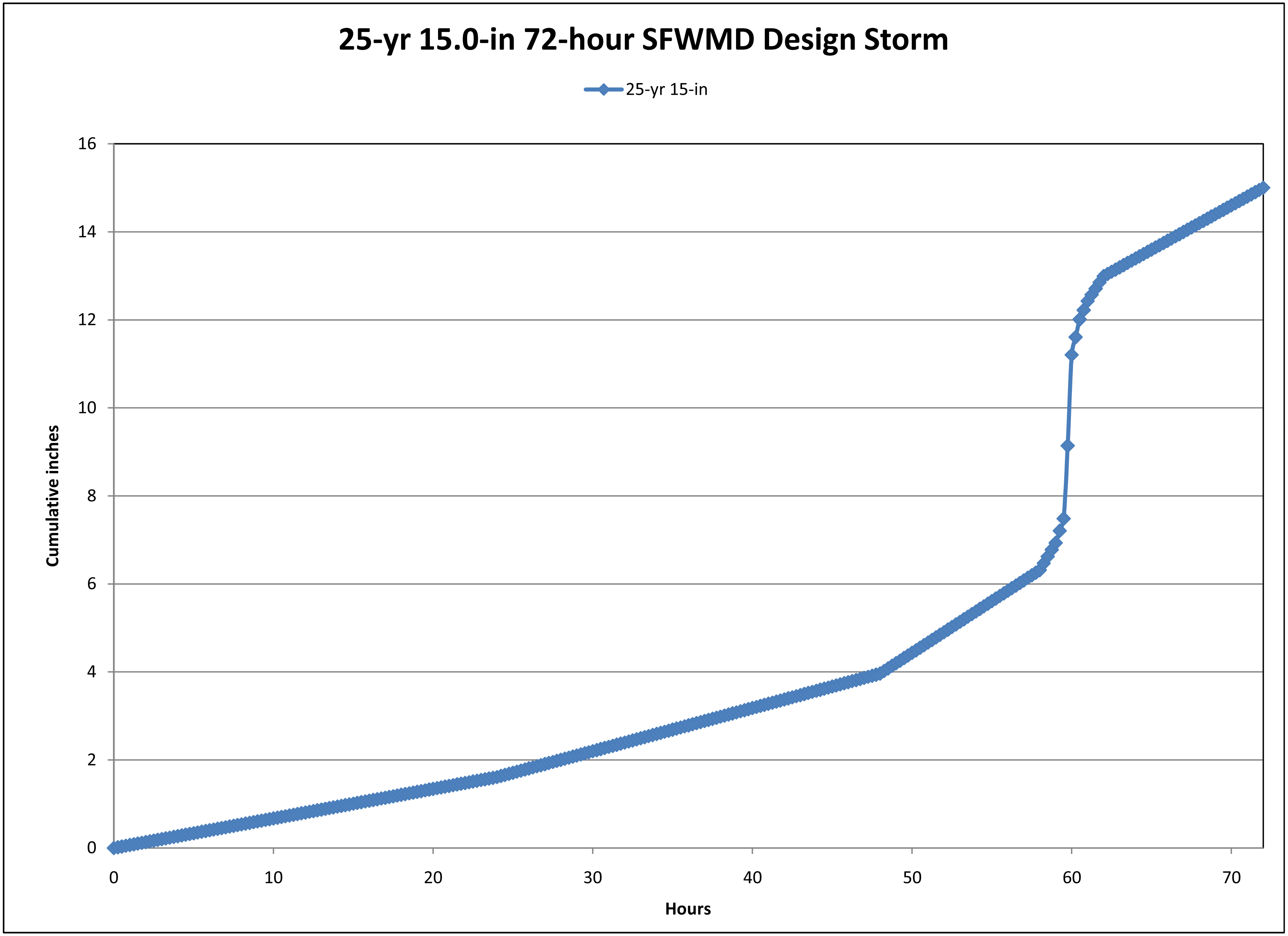

10-yr 8.5-in 24-hour SFWMD Design Storm
10-yr 8.5-in
Cumulative inches
0
1
2
3
4
5
6
7
8
9
Hours
0
4
8
12
16
20
24


10-yr 9.0-in 24-hour SFWMD Design Storm
10-yr 9-in
Cumulative inches
0
1
2
3
4
5
6
7
8
9
10
Hours
0
4
8
12
16
20
24

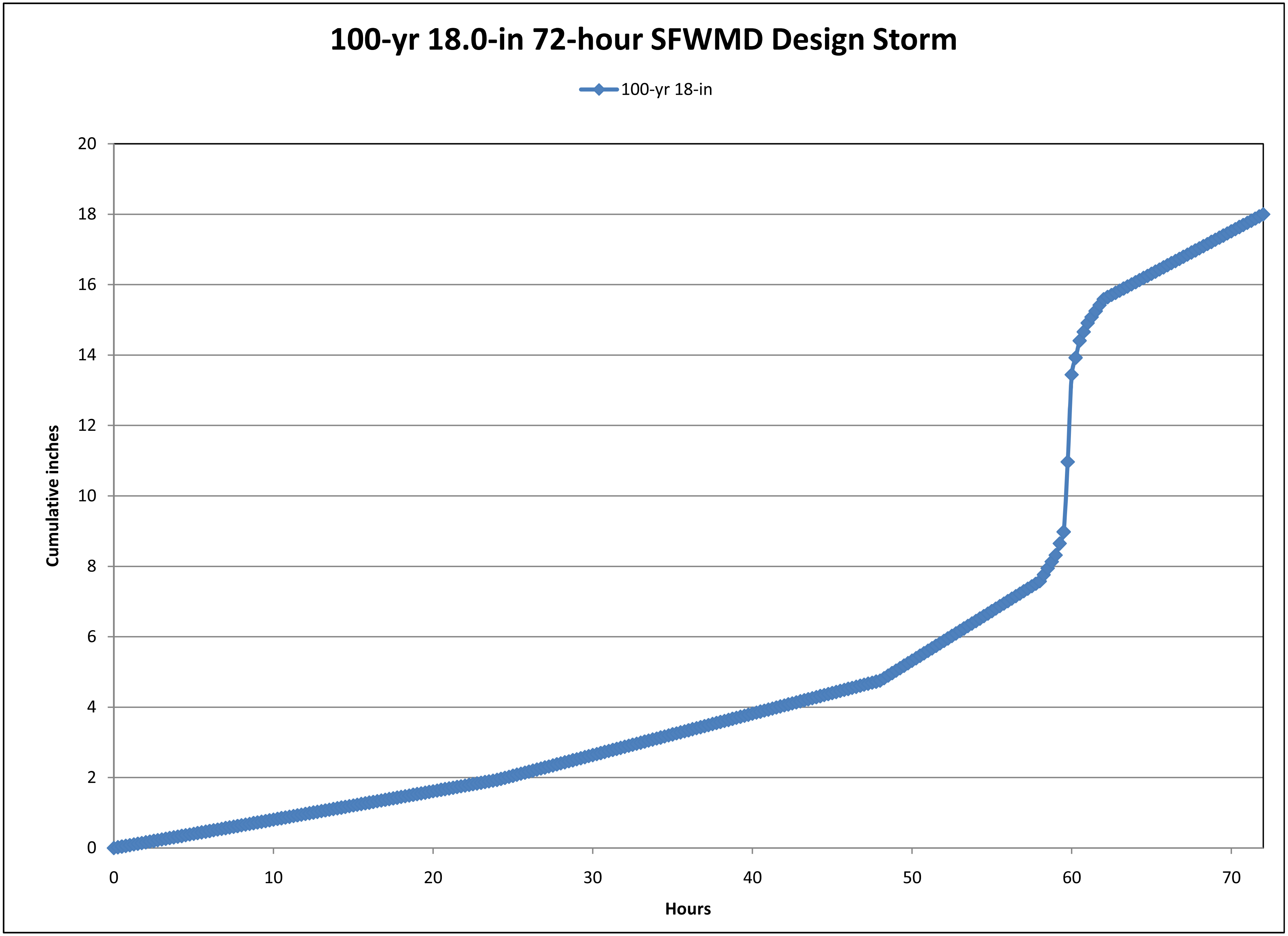
CDM

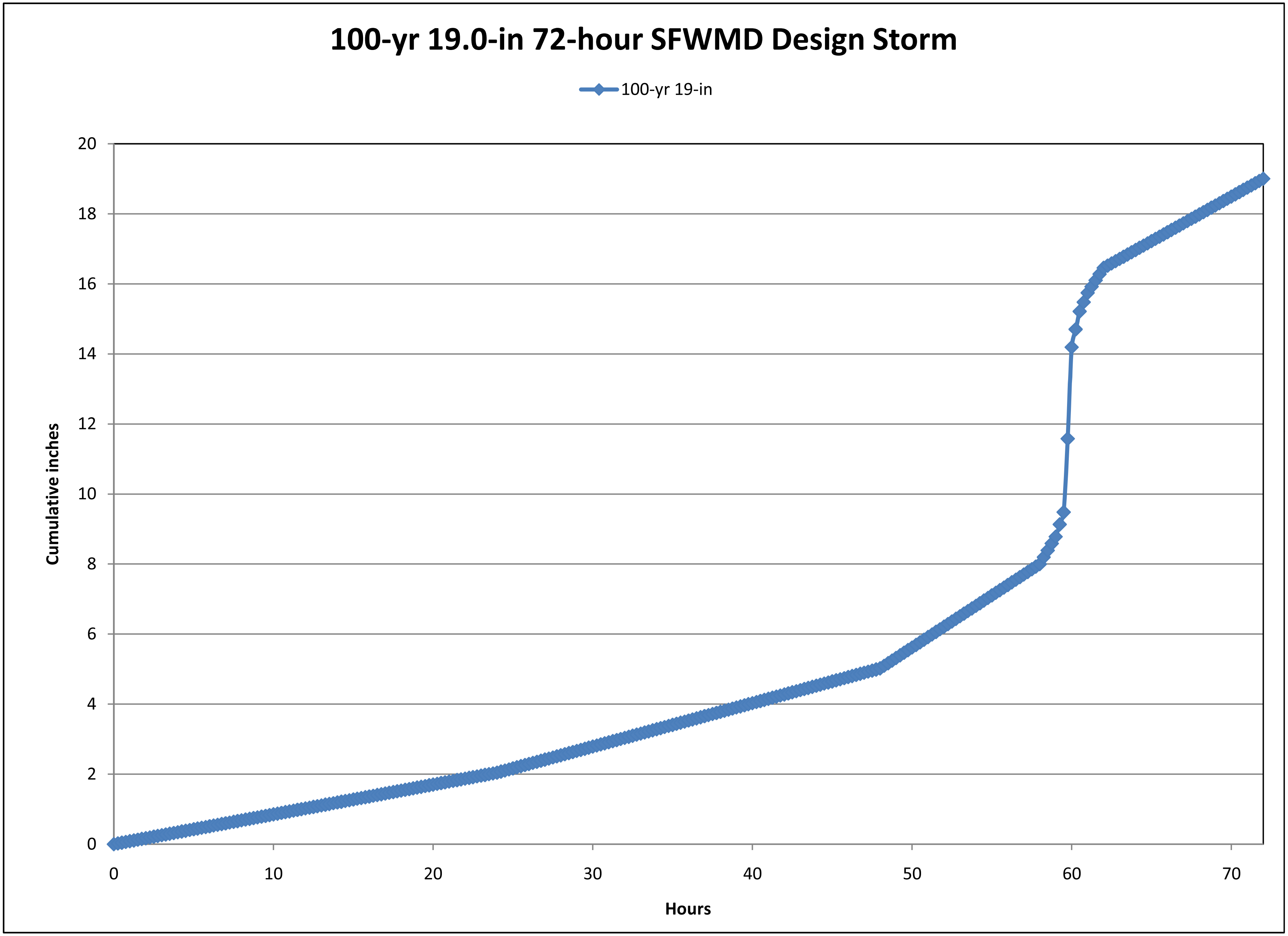

25-yr 14.5-in 72-hour SFWMD Design Storm
25-yr 14.5-in
Cumulative inches
16
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
Hours

CDM

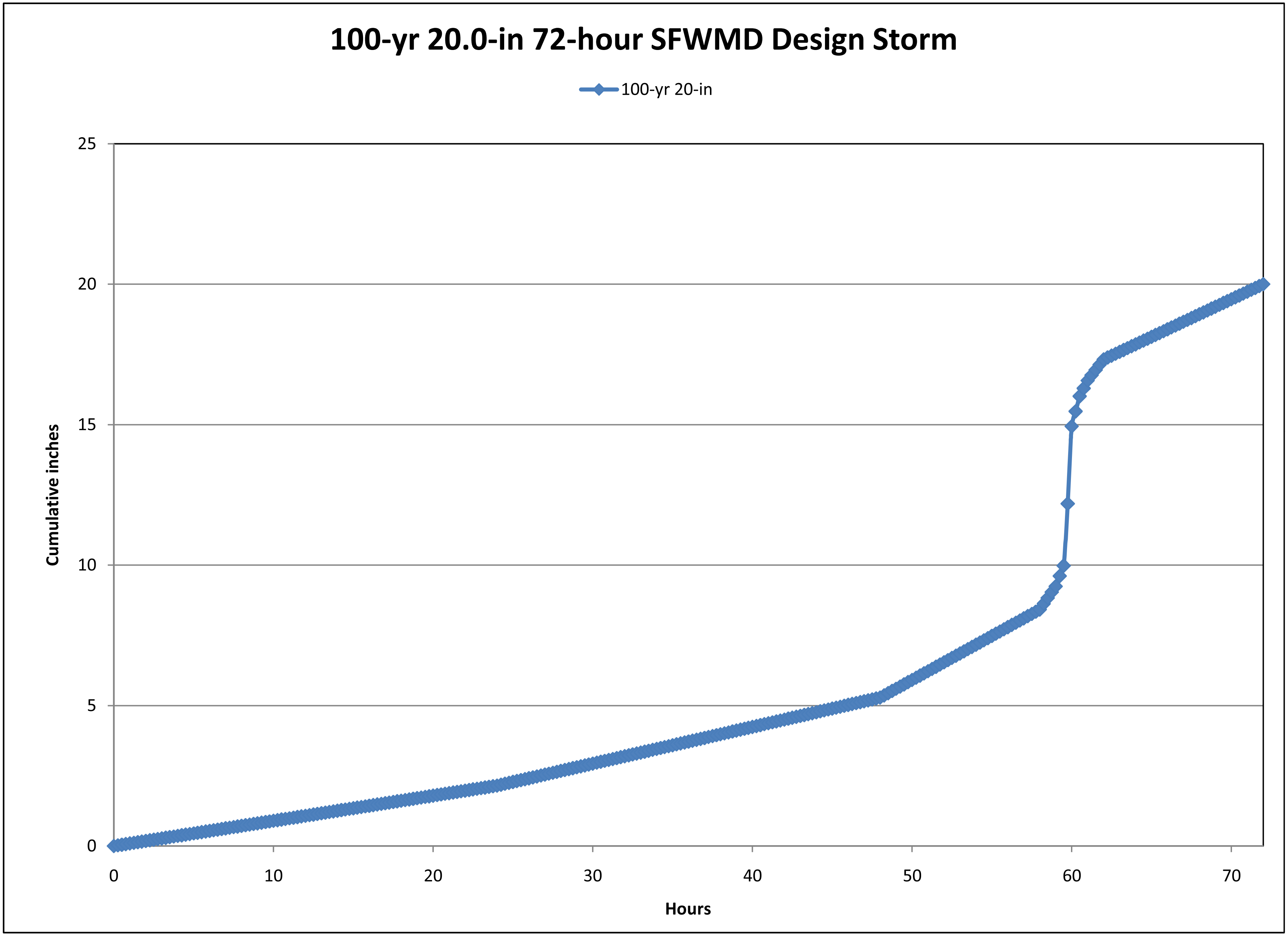

25-yr 15.0-in 72-hour SFWMD Design Storm
25-yr 15-in
Cumulative inches
0
2
4
6
8
10
12
14
16
Hours
0
10
20
30
40
50
60
70

CDM


100-yr 18.0-in 72-hour SFWMD Design Storm
100-yr 18-in
Cumulative inches
0
2
4
6
8
10
12
14
16
18
20
Hours
0
10
20
30
40
50
60
70


100-yr 19.0-in 72-hour SFWMD Design Storm
100-yr 19-in
Cumulative inches
0
2
4
6
8
10
12
14
16
18
20
Hours
0
10
20
30
40
50
60
70

CDM


100-yr 20.0-in 72-hour SFWMD Design Storm
100-yr 20-in
Cumulative inches
0
5
10
15
20
25
0
10
20
30
40
50
60
70
Hours

CDM

Appendix 3E
Surface Water Management Model
Soils Data

The following table displays the percentage of soil type (area weighted average) per model hydrologic unit.

Hydrologic Units	Soil Type			
	A	B	C	D
HUBROWARD-01	39.1%	15.1%	0.0%	45.8%
HUBROWARD-02	64.1%	0.0%	0.0%	35.9%
HUBROWARD-03	29.4%	0.0%	0.0%	70.6%
HUBROWARD-05	0.0%	0.0%	0.0%	100.0%
HUBROWARD-06	0.0%	0.0%	0.0%	100.0%
HUC12UI-01	2.0%	5.1%	0.0%	92.9%
HUC13IC-01	32.5%	21.5%	0.0%	46.0%
HUC13IC-02	24.1%	33.6%	0.0%	42.2%
HUC13IC-03	20.1%	14.4%	0.0%	65.5%
HUC13MR-01	2.5%	12.9%	0.0%	84.6%
HUC13MR-02	12.4%	25.3%	0.0%	62.4%
HUC13MR-03	55.6%	19.9%	0.0%	24.5%
HUC13MR-04	0.0%	22.2%	0.0%	77.8%
HUC13MR-05	0.8%	0.3%	0.0%	98.9%
HUC13MR-06	0.0%	0.0%	0.0%	100.0%
HUC13MR-07	0.0%	46.4%	0.0%	53.6%
HUC13MR-08	10.3%	23.2%	2.4%	64.0%
HUC13MRC-01	64.8%	0.0%	12.1%	23.1%
HUC13MRC-02	0.0%	0.0%	29.2%	70.8%
HUC13MRC-03	14.9%	8.5%	8.3%	68.3%
HUC13MRC-04	2.9%	12.7%	14.4%	69.9%
HUC13MRC-05	0.0%	66.3%	0.0%	33.7%
HUC13MRC-07	3.3%	9.2%	0.0%	87.5%
HUC13MRC-08	0.0%	19.3%	48.7%	32.0%
HUC13MRC-11	16.0%	11.7%	0.0%	72.3%
HUC13MRC-12	0.0%	43.0%	0.0%	57.0%
HUC13MRC-13	9.0%	19.3%	0.0%	71.7%
HUC14CCC-01	8.0%	21.7%	2.5%	67.8%
HUC14CCC-02	0.8%	29.2%	0.0%	70.0%
HUC14CCC-03	14.0%	69.3%	3.1%	13.6%
HUC14CCC-04	0.0%	75.9%	0.0%	24.1%
HUC14CCC-05	0.0%	0.0%	0.0%	100.0%
HUC14CCC-06	0.0%	4.2%	45.6%	50.2%
HUC14CCC-07	0.0%	13.7%	5.2%	81.1%
HUC14CCC-08	0.0%	46.5%	0.0%	53.5%
HUC14CCC-09	0.0%	51.1%	0.0%	48.9%
HUC14CCC-10	0.0%	0.0%	0.0%	100.0%
HUCCCSPUR-01	26.1%	23.4%	0.0%	50.5%
HUCCCSPUR-02	24.6%	4.5%	0.0%	70.8%
HUCRCC-01	35.8%	0.6%	0.0%	63.7%
HUDAVIE-01	0.0%	10.4%	55.6%	34.0%

Hydrologic Units	Soil Type			
	A	B	C	D
HUDAVIE-02	26.5%	3.2%	0.0%	70.3%
HUDAVIE-03	90.6%	0.0%	0.0%	9.4%
HUDAVIE-04	66.0%	0.0%	0.0%	34.0%
HUDAVIE-05	99.9%	0.0%	0.0%	0.1%
HUDAVIE-06	82.1%	8.8%	0.0%	9.1%
HUDAVIE-07	13.5%	4.7%	0.0%	81.7%
HUDAVIE-08	56.5%	0.3%	0.0%	43.2%
HUECOMM-01	0.0%	67.3%	0.0%	32.7%
HUECOMM-02	0.0%	30.5%	0.0%	69.5%
HUELOSO-01	0.0%	0.0%	0.0%	100.0%
HUEOAKPRK-01	56.8%	3.2%	0.0%	40.0%
HUFLAGLER-01	0.0%	0.0%	0.0%	100.0%
HUFLAGLER-02	9.6%	0.0%	0.0%	90.4%
HUFLEA-01	18.1%	0.0%	27.9%	54.0%
HUFLEA-02	75.3%	0.0%	5.7%	19.0%
HUG16-01	4.7%	33.8%	3.3%	58.2%
HUGALT-01	0.0%	0.0%	0.0%	100.0%
HUHF-01	2.6%	1.9%	0.0%	95.5%
HUHF-02	0.0%	3.7%	2.4%	93.9%
HUI595-01	37.3%	18.9%	0.0%	43.7%
HUI595-02	0.0%	48.0%	0.0%	52.0%
HUIC-01	0.0%	61.2%	0.0%	38.8%
HUIC-02	0.0%	46.3%	0.0%	53.7%
HUIC-03	13.5%	23.4%	0.0%	63.1%
HUIC-04	36.1%	23.0%	0.0%	40.9%
HUIC-05	0.0%	48.8%	0.0%	51.2%
HUIC-06	37.1%	8.8%	3.3%	50.9%
HUIC-07	27.4%	43.9%	0.0%	28.7%
HUIC-08	0.0%	41.8%	0.0%	58.2%
HUIC-09	27.1%	34.0%	2.1%	36.7%
HUIC-10	15.3%	0.0%	5.8%	78.9%
HUIC-11	9.4%	62.0%	0.0%	28.6%
HUIC-12	3.9%	67.8%	0.0%	28.2%
HUIC-13	4.3%	39.2%	9.9%	46.6%
HUIC-14	12.9%	49.6%	0.0%	37.5%
HUIC-15	0.1%	39.4%	0.0%	60.5%
HULEMERALD-01	3.3%	27.2%	25.7%	43.8%
HULKMELVA-01	52.6%	0.0%	0.0%	47.4%
HULL-01	95.8%	0.0%	4.2%	0.0%
HULL-02	69.8%	0.0%	0.0%	30.2%
HULL-03	87.4%	0.0%	3.0%	9.7%

Hydrologic Units	Soil Type			
	A	B	C	D
HULL-04	63.2%	0.0%	0.0%	36.8%
HULL-05	14.2%	0.0%	45.0%	40.8%
HULL-06	36.9%	0.0%	18.2%	44.9%
HULL-07	0.3%	0.0%	37.6%	62.1%
HULL-08	6.5%	0.0%	60.8%	32.6%
HUMELROSEPK-01	53.1%	0.2%	0.0%	46.7%
HUMIDLST-01	0.0%	0.0%	0.0%	100.0%
HUMLK-01	81.5%	0.0%	0.0%	18.5%
HUMLK-02	99.5%	0.0%	0.0%	0.5%
HUMLK-03	72.6%	0.0%	9.1%	18.3%
HUMLKPOND-01	42.6%	9.0%	0.0%	48.4%
HUNANDR-01	0.0%	0.0%	0.0%	100.0%
HUNANDR-02	0.0%	0.0%	0.0%	100.0%
HUNANDR-03	0.0%	0.0%	0.0%	100.0%
HUNE11ST-01	3.0%	0.0%	0.0%	97.0%
HUNE13ST-01	95.7%	0.0%	0.0%	4.3%
HUNE13ST-02	63.5%	2.8%	0.0%	33.7%
HUNE13ST-03	9.7%	0.0%	0.0%	90.3%
HUNE15A-01	37.6%	26.5%	0.0%	35.9%
HUNE3A-01	0.0%	0.0%	0.0%	100.0%
HUNE3A-02	0.0%	0.0%	0.0%	100.0%
HUNE3A-03	0.0%	0.0%	0.0%	100.0%
HUNE3CT-01	99.4%	0.0%	0.0%	0.6%
HUNE4A-01	2.6%	0.0%	0.0%	97.4%
HUNE4A-02	0.0%	0.0%	0.0%	100.0%
HUNE4A-03	0.0%	0.0%	0.0%	100.0%
HUNE65-01	0.0%	41.5%	0.0%	58.5%
HUNFED-01	41.0%	0.0%	20.2%	38.8%
HUNFED-02	50.5%	0.6%	9.0%	39.9%
HUNFED-03	66.7%	11.8%	0.0%	21.5%
HUNFED-04	86.4%	8.2%	0.0%	5.4%
HUNFED-05	53.4%	0.3%	0.0%	46.2%
HUNFED-06	0.0%	2.6%	0.0%	97.4%
HUNFED-07	63.4%	0.0%	0.0%	36.6%
HUNFED-08	54.1%	0.0%	0.0%	45.9%
HUNFED-09	0.0%	0.0%	0.0%	100.0%
HUNFED-10	2.4%	0.0%	0.0%	97.6%
HUNFED-11	19.2%	0.0%	0.0%	80.8%
HUNFED-12	0.0%	0.0%	0.0%	100.0%
HUNFED-13	33.9%	0.0%	0.0%	66.1%
HUNFED-14	30.4%	0.0%	0.0%	69.6%

Hydrologic Units	Soil Type			
	A	B	C	D
HUNFNR-01	59.5%	30.2%	0.0%	10.3%
HUNFNR-02	36.4%	0.0%	0.0%	63.6%
HUNFNR-03	23.7%	0.0%	0.0%	76.3%
HUNFNR-04	0.0%	0.0%	0.0%	100.0%
HUNFNR-05	0.0%	0.0%	0.0%	100.0%
HUNFNR-06	0.0%	0.0%	0.0%	100.0%
HUNFNR-07	0.0%	0.0%	0.0%	100.0%
HUNFNR-08	0.0%	0.0%	0.0%	100.0%
HUNFNR-09	0.0%	0.0%	0.0%	100.0%
HUNFNR-10	0.0%	0.0%	0.0%	100.0%
HUNFNR-11	6.4%	50.3%	0.0%	43.3%
HUNFNR-12	0.0%	13.7%	0.0%	86.3%
HUNFNR-13	3.5%	36.9%	0.0%	59.6%
HUNFNR-14	9.3%	12.4%	0.0%	78.3%
HUNFNR-15	0.5%	8.1%	0.0%	91.4%
HUNFNR-16	0.0%	9.2%	0.0%	90.8%
HUNNRC-03	8.7%	0.0%	1.0%	90.3%
HUNNRC-04	40.7%	8.1%	16.8%	34.4%
HUNW15A-01	72.5%	3.2%	0.0%	24.3%
HUNW15A-02	0.0%	0.0%	0.0%	100.0%
HUNW18A-01	3.0%	6.3%	0.0%	90.7%
HUNW22ST-01	3.8%	2.6%	0.0%	93.6%
HUNW24A-01	9.1%	13.9%	0.0%	77.1%
HUNW4A-01	0.0%	0.0%	0.0%	100.0%
HUNW4A-02	0.0%	0.0%	0.0%	100.0%
HUNW5A-01	5.1%	0.0%	0.0%	94.9%
HUNW5A-02	0.0%	0.0%	0.0%	100.0%
HUNW7A-01	0.0%	0.0%	0.0%	100.0%
HUNW7A-02	0.0%	0.0%	0.0%	100.0%
HUNW8ST-01	0.0%	0.0%	0.0%	100.0%
HUNW8ST-02	3.5%	0.0%	0.0%	96.5%
HUNW9A-01	0.0%	0.0%	0.0%	100.0%
HUNW9A-02	0.0%	0.0%	0.0%	100.0%
HUOC-01	23.1%	32.0%	21.0%	23.9%
HUOC-02	5.6%	14.8%	16.9%	62.7%
HUOP-01	20.4%	12.0%	0.0%	67.6%
HUOPEB-01	16.3%	7.2%	0.0%	76.4%
HUOPEB-02	6.4%	26.0%	0.0%	67.6%
HUOPEB-03	28.4%	26.3%	0.0%	45.3%
HUOPL-01	17.9%	0.2%	28.6%	53.3%
HUOPL-02	34.9%	9.0%	2.2%	53.9%

Hydrologic Units	Soil Type			
	A	B	C	D
HUOPL-03	5.5%	0.3%	71.1%	23.1%
HUOPL-04	18.3%	5.3%	30.1%	46.2%
HUOPL-05	0.0%	33.4%	17.9%	48.6%
HUPAG-01	0.0%	0.0%	0.0%	100.0%
HUPAG-02	0.0%	0.0%	0.0%	100.0%
HUPOWRLN-02	16.0%	0.0%	0.0%	84.0%
HUPOWRLN-03	8.5%	0.0%	0.0%	91.5%
HUPRL-01	14.6%	0.0%	0.0%	85.4%
HUPRN-01	0.0%	34.8%	2.2%	63.0%
HUPRN-02	0.0%	0.0%	0.0%	100.0%
HUPRN-03	0.0%	0.0%	0.0%	100.0%
HUPRN-04	0.0%	0.0%	0.0%	100.0%
HUPRN-05	0.0%	0.0%	0.0%	100.0%
HUPRN-06	0.0%	0.0%	18.9%	81.1%
HUPRN-07	38.1%	0.0%	13.2%	48.7%
HUPRN-08	17.9%	0.0%	11.4%	70.6%
HUPRN-09	7.8%	9.1%	24.9%	58.2%
HUPRN-10	0.0%	0.0%	25.2%	74.8%
HUPRSW-01	23.2%	0.0%	4.3%	72.4%
HUPRSW-02	11.0%	0.0%	0.0%	89.0%
HUROL-01	46.8%	16.6%	36.6%	0.0%
HUSANDR-01	27.0%	0.0%	0.0%	73.0%
HUSE10A-01	2.9%	72.4%	0.0%	24.7%
HUSE3A-01	0.0%	0.0%	0.0%	100.0%
HUSE3A-02	45.3%	0.0%	0.0%	54.7%
HUSE3A-03	20.9%	0.0%	0.0%	79.1%
HUSE4A-02	47.2%	0.0%	0.0%	52.8%
HUSE5A-05	0.0%	0.0%	0.0%	100.0%
HUSFED-01	75.4%	0.0%	0.0%	24.6%
HUSFED-02	62.2%	0.0%	0.0%	37.8%
HUSFED-03	6.0%	0.0%	0.0%	94.0%
HUSFED-04	17.1%	0.0%	0.0%	82.9%
HUSFED-05	63.1%	0.0%	0.0%	36.9%
HUSFNR-01	0.0%	11.7%	1.8%	86.4%
HUSFNR-02	0.0%	18.4%	1.8%	79.8%
HUSFNR-03	28.0%	41.2%	24.5%	6.2%
HUSFNR-04	0.2%	16.4%	43.5%	40.0%
HUSFNR-05	0.1%	34.1%	6.3%	59.5%
HUSFNR-06	4.9%	37.8%	5.3%	52.0%
HUSFNR-07	3.8%	67.9%	0.0%	28.3%
HUSFNRSPUR-01	46.3%	26.1%	0.0%	27.6%

Hydrologic Units	Soil Type			
	A	B	C	D
HUSFNRSPUR-02	36.0%	25.2%	16.8%	22.0%
HUSFNRSPUR-03	81.9%	0.0%	5.4%	12.8%
HUSMIAMI-01	84.8%	15.2%	0.0%	0.0%
HUSMIAMI-02	63.2%	0.0%	0.0%	36.8%
HUSNRC-01	0.0%	11.1%	0.2%	88.7%
HUSNRC-02	4.1%	16.6%	0.2%	79.0%
HUSNYDERPK-01	47.6%	18.2%	0.1%	34.1%
HUSNYDERPK-02	0.1%	17.8%	18.6%	63.5%
HUSR84-01	54.8%	0.0%	0.0%	45.2%
HUSR84-02	85.1%	0.0%	0.0%	14.9%
HUSR84-03	12.8%	1.2%	0.0%	86.0%
HUSUNR-01	75.7%	0.0%	0.0%	24.3%
HUSUNR-02	0.0%	0.0%	0.0%	100.0%
HUSUNR-03	0.0%	0.0%	0.0%	100.0%
HUSUNR-04	3.6%	21.7%	0.0%	74.7%
HUSUNR-05	20.4%	9.0%	0.0%	70.6%
HUSUNR-06	12.2%	13.7%	0.0%	74.0%
HUSW12A-01	4.3%	2.4%	74.4%	19.0%
HUSW12A-02	0.0%	0.0%	14.1%	85.9%
HUSW14A-01	0.0%	0.0%	0.0%	100.0%
HUSW14ST-01	100.0%	0.0%	0.0%	0.0%
HUSW15A-01	90.5%	0.0%	6.4%	3.2%
HUSW15CT-01	96.6%	0.0%	0.0%	3.4%
HUSW20ST-01	44.4%	0.0%	33.9%	21.7%
HUSW20ST-02	23.7%	0.0%	34.3%	42.0%
HUSW24ST-01	28.8%	26.9%	36.3%	8.0%
HUSW27A-01	87.1%	0.0%	0.0%	12.9%
HUSW4A-01	0.0%	0.0%	0.0%	100.0%
HUSW4A-02	81.2%	0.0%	0.0%	18.8%
HUSW4A-03	86.9%	0.0%	0.0%	13.1%
HUSW7A-01	0.0%	0.0%	0.0%	100.0%
HUSWRIVRS-01	18.6%	20.0%	0.0%	61.4%
HUTR-01	55.3%	8.8%	0.0%	35.8%
HUTR-02	49.1%	0.0%	0.0%	50.9%
HUTR-03	27.0%	0.0%	0.0%	73.0%
HUTR-04	7.4%	0.0%	0.0%	92.6%
HUTR-05	4.5%	0.0%	4.7%	90.8%
HUWSIST-01	0.0%	0.0%	0.0%	100.0%
HUC13MR-09	0.9%	27.6%	53.5%	17.9%
HUC14CCC-11	50.5%	19.0%	0.0%	30.5%
HUNW15A-03	0.0%	0.0%	0.0%	100.0%

Hydrologic Units	Soil Type			
	A	B	C	D
HUNW22ST-02	26.4%	19.7%	0.0%	53.9%
HUSFNRSPUR-04	74.8%	5.3%	0.0%	19.8%
HUCCCSPUR-03	58.0%	0.0%	0.0%	42.0%
HUNDIX-01	43.7%	6.6%	0.0%	49.7%
HUNFNRSPUR-01	49.4%	0.0%	0.0%	50.6%
HUNPOWR-01	46.2%	4.9%	0.0%	48.9%
HUNW10T-01	54.5%	5.9%	0.0%	39.6%
HUSUNREX-01	30.1%	0.0%	0.0%	69.9%
HUSUNREX-02	0.0%	0.0%	0.0%	100.0%
Grand Total	20.2%	16.2%	5.8%	57.8%

Appendix 4A
Existing Land Use Coverage per Hydrologic Unit

The following tables present the existing land use coverage per hydrologic unit and per major basin for the City of Fort Lauderdale regional WMM water quality evaluation.

Table 4A-1. Distribution of Existing Land Use per Hydrologic Unit and per Major Basin for the Regional Model Area.

Map ID	Hydrologic Units	Agricultural	Commercial and Services	High Density Residential	Industrial	Institutional	Low Density Residential	Medium Density Residential	Recreational / Open Land	Transportation, Utilities, and Communication	Upland Forests	Water/ Wetlands	Total (acres)	Percent Imperviousness [1]
Cypress Creek														
29	HUC14CCC-01		19%	16%	0%	3%		47%	2%	2%		10%	1,014.47	44%
38	HUC14CCC-10		22%	14%	7%	1%		43%	1%			13%	106.40	46%
39	HUC14CCC-11		0%	6%		7%		81%	0%			6%	293.73	30%
40	HUCCCSPUR-01		3%	9%	3%	9%		66%	1%			8%	349.21	36%
41	HUCCCSPUR-02		10%	64%	2%	13%			2%	9%			734.69	70%
42	HUCCCSPUR-03		13%	16%		9%		58%	0%	5%			111.78	45%
60	HUG16-01		16%	28%		6%		31%		8%		10%	816.02	53%
	Total [2]	0%	13%	28%	1%	7%	0%	38%	1%	5%	0%	7%	3,426.31	50%
ICW-North														
43	HUCRCC-01		3%	3%		0%		29%	64%			0%	313.40	12%
52	HUECOMM-01		13%	5%		11%		67%	0%	4%			44.24	41%
53	HUECOMM-02		30%	20%		13%		11%	14%	12%			39.65	61%
55	HUEOAKPRK-01		12%	1%		1%		84%	1%	2%			208.86	32%
61	HUGALT-01		48%	51%					1%				52.08	72%
66	HUIC-01		5%	16%	0%	0%		53%	1%	0%		25%	436.48	33%
67	HUIC-02		5%	9%		8%		57%	4%	1%		16%	281.75	35%
68	HUIC-03		19%	23%		1%		34%	2%			21%	205.40	44%
69	HUIC-04		11%	26%		1%		33%	9%			19%	296.12	39%
70	HUIC-05		10%	8%		0%		60%	1%	2%		20%	272.14	33%
71	HUIC-06			13%		1%			51%	1%		34%	235.42	19%
72	HUIC-07		5%	5%		0%		64%	2%	1%		23%	262.51	29%
113	HUNE65-01		9%	90%					1%				23.28	66%
114	HUNFED-01		44%	24%		9%		13%	3%	6%			83.37	68%
115	HUNFED-02		26%			16%		48%	2%	7%			78.24	52%
116	HUNFED-03		22%		0%	3%		67%	1%	8%			60.45	43%
117	HUNFED-04		3%	13%		15%		65%	1%	3%			116.46	41%
118	HUNFED-05		18%	17%		2%		55%	1%	7%			100.20	46%
119	HUNFED-06		37%	0%		44%			2%	17%			53.78	81%
	Total	0%	11%	13%	0%	3%	0%	45%	12%	2%	0%	14%	3,163.84	35%
ICW-South														
64	HUI595-01		27%		13%	4%			6%	39%	11%	0%	61.94	71%
73	HUIC-08		34%	3%		0%		38%	1%	3%		21%	183.81	46%
74	HUIC-09		14%	49%		1%			17%	1%		18%	204.07	49%
75	HUIC-10		29%	19%		10%			18%	4%		20%	155.61	53%
76	HUIC-11		3%	12%		0%		53%	1%	0%		31%	536.00	30%
77	HUIC-12		2%	3%		0%		64%	2%			29%	318.20	26%
78	HUIC-13		10%	9%		2%		41%	11%	1%		25%	590.52	33%
79	HUIC-14		3%	9%		0%		52%	4%			33%	312.49	28%
80	HUIC-15		35%	0%	1%	41%			3%	12%		8%	198.93	75%
109	HUNE3CT-01		6%	64%	0%	0%		27%	3%				173.27	53%
196	HUSE10A-01		70%	7%	10%	3%			3%	8%			185.26	79%
199	HUSE3A-03		40%	17%		24%		14%	1%	3%			77.36	70%
200	HUSE4A-02		64%		13%	4%			12%	7%			72.37	72%
205	HUSFED-04		43%	26%		3%			11%	17%			33.57	69%
206	HUSFED-05		45%	41%	1%	4%			4%	6%			58.73	72%
218	HUSMIAMI-01		0%	82%					18%				25.15	54%
219	HUSMIAMI-02		21%	38%		39%			0%	1%			13.22	75%
224	HUSR84-01		49%	22%	7%	2%			6%	14%			91.27	74%
	Total	0%	19%	15%	1%	5%	0%	31%	6%	3%	0%	19%	3,291.78	45%
Middle River														
7	HUC13IC-01		16%			0%		56%	1%	3%		24%	75.94	34%
8	HUC13IC-02		16%			4%		52%	1%	3%		24%	130.34	37%
9	HUC13IC-03		34%	2%		7%		15%	14%	9%		20%	142.80	50%
10	HUC13MR-01		4%	10%	12%	5%		11%	30%	12%		16%	149.00	41%

Notes: 1. The total impervious area percentage is an area-weighted value.
2. Total acreage percentage of each land use category with respect to the total Major Basin area.

Table 4A-1. Distribution of Existing Land Use per Hydrologic Unit and per Major Basin for the Regional Model Area (continued)

Map ID	Hydrologic Units	Agricultural	Commercial and Services	High Density Residential	Industrial	Institutional	Low Density Residential	Medium Density Residential	Recreational / Open Land	Transportation, Utilities, and Communication	Upland Forests	Water/ Wetlands	Total (acres)	Percent Imperviousness [1]
11	HUC13MR-02		3%	3%		7%		28%	17%	0%		41%	136.85	28%
12	HUC13MR-03		16%	26%		8%		34%	9%	4%		2%	142.93	49%
13	HUC13MR-04		3%	34%	2%	23%		33%	2%		0%	4%	171.03	53%
14	HUC13MR-05		5%		0%	1%		91%	0%			3%	167.23	26%
15	HUC13MR-06		23%	2%				60%	5%			10%	23.70	37%
16	HUC13MR-07		7%	18%	3%	6%		46%	1%		4%	16%	164.56	39%
17	HUC13MR-08		11%	26%	4%	4%	5%	34%	5%		5%	6%	245.36	42%
18	HUC13MR-09		1%	1%		1%		85%	4%	4%		4%	145.53	26%
19	HUC13MRC-01			15%		3%		6%	57%	0%		18%	25.87	19%
21	HUC13MRC-03	1%	12%	32%	5%	3%		6%	12%	4%	4%	22%	705.33	47%
22	HUC13MRC-04		22%	4%	9%	14%		28%	9%	8%		6%	359.33	54%
23	HUC13MRC-05		2%	7%				44%	1%	13%		32%	76.65	36%
24	HUC13MRC-07		25%	19%	4%	6%	0%	38%	1%	3%		4%	448.33	53%
25	HUC13MRC-08		6%	3%		12%		68%	1%	3%		7%	111.00	37%
26	HUC13MRC-11		21%	4%	2%	10%		50%	2%	5%		5%	272.35	48%
27	HUC13MRC-12		2%					80%	0%			18%	53.19	24%
28	HUC13MRC-13		30%	6%				48%	2%	5%		9%	98.43	46%
81	HULEMERALD-01		5%	21%	0%	10%		4%	25%	4%		32%	640.55	38%
82	HULKMELVA-01		19%	6%		20%		34%	3%	1%		17%	58.03	49%
96	HUMLKPOND-01		8%	1%		0%		56%	10%	2%	3%	19%	141.30	27%
97	HUNANDR-01		1%			10%		86%	3%				77.41	29%
100	HUNDIX-01		20%	53%	10%	2%		1%	6%	8%			897.50	68%
101	HUNE11ST-01		6%	86%	2%				6%				33.10	62%
102	HUNE13ST-01		4%	48%		14%		33%	1%				103.90	53%
103	HUNE13ST-02		15%	70%	4%	0%		8%	2%	0%			41.30	63%
104	HUNE13ST-03		35%	29%	23%	5%			2%	6%			59.86	75%
105	HUNE15A-01		5%		5%	5%		78%	3%	4%			74.04	34%
110	HUNE4A-01		11%	65%	2%	5%		13%	5%	0%			143.38	59%
111	HUNE4A-02		24%	16%		4%		51%	5%				43.24	45%
112	HUNE4A-03		23%	10%	10%	19%		29%	8%	0%			36.74	56%
120	HUNFED-07		21%	21%		0%		42%	2%	13%			44.80	53%
121	HUNFED-08		31%	2%	1%			32%	22%	12%			58.52	46%
122	HUNFED-09		84%							16%			20.85	82%
123	HUNFED-10		50%	14%		1%		9%	5%	21%			26.12	72%
124	HUNFED-11		69%	9%				1%	1%	20%			39.11	80%
125	HUNFED-12		82%			5%			3%	10%			24.94	80%
148	HUNW10T-01		9%		32%	7%			20%	32%			299.25	68%
149	HUNW15A-01		1%		0%	4%		92%	0%	3%			503.59	28%
153	HUNW22ST-01		4%	2%	1%	8%		77%	6%	1%			238.21	31%
154	HUNW22ST-02		7%	2%	18%	28%		16%	19%	10%		1%	285.96	57%
158	HUNW5A-01		0%	12%		1%		84%	3%				134.90	28%
168	HUOP-01		31%	16%	2%	2%		38%	2%	9%		1%	529.97	55%
169	HUOPEB-01		13%		5%	8%		67%	3%	0%		5%	172.79	37%
170	HUOPEB-02		9%	2%	8%	2%		70%	1%	1%		7%	310.94	36%
171	HUOPEB-03		17%	2%		7%		69%	3%	0%		3%	165.11	37%
172	HUOPL-01		35%	8%	8%	10%		0%	8%	27%	3%	2%	268.37	73%
173	HUOPL-02		13%	3%	15%	9%		39%	2%	18%		1%	203.68	57%
174	HUOPL-03					1%		89%		10%			44.35	30%
175	HUOPL-04		2%	3%	4%	20%		42%	4%	8%		15%	310.21	45%
176	HUOPL-05		0%	15%		6%		22%	12%	11%		33%	185.94	39%
179	HUPOWRLN-02			19%				73%	1%	7%			76.65	36%
180	HUPOWRLN-03		14%	4%		24%		48%	2%	9%			60.30	52%
228	HUSUNR-02		58%		5%	9%		2%	2%	25%			23.95	81%
229	HUSUNR-03		49%	1%	2%	3%		6%	8%	31%			20.01	73%

Notes: 1. The total impervious area percentage is an area-weighted value.
2. Total acreage percentage of each land use category with respect to the total Major Basin area.

Table 4A-1. Distribution of Existing Land Use per Hydrologic Unit and per Major Basin for the Regional Model Area (continued)

Map ID	Hydrologic Units	Agricultural	Commercial and Services	High Density Residential	Industrial	Institutional	Low Density Residential	Medium Density Residential	Recreational / Open Land	Transportation, Utilities, and Communication	Upland Forests	Water/ Wetlands	Total (acres)	Percent Imperviousness [1]
230	HUSUNR-04		29%		6%	2%		1%	9%	47%		6%	52.22	74%
233	HUSUNREX-01		29%	33%	1%	5%			20%	11%			83.96	60%
234	HUSUNREX-02		60%	12%	0%	0%			1%	27%			18.05	80%
	Total [2]	0%	14%	16%	5%	7%	0%	35%	8%	7%	1%	9%	10,398.82	48%
New River														
5	HUBROWARD-06		46%		0%	40%			5%	8%			29.18	77%
54	HUELOSO-01		70%			18%			12%				15.61	72%
56	HUFLAGLER-01		22%		2%	39%			17%	20%			15.78	69%
57	HUFLAGLER-02		59%	0%	10%	15%			4%	12%			60.63	79%
98	HUNANDR-02		58%	8%	20%				7%	7%			22.60	75%
99	HUNANDR-03		46%		4%	24%			16%	10%			23.71	69%
106	HUNE3A-01		43%	24%	12%	3%			6%	13%			39.70	74%
107	HUNE3A-02		17%	56%	3%	3%			22%	0%			41.84	54%
108	HUNE3A-03		62%	10%	1%	7%			20%				47.87	64%
126	HUNFED-13		17%	30%	0%	3%		19%	31%				117.90	41%
127	HUNFED-14		34%	21%		6%		30%	9%				68.85	53%
128	HUNFNR-01							83%	5%			12%	76.85	22%
129	HUNFNR-02		48%	2%	0%	16%		20%	2%			12%	67.93	61%
130	HUNFNR-03		38%	6%	3%	26%		13%	3%	5%		6%	103.44	67%
131	HUNFNR-04		91%			2%			0%			7%	25.05	77%
132	HUNFNR-05		58%			1%			19%	1%		21%	14.80	54%
133	HUNFNR-06		25%	24%	2%			29%	5%	3%		13%	62.35	50%
134	HUNFNR-07		50%			22%			5%	14%		8%	26.12	74%
135	HUNFNR-08		22%		3%	56%			1%	9%		9%	11.59	76%
136	HUNFNR-09		1%	20%		8%		32%	23%			16%	29.94	32%
144	HUNFNRSPUR-01		38%	43%	0%	13%			3%	1%		2%	102.98	71%
156	HUNW4A-01		42%	27%	14%	3%			11%	3%			95.99	68%
157	HUNW4A-02		19%	43%	19%	7%			10%	2%			68.41	67%
159	HUNW5A-02		20%	27%	7%	29%			15%	2%			84.18	65%
160	HUNW7A-01		49%	1%	28%				22%				14.29	63%
161	HUNW7A-02		2%	35%	3%	20%			38%	1%			30.79	45%
162	HUNW8ST-01		22%	28%	39%	4%			7%				91.32	71%
164	HUNW9A-01		27%	50%	2%	3%			17%				33.32	59%
165	HUNW9A-02		2%	57%		30%		3%	8%				25.22	64%
195	HUSANDR-01		51%		2%	29%		4%	9%	5%			35.89	71%
197	HUSE3A-01		53%			29%			3%	16%			26.61	80%
198	HUSE3A-02		84%	9%	2%	2%			2%	1%			29.02	78%
201	HUSE5A-05		97%			3%							17.27	81%
202	HUSFED-01		21%	0%	1%	5%		67%	1%	6%			41.89	42%
203	HUSFED-02		50%	23%		4%		3%	3%	17%			28.71	75%
204	HUSFED-03		29%	45%		8%			2%	15%			13.08	73%
227	HUSUNR-01		3%	38%		2%		24%	33%				143.46	34%
245	HUSW4A-01		6%	38%	9%	4%		34%	5%	5%			48.48	52%
246	HUSW4A-02		14%	25%	4%			49%	2%	6%			26.71	48%
247	HUSW4A-03		4%	3%	6%	19%		61%	2%	4%			104.89	43%
250	HUTR-01		20%	17%		1%		46%	12%	2%		2%	84.78	41%
251	HUTR-02		6%	4%		4%		74%	2%	2%		8%	43.17	32%
252	HUTR-03		48%		12%	9%		20%	0%	9%		3%	40.86	69%
253	HUTR-04		27%		1%	8%		47%	7%	3%		7%	21.57	45%
254	HUTR-05		2%	4%				83%	2%	5%		4%	110.07	29%
	Total	0%	29%	20%	5%	10%	0%	19%	11%	3%	0%	3%	2,154.64	57%
North Fork New River														
1	HUBROWARD-01		5%		7%	1%		35%	10%	42%			97.36	57%
2	HUBROWARD-02		13%	2%	2%	1%		71%	7%	4%			271.75	35%
3	HUBROWARD-03		18%	4%	1%	3%		66%	4%	4%			133.85	39%
4	HUBROWARD-05		19%	34%	10%	21%			4%	11%			49.04	73%
6	HUC12UI-01		14%			8%		74%	2%	2%			336.03	36%

Notes: 1. The total impervious area percentage is an area-weighted value.
2. Total acreage percentage of each land use category with respect to the total Major Basin area.

Table 4A-1. Distribution of Existing Land Use per Hydrologic Unit and per Major Basin for the Regional Model Area (continued)

Map ID	Hydrologic Units	Agricultural	Commercial and Services	High Density Residential	Industrial	Institutional	Low Density Residential	Medium Density Residential	Recreational / Open Land	Transportation, Utilities, and Communication	Upland Forests	Water/ Wetlands	Total (acres)	Percent Imperviousness [1]
62	HUHF-01		11%	23%	3%	2%		41%	11%	2%		6%	441.12	41%
63	HUHF-02		37%	31%	1%	5%			8%	10%		7%	609.12	67%
91	HUMELROSEPK-01		4%		1%	1%		92%	1%	1%			379.87	27%
92	HUMIDLST-01			82%	1%	15%			2%				11.79	67%
137	HUNFNR-10			30%		0%		42%	3%		4%	21%	23.49	35%
138	HUNFNR-11		3%	30%		16%		35%	1%	6%	2%	8%	182.48	50%
139	HUNFNR-12		6%	37%		35%			1%	7%	9%	5%	53.15	65%
140	HUNFNR-13		4%	5%	10%	16%		34%	4%	17%		10%	86.66	53%
141	HUNFNR-14		9%	1%	10%	13%		15%	31%	11%		10%	244.33	43%
142	HUNFNR-15		12%	6%	4%	8%		43%	16%	5%	1%	3%	296.78	40%
143	HUNFNR-16		17%			4%		70%	2%	3%		4%	252.35	37%
150	HUNW15A-02		8%	15%		5%		60%	11%				50.27	35%
151	HUNW15A-03		1%	47%	0%	18%		19%	14%	0%			96.15	51%
152	HUNW18A-01		15%	9%	4%	5%		36%	15%	17%			120.33	48%
155	HUNW24A-01		18%	15%	21%	2%		14%	7%	23%			90.54	67%
163	HUNW8ST-02		5%	49%	1%	10%		8%	27%	0%			105.49	47%
231	HUSUNR-05		4%	36%	9%	33%		3%	1%	13%	0%	1%	187.86	73%
232	HUSUNR-06		5%	0%	0%	10%		49%	28%	5%	1%	2%	255.88	28%
237	HUSW14A-01			60%		1%					39%		3.79	40%
248	HUSW7A-01		12%	61%	2%	16%		3%	3%	3%			84.81	68%
249	HUSWRIVRS-01		0%	30%		19%		16%	3%	32%			68.47	68%
255	HUWSIST-01		15%	28%		17%		26%	14%				32.18	50%
	Total [2]	0%	13%	16%	3%	8%	0%	40%	9%	7%	0%	3%	4,564.93	46%
South Fork New River														
44	HUDAVIE-01		1%	21%	0%	2%		49%	1%	27%			87.87	51%
45	HUDAVIE-02		7%	12%	21%	3%		9%	0%	48%			97.94	78%
46	HUDAVIE-03		4%	4%	2%	9%		77%	1%	3%			180.26	35%
47	HUDAVIE-04		39%	0%		31%		24%	5%				52.08	63%
48	HUDAVIE-05		0%			23%		77%	0%				61.87	36%
49	HUDAVIE-06		7%		0%	0%		82%	11%				77.92	25%
50	HUDAVIE-07		60%	18%	0%	4%		12%	6%				23.23	66%
51	HUDAVIE-08		40%	24%	1%	10%		16%	9%	0%			41.26	61%
65	HUI595-02		1%		0%					99%			57.24	90%
93	HUMLK-01		29%			7%		62%	2%				20.43	44%
94	HUMLK-02		1%					98%	1%				12.73	23%
95	HUMLK-03			2%		1%		96%	1%				126.36	24%
145	HUNNRC-03					12%		63%	3%	6%		15%	538.78	34%
146	HUNNRC-04		6%	23%		4%		41%	4%	10%	2%	10%	424.24	44%
166	HUOC-01		3%	8%	3%	1%		49%	16%	10%		11%	138.06	34%
167	HUOC-02		10%	30%	21%				15%	25%			38.96	66%
194	HUROL-01		1%	52%		2%		4%	18%	2%	21%		45.47	40%
207	HUSFNR-01		1%	35%		6%	0%	41%	5%	0%		11%	114.76	41%
208	HUSFNR-02			17%		1%	7%	47%	5%	2%	6%	15%	103.92	29%
209	HUSFNR-03			20%		1%	3%	63%	1%	1%		11%	293.44	33%
210	HUSFNR-04		0%	1%		4%	3%	42%	26%	5%	2%	18%	191.21	22%
211	HUSFNR-05		12%	15%	2%	1%	4%	22%	8%	13%		23%	244.98	45%
212	HUSFNR-06		11%		1%	5%	2%	34%	3%	3%		41%	310.06	34%
213	HUSFNR-07		1%	11%		0%		50%	4%	16%		17%	198.98	39%
214	HUSFNRSPUR-01				5%	0%		92%	0%	2%		1%	41.82	27%
215	HUSFNRSPUR-02		0%	2%		3%	12%	82%	2%				218.88	23%
216	HUSFNRSPUR-03					10%	4%	85%	1%				99.79	28%
217	HUSFNRSPUR-04		11%	4%	2%	5%		65%	6%	7%			223.12	38%
220	HUSNRC-01	1%	1%		2%	13%			1%	28%	4%	50%	643.79	51%
221	HUSNRC-02	3%	18%		3%				5%	6%	8%	57%	382.87	37%
222	HUSNYDERPK-01				1%			0%	52%	9%	19%	20%	54.01	14%

Notes: 1. The total impervious area percentage is an area-weighted value.
2. Total acreage percentage of each land use category with respect to the total Major Basin area.

Table 4A-1. Distribution of Existing Land Use per Hydrologic Unit and per Major Basin for the Regional Model Area (continued)

Map ID	Hydrologic Units	Agricultural	Commercial and Services	High Density Residential	Industrial	Institutional	Low Density Residential	Medium Density Residential	Recreational / Open Land	Transportation, Utilities, and Communication	Upland Forests	Water/ Wetlands	Total (acres)	Percent Imperviousness [1]
223	HUSNYDERPK-02		7%	6%	10%	31%		11%	33%	3%		0%	153.93	47%
225	HUSR84-02		7%		3%	2%		41%	43%	6%			95.20	24%
226	HUSR84-03		31%		41%	18%			3%	6%			152.74	79%
235	HUSW12A-01		12%	14%		9%		52%	1%	5%	8%		128.00	42%
236	HUSW12A-02		12%		51%	17%		6%	6%	7%			61.21	73%
238	HUSW14ST-01		0%					100%					29.60	23%
239	HUSW15A-01		14%	21%	6%			41%	4%	14%			40.46	52%
240	HUSW15CT-01		2%	3%		9%		86%	0%				125.72	30%
241	HUSW20ST-01		17%			2%		60%	17%	4%			114.56	33%
242	HUSW20ST-02		9%	27%		15%		31%	15%	3%			73.10	47%
243	HUSW24ST-01			87%					2%	5%	6%		22.33	61%
244	HUSW27A-01		6%	11%	2%	11%		65%	5%				271.09	37%
	Total [2]	0%	6%	8%	3%	7%	1%	42%	6%	9%	2%	16%	6,414.27	40%
Prospect Recharge														
177	HUPAG-01			54%					37%			9%	76.56	38%
178	HUPAG-02			53%		7%		1%	30%			8%	186.86	43%
181	HUPRL-01			23%		0%		2%	10%	28%		38%	69.08	50%
182	HUPRN-01			39%					26%	25%	2%	8%	192.20	51%
183	HUPRN-02			58%				0%	23%	10%		9%	235.38	49%
184	HUPRN-03		0%	8%		1%		75%	0%	6%		11%	160.64	31%
185	HUPRN-04		5%	36%	18%	23%		7%	1%	2%		6%	58.13	67%
186	HUPRN-05			25%				75%					51.31	34%
187	HUPRN-06		50%		35%	3%				11%			41.90	82%
188	HUPRN-07		1%		1%	29%		44%	13%	3%	7%	2%	147.15	39%
189	HUPRN-08		31%		40%	4%		1%	4%	3%	15%	3%	168.97	64%
190	HUPRN-09		31%		46%				1%	3%	17%	1%	143.34	66%
192	HUPRSW-01		0%						27%	5%	29%	38%	169.62	15%
193	HUPRSW-02		3%	13%					43%	8%	13%	20%	142.25	24%
	Total	0%	7%	23%	9%	4%	0%	13%	18%	8%	7%	11%	1,843.39	44%
S36														
20	HUC13MRC-02		22%	7%		4%		46%	12%	4%	1%	4%	404.24	41%
58	HUFLEA-01	1%	13%	13%	16%	1%			2%	54%	0%		311.22	81%
59	HUFLEA-02		3%		0%	0%			1%	92%	5%		327.41	85%
83	HULL-01		15%	1%	79%	1%			5%				52.01	77%
84	HULL-02		58%		42%	0%							21.04	81%
85	HULL-03		17%	1%	82%				0%				25.55	81%
86	HULL-04	0%	34%	1%	13%	16%			4%	7%	0%	25%	152.13	64%
87	HULL-05		8%	29%		17%			5%	4%	7%	31%	155.17	50%
88	HULL-06		68%		13%	0%			5%	14%			64.94	79%
89	HULL-07		30%	29%	18%	0%			12%	11%			131.78	68%
90	HULL-08		12%	6%	1%	3%		49%	14%	3%		12%	510.74	34%
	Total	0%	17%	8%	8%	4%	0%	20%	8%	25%	1%	8%	2,156.23	59%
S37A														
30	HUC14CCC-02		38%	9%	16%	0%			22%	8%		6%	1,086.32	60%
31	HUC14CCC-03		6%	37%				3%	48%	1%		5%	427.94	32%
32	HUC14CCC-04		0%	46%					48%			6%	177.64	32%
33	HUC14CCC-05		82%	1%					2%	0%		14%	61.93	71%
34	HUC14CCC-06		64%	0%	2%	0%			0%	22%		12%	54.54	76%
35	HUC14CCC-07		48%		32%	3%			8%	8%		1%	145.68	75%
36	HUC14CCC-08		42%	14%	1%	0%			2%	28%		13%	189.62	73%
37	HUC14CCC-09		30%	22%	7%	0%			2%	20%	2%	15%	166.99	67%
147	HUNPOWR-01		26%		29%	6%			4%	34%		1%	268.72	80%
191	HUPRN-10		82%	0%	0%			0%	0%	1%		17%	215.37	71%
	Total	0%	35%	15%	11%	1%	0%	0%	20%	11%	0%	7%	2,794.73	59%
Total (Regional Model) [3]		0.1%	14.8%	15.3%	4.2%	6.1%	0.2%	32.2%	8.8%	7.5%	0.9%	9.9%	40,319.00	47%

Notes: 1. The total impervious area percentage is an area-weighted value.
2. Total acreage percentage of each land use category with respect to the total Major Basin area.
3. Total acreage percentage of each land use category with respect to the Regional Model area.

Appendix 4B
WMM-Estimated Loads for the Regional Model Area

The following tables present the average annual WMM-estimated flow and loads for the Regional Model Area per hydrologic unit for the City of Fort Lauderdale water quality evaluation.

Table 4B-1. Average Annual WMM-Estimated Loads for the Regional Model Area per Hydrologic Unit.

Map ID	Hydrologic Unit	Area (acres)	Imp. Area (%)	Imp. Area (acres)	Flow (ac-ft/yr)	BOD (lbs/yr)	Cd (lbs/yr)	COD (lbs/yr)	Cu (lbs/yr)	DP (lbs/yr)	F-Coli (counts/yr)	NO23 (lbs/yr)	Pb (lbs/yr)	TDS (lbs/yr)	TKN (lbs/yr)	TP (lbs/yr)	TSS (lbs/yr)	Zn (lbs/yr)
Cypress Creek																		
29	HUC14CCC-01	1,014.5	44%	447.4	2,186	64,743	5.0	420,000	53	1,303	5.30E+14	3,145	477	640,000	10,833	2,203	350,000	575
38	HUC14CCC-10	106.4	46%	49.2	238	7,356	0.6	47,466	5	138	5.40E+13	349	52	75,067	1,161	237	39,671	64
39	HUC14CCC-11	293.7	30%	87.1	442	9,324	1.0	79,479	10	246	1.40E+14	580	10	120,000	1,984	415	44,087	62
40	HUCCCSPUR-01	349.2	36%	124.2	628	14,977	1.0	120,000	15	354	1.80E+14	855	36	180,000	2,844	605	76,809	110
41	HUCCCSPUR-02	734.7	70%	516.7	2,306	50,369	2.0	400,000	62	1,212	3.30E+14	2,988	322	440,000	9,217	2,103	290,000	476
42	HUCCCSPUR-03	111.8	45%	50.7	238	6,672	0.6	44,783	7	146	5.90E+13	362	44	66,150	1,162	250	36,754	61
60	HUG16-01	816.0	53%	435.3	2,045	59,034	4.0	390,000	66	1,209	4.60E+14	3,019	438	550,000	10,027	2,086	340,000	569
	Total	**3,426.3**	**50%**	**1,710.6**	**8,083**	**212,475**	**14.1**	**1,501,728**	**218**	**4,608**	**1.7530E+15**	**11,298**	**1,379**	**2,071,217**	**37,228**	**7,899**	**1,177,321**	**1,917**
ICW-North																		
43	HUCRCC-01	313.4	12%	38.2	268	7,768	0.7	48,919	4	145	7.00E+13	276	24	98,548	1,050	235	26,994	39
52	HUECOMM-01	44.2	41%	18.4	91	2,536	0.2	16,838	3	55	2.40E+13	139	17	26,828	448	95	13,478	23
53	HUECOMM-02	39.7	61%	24.3	111	3,765	0.3	21,379	4	70	2.00E+13	179	36	32,470	573	121	21,802	39
55	HUEOAKPRK-01	208.9	32%	66.3	331	8,648	1.0	57,380	8	190	1.00E+14	487	64	110,000	1,599	324	40,826	74
61	HUGALT-01	52.1	72%	37.5	167	4,741	0.2	32,795	3	79	3.40E+13	168	35	37,823	757	137	22,248	36
66	HUIC-01	436.5	33%	143.1	752	16,820	1.0	140,000	14	376	2.10E+14	873	59	210,000	3,363	634	84,634	122
67	HUIC-02	281.8	35%	97.6	506	12,048	1.0	93,363	12	276	1.40E+14	651	46	140,000	2,318	467	62,071	93
68	HUIC-03	205.4	44%	90.6	437	12,748	0.9	87,575	8	248	1.00E+14	569	86	120,000	2,129	415	68,872	107
69	HUIC-04	296.1	39%	116.5	567	15,867	1.0	110,000	12	330	1.40E+14	742	78	150,000	2,708	551	86,954	128
70	HUIC-05	272.1	33%	90.6	474	11,433	1.0	83,153	10	239	1.30E+14	590	73	140,000	2,188	407	56,445	94
71	HUIC-06	235.4	19%	45.4	267	5,804	0.2	47,349	4	99	4.80E+13	177	8	77,176	980	163	25,803	31
72	HUIC-07	262.5	29%	75.6	404	8,537	1.0	68,387	8	189	1.20E+14	462	39	120,000	1,783	322	39,287	63
113	HUNE65-01	23.3	66%	15.3	70	1,730	0.1	14,617	1	43	1.40E+13	93	6	12,596	299	71	9,969	14
114	HUNFED-01	83.4	68%	56.4	252	9,251	0.6	52,759	7	169	4.60E+13	412	89	74,181	1,358	286	53,353	91
115	HUNFED-02	78.2	52%	40.4	185	5,813	0.5	34,910	6	114	3.70E+13	290	53	55,351	939	195	31,935	57
116	HUNFED-03	60.4	43%	25.7	122	3,659	0.4	20,765	4	70	3.00E+13	190	39	39,867	613	122	19,144	37
117	HUNFED-04	116.5	41%	47.5	223	5,612	0.4	42,335	7	136	6.00E+13	327	20	58,080	1,055	232	30,624	47
118	HUNFED-05	100.2	46%	46.1	215	6,439	0.6	39,643	7	131	5.40E+13	338	55	64,137	1,083	227	35,482	63
119	HUNFED-06	53.8	81%	43.7	192	6,466	0.4	36,924	8	121	2.70E+13	315	63	53,339	999	212	38,856	69
	Total	**3,163.8**	**35%**	**1,119.2**	**5,634**	**149,685**	**11.5**	**1,049,091**	**130**	**3,080**	**1.4040E+15**	**7,278**	**890**	**1,620,396**	**26,242**	**5,216**	**768,777**	**1,227**
ICW-South																		
64	HUI595-01	61.9	71%	44.1	196	5,328	0.5	23,998	10	80	2.70E+13	287	74	62,926	856	160	30,350	66
73	HUIC-08	183.8	46%	84.4	409	12,116	1.0	75,173	8	213	8.00E+13	533	122	130,000	1,974	361	61,402	110
74	HUIC-09	204.1	49%	100.8	476	14,539	0.6	100,000	12	295	1.00E+14	650	73	120,000	2,310	493	85,029	123
75	HUIC-10	155.6	53%	82.3	384	12,795	0.7	78,331	10	228	6.50E+13	535	109	110,000	1,929	385	72,289	118
76	HUIC-11	536.0	30%	162.0	872	17,542	2.0	150,000	16	396	2.40E+14	922	47	250,000	3,767	669	85,107	120
77	HUIC-12	318.2	26%	81.7	462	8,310	1.0	75,867	8	193	1.40E+14	461	18	140,000	1,937	327	34,938	51
78	HUIC-13	590.5	33%	193.0	1,016	25,498	2.0	190,000	20	506	2.50E+14	1,179	148	300,000	4,602	853	130,000	199
79	HUIC-14	312.5	28%	87.4	471	9,220	0.9	80,945	8	202	1.30E+14	468	25	140,000	1,995	341	42,723	60
80	HUIC-15	198.9	75%	150.0	666	22,066	1.0	130,000	22	412	9.30E+13	1,034	196	180,000	3,403	712	130,000	222
109	HUNE3CT-01	173.3	53%	91.7	412	12,248	0.5	91,809	11	289	1.10E+14	638	32	93,287	2,054	483	74,239	101
196	HUSE10A-01	185.3	79%	145.6	642	25,990	2.0	130,000	18	408	9.40E+13	1,093	302	220,000	3,504	709	150,000	267
199	HUSE3A-03	77.4	70%	53.9	241	8,735	0.5	52,276	6	166	4.20E+13	393	74	67,791	1,297	279	50,980	83
200	HUSE4A-02	72.4	72%	52.2	231	9,333	0.8	46,914	6	143	3.20E+13	393	106	82,781	1,232	251	51,963	95
205	HUSFED-04	33.6	69%	23.3	104	3,689	0.3	19,306	4	64	1.80E+13	168	42	31,546	545	111	21,346	40
206	HUSFED-05	58.7	72%	42.1	186	6,929	0.4	39,844	5	127	3.50E+13	307	64	53,451	1,005	214	40,655	68
218	HUSMIAMI-01	25.2	54%	13.5	61	1,842	0.0	14,210	2	44	1.60E+13	94	2	12,472	302	74	11,608	15
219	HUSMIAMI-02	13.2	75%	9.9	43	1,453	0.1	9,934	1	31	8.00E+12	70	7	10,151	226	52	8,956	13
224	HUSR84-01	91.3	74%	67.2	296	10,853	0.8	56,503	11	181	4.90E+13	501	122	95,749	1,552	320	62,918	116
	Total	**3,291.8**	**45%**	**1,485.1**	**7,168**	**208,486**	**15.1**	**1,365,110**	**178**	**3,978**	**1.5290E+15**	**9,726**	**1,563**	**2,100,154**	**34,490**	**6,794**	**1,144,503**	**1,867**
Middle River																		
7	HUC13IC-01	75.9	34%	26.1	131	3,296	0.4	21,961	3	62	3.20E+13	160	30	41,737	607	106	16,073	29
8	HUC13IC-02	130.3	37%	47.6	239	6,182	0.6	41,847	5	118	5.60E+13	297	51	74,144	1,121	202	31,135	54
9	HUC13IC-03	142.8	50%	71.9	338	11,246	0.9	61,439	10	184	5.50E+13	477	129	110,000	1,705	317	61,329	114
10	HUC13MR-01	149.0	41%	61.1	304	7,154	0.6	45,344	12	121	5.30E+13	377	48	93,734	1,182	235	37,862	68

Notes: 1. The total impervious area percentage is an area-weighted value.
2. Existing BMPs are included
3. Flow includes septic tank flows and stormwater runoff.
4. Delivery ratios are set to 100 percent.

Table 4B-1. Average Annual WMM-Estimated Loads for the Regional Model Area per Hydrologic Unit. (continued)

Map ID	Hydrologic Unit	Area (acres)	Imp. Area (%)	Imp. Area (acres)	Flow (ac-ft/yr)	BOD (lbs/yr)	Cd (lbs/yr)	COD (lbs/yr)	Cu (lbs/yr)	DP (lbs/yr)	F-Coli (counts/yr)	NO23 (lbs/yr)	Pb (lbs/yr)	TDS (lbs/yr)	TKN (lbs/yr)	TP (lbs/yr)	TSS (lbs/yr)	Zn (lbs/yr)
11	HUC13MR-02	136.8	28%	38.1	205	4,144	0.3	35,735	3	83	4.50E+13	180	13	58,162	859	139	19,638	27
12	HUC13MR-03	142.9	49%	69.5	322	9,890	0.7	64,734	10	206	7.50E+13	493	65	87,716	1,615	350	56,316	90
13	HUC13MR-04	171.0	53%	90.1	424	11,870	0.5	91,850	11	284	1.00E+14	639	21	99,237	2,046	477	70,984	95
14	HUC13MR-05	167.2	26%	44.2	248	5,419	0.8	42,164	5	135	8.60E+13	335	21	78,251	1,126	229	22,939	38
15	HUC13MR-06	23.7	37%	8.7	44	1,339	0.1	8,412	1	25	1.10E+13	61	12	14,422	220	42	6,591	11
16	HUC13MR-07	164.6	39%	64.4	324	8,323	0.6	63,525	7	184	8.30E+13	437	30	89,088	1,501	312	45,430	65
17	HUC13MR-08	245.4	42%	102.2	499	13,109	0.8	96,949	10	264	1.20E+14	612	59	130,000	2,209	454	68,586	101
18	HUC13MR-09	145.5	26%	38.2	215	4,260	0.7	33,002	6	109	7.40E+13	289	19	67,595	948	190	18,083	33
19	HUC13MRC-01	25.9	19%	4.9	28	708	0.0	5,416	1	14	5.80E+12	26	1	7,970	111	23	3,305	4
21	HUC13MRC-03	705.3	47%	334.4	1,591	39,523	2.0	290,000	40	707	3.10E+14	1,748	238	410,000	6,692	1,261	210,000	331
22	HUC13MRC-04	359.3	54%	194.9	913	27,836	2.0	170,000	30	502	1.70E+14	1,378	232	290,000	4,330	898	150,000	269
23	HUC13MRC-05	76.7	36%	28.0	143	2,646	0.3	18,697	6	52	3.40E+13	161	26	42,046	597	98	13,689	29
24	HUC13MRC-07	448.3	53%	236.7	1,114	35,867	3.0	220,000	29	697	2.50E+14	1,736	272	330,000	5,611	1,193	200,000	329
25	HUC13MRC-08	111.0	37%	40.6	207	5,146	0.5	37,701	6	119	5.60E+13	293	25	59,574	978	203	26,576	43
26	HUC13MRC-11	272.3	48%	129.9	617	18,542	2.0	110,000	18	362	1.30E+14	935	157	190,000	3,046	626	100,000	176
27	HUC13MRC-12	53.2	24%	12.9	74	1,319	0.2	11,893	1	33	2.50E+13	82	3	22,811	314	56	5,117	8
28	HUC13MRC-13	98.4	46%	45.5	220	7,115	0.7	40,586	6	128	4.90E+13	330	75	71,527	1,129	219	37,819	70
81	HULEMERALD-01	640.6	38%	244.1	1,234	27,715	1.0	220,000	30	528	2.20E+14	1,183	130	300,000	4,984	912	150,000	219
82	HULKMELVA-01	58.0	49%	28.2	131	3,452	0.2	24,723	3	66	2.50E+13	149	22	32,812	593	112	17,811	28
96	HUMLKPOND-01	141.3	27%	38.5	204	3,970	0.4	30,463	4	71	5.00E+13	172	30	56,232	796	125	17,191	31
97	HUNANDR-01	77.4	29%	22.2	121	2,712	0.3	21,960	3	72	4.00E+13	171	5	35,600	558	121	12,467	18
100	HUNDIX-01	897.5	68%	612.8	2,733	77,905	5.0	520,000	83	1,595	4.80E+14	4,169	556	700,000	12,444	2,812	450,000	748
101	HUNE11ST-01	33.1	62%	20.6	94	2,929	0.1	21,772	3	68	2.40E+13	149	7	20,434	470	113	18,375	24
102	HUNE13ST-01	103.9	53%	55.4	249	7,110	0.3	54,730	7	171	6.40E+13	377	15	55,267	1,222	286	42,804	57
103	HUNE13ST-02	41.3	63%	26.2	117	3,817	0.2	26,524	3	82	2.80E+13	189	16	28,599	596	139	23,312	33
104	HUNE13ST-03	59.9	75%	45.1	200	7,069	0.5	41,248	6	123	3.50E+13	344	54	65,018	989	221	41,536	69
105	HUNE15A-01	74.0	34%	25.1	126	3,083	0.4	21,247	4	69	3.70E+13	190	17	40,918	575	122	15,162	27
110	HUNE4A-01	143.4	59%	85.2	393	12,385	0.5	88,745	11	277	9.60E+13	620	43	92,465	1,976	464	75,450	105
111	HUNE4A-02	43.2	45%	19.5	95	3,129	0.3	19,695	2	63	2.40E+13	147	23	28,462	492	104	16,842	27
112	HUNE4A-03	36.7	56%	20.6	96	3,203	0.2	20,326	2	62	1.80E+13	155	20	29,188	475	107	18,112	28
120	HUNFED-07	44.8	53%	23.6	108	3,269	0.3	18,591	4	63	2.50E+13	174	34	32,500	544	112	18,633	35
121	HUNFED-08	58.5	46%	26.7	125	3,995	0.4	20,462	5	68	2.30E+13	193	50	41,802	613	120	21,012	43
122	HUNFED-09	20.9	82%	17.2	75	1,554	0.1	11,190	2	30	5.80E+12	87	18	17,646	283	54	6,430	14
123	HUNFED-10	26.1	72%	18.7	84	3,007	0.3	14,585	4	50	1.40E+13	141	40	27,201	446	88	17,341	35
124	HUNFED-11	39.1	80%	31.2	137	4,461	0.4	23,243	5	74	1.80E+13	211	59	41,370	677	132	24,364	49
125	HUNFED-12	24.9	80%	19.9	88	3,695	0.3	17,889	2	58	1.20E+13	148	48	29,904	500	98	20,729	39
148	HUNW10T-01	299.2	68%	203.6	904	22,240	2.0	110,000	49	335	1.20E+14	1,373	230	310,000	3,474	728	130,000	263
149	HUNW15A-01	503.6	28%	140.1	704	14,511	2.0	110,000	21	401	2.60E+14	1,052	61	220,000	3,351	698	64,386	116
153	HUNW22ST-01	238.2	31%	74.2	396	6,689	0.5	58,729	6	169	6.30E+13	417	32	84,718	1,327	289	32,823	52
154	HUNW22ST-02	286.0	57%	163.2	752	19,179	1.0	130,000	27	374	1.10E+14	1,098	111	210,000	3,054	696	110,000	182
158	HUNW5A-01	134.9	28%	37.4	207	4,546	0.5	37,311	5	122	7.40E+13	289	6	60,129	944	205	20,865	30
168	HUOP-01	530.0	55%	293.4	1,358	42,896	4.0	250,000	43	794	2.80E+14	2,096	427	410,000	6,783	1,383	240,000	430
169	HUOPEB-01	172.8	37%	64.5	322	9,044	0.9	61,397	7	187	8.40E+13	475	52	100,000	1,536	322	45,814	74
170	HUOPEB-02	310.9	36%	110.4	568	14,420	2.0	100,000	14	299	1.50E+14	819	73	190,000	2,541	530	71,057	116
171	HUOPEB-03	165.1	37%	61.5	308	9,000	0.9	59,432	6	188	8.20E+13	451	63	94,770	1,528	315	45,600	75
172	HUOPL-01	268.4	73%	194.8	866	21,279	2.0	120,000	32	329	1.20E+14	957	215	230,000	3,591	632	100,000	203
173	HUOPL-02	203.7	57%	116.2	531	13,124	1.0	77,377	22	232	1.00E+14	736	118	160,000	2,259	449	70,903	136
174	HUOPL-03	44.4	30%	13.3	72	1,210	0.2	8,872	3	29	2.40E+13	86	10	20,699	291	54	5,221	12
175	HUOPL-04	310.2	45%	138.8	668	14,044	1.0	110,000	22	288	1.40E+14	772	75	170,000	2,752	528	74,937	126
176	HUOPL-05	185.9	39%	71.9	362	7,436	0.6	54,948	13	150	7.50E+13	406	50	98,051	1,519	271	41,291	73
179	HUPOWRLN-02	76.6	36%	27.2	138	3,099	0.3	22,775	5	79	4.50E+13	208	15	38,811	643	138	16,326	28
180	HUPOWRLN-03	60.3	52%	31.3	148	4,163	0.3	26,908	5	87	3.10E+13	224	32	40,834	719	152	23,283	40
228	HUSUNR-02	23.9	81%	19.3	85	2,890	0.3	14,105	3	46	1.20E+13	135	38	27,206	428	83	16,308	33
229	HUSUNR-03	20.0	73%	14.7	65	2,251	0.2	9,897	3	35	9.60E+12	111	34	22,289	339	65	13,021	28

Notes: 1. The total impervious area percentage is an area-weighted value.
2. Existing BMPs are included
3. Flow includes septic tank flows and stormwater runoff.
4. Delivery ratios are set to 100 percent.

Table 4B-1. Average Annual WMM-Estimated Loads for the Regional Model Area per Hydrologic Unit. (continued)

Map ID	Hydrologic Unit	Area (acres)	Imp. Area (%)	Imp. Area (acres)	Flow (ac-ft/yr)	BOD (lbs/yr)	Cd (lbs/yr)	COD (lbs/yr)	Cu (lbs/yr)	DP (lbs/yr)	F-Coli (counts/yr)	NO23 (lbs/yr)	Pb (lbs/yr)	TDS (lbs/yr)	TKN (lbs/yr)	TP (lbs/yr)	TSS (lbs/yr)	Zn (lbs/yr)
230	HUSUNR-04	52.2	74%	38.6	172	3,527	0.3	17,083	6	47	2.20E+13	140	41	44,721	633	95	15,747	32
233	HUSUNREX-01	84.0	60%	50.8	230	7,884	0.5	44,897	8	145	4.30E+13	365	73	65,774	1,178	251	45,957	80
234	HUSUNREX-02	18.0	80%	14.5	64	2,282	0.2	10,737	3	36	9.70E+12	102	31	20,468	335	64	13,027	26
	Total	**10,398.8**	**48%**	**4,950.7**	**23,530**	**629,108**	**49.1**	**4,163,116**	**705**	**12,351**	**4.9129E+15**	**32,327**	**4,501**	**6,661,902**	**106,405**	**21,820**	**3,405,609**	**5,768**
New River																		
5	HUBROWARD-06	29.2	77%	22.6	100	3,583	0.2	20,777	3	66	1.30E+13	161	34	28,144	525	112	20,828	35
54	HUELOSO-01	15.6	72%	11.2	50	2,132	0.2	11,304	1	35	7.00E+12	83	23	16,192	285	58	11,927	20
56	HUFLAGLER-01	15.8	69%	10.9	49	1,425	0.1	8,371	2	27	6.20E+12	75	14	13,140	228	49	8,309	15
57	HUFLAGLER-02	60.6	79%	47.7	210	8,045	0.6	41,204	7	130	2.90E+13	359	92	70,515	1,120	230	46,184	85
98	HUNANDR-02	22.6	75%	16.9	75	2,948	0.2	15,109	2	45	1.10E+13	130	31	27,188	390	81	16,628	30
99	HUNANDR-03	23.7	69%	16.3	73	2,723	0.2	14,654	2	47	1.00E+13	120	28	23,000	386	81	15,562	28
106	HUNE3A-01	39.7	74%	29.3	130	4,661	0.4	25,109	5	79	2.20E+13	219	47	42,125	664	140	27,067	48
107	HUNE3A-02	41.8	54%	22.8	107	3,621	0.2	24,236	3	75	2.40E+13	166	17	27,272	537	125	21,352	31
108	HUNE3A-03	47.9	64%	30.5	139	5,905	0.4	31,224	3	97	2.10E+13	227	63	45,729	781	161	32,670	56
126	HUNFED-13	117.9	41%	48.1	233	7,901	0.5	50,832	5	158	5.30E+13	349	46	65,263	1,171	262	43,654	66
127	HUNFED-14	68.9	53%	36.6	169	6,143	0.4	36,831	4	116	3.60E+13	268	51	50,215	904	193	34,241	56
128	HUNFNR-01	76.9	22%	17.1	93	1,661	0.3	14,883	2	44	3.30E+13	108	2	29,277	396	75	6,045	9
129	HUNFNR-02	67.9	61%	41.3	187	7,006	0.5	40,294	4	122	3.10E+13	287	69	57,722	1,011	203	38,923	66
130	HUNFNR-03	103.4	67%	69.4	312	10,937	0.7	64,711	9	201	5.00E+13	496	97	91,287	1,631	343	63,229	106
131	HUNFNR-04	25.0	77%	19.3	85	3,756	0.3	18,905	1	58	1.20E+13	140	46	29,345	496	96	20,664	37
132	HUNFNR-05	14.8	54%	8.0	38	1,526	0.1	7,884	1	23	5.20E+12	54	18	13,070	205	38	8,184	15
133	HUNFNR-06	62.3	50%	31.0	148	4,700	0.3	29,630	4	89	3.20E+13	216	37	43,621	739	151	26,147	43
134	HUNFNR-07	26.1	74%	19.3	86	2,898	0.2	15,965	3	50	1.10E+13	132	32	25,247	436	87	16,484	30
135	HUNFNR-08	11.6	76%	8.8	39	1,170	0.1	7,776	1	24	5.10E+12	59	8	9,704	188	41	7,004	11
136	HUNFNR-09	29.9	32%	9.6	51	1,263	0.1	10,053	1	31	1.40E+13	66	2	13,344	239	51	6,599	9
144	HUNFNRSPUR-01	103.0	71%	73.0	324	11,744	0.6	72,866	8	227	6.10E+13	521	89	86,219	1,734	379	69,507	109
156	HUNW4A-01	96.0	68%	65.1	293	10,244	0.7	60,841	8	184	5.00E+13	477	82	90,721	1,460	321	57,699	95
157	HUNW4A-02	68.4	67%	45.6	206	6,876	0.4	44,134	6	131	4.00E+13	344	35	61,274	993	233	40,907	62
159	HUNW5A-02	84.2	65%	54.3	247	8,198	0.4	54,300	7	166	4.20E+13	391	42	65,321	1,219	282	48,546	72
160	HUNW7A-01	14.3	63%	9.0	41	1,649	0.1	8,685	1	24	5.80E+12	71	15	16,000	204	44	9,010	15
161	HUNW7A-02	30.8	45%	13.8	67	2,059	0.1	14,888	2	46	1.40E+13	99	4	16,428	313	77	12,036	16
162	HUNW8ST-01	91.3	71%	64.9	290	9,863	0.7	61,324	9	169	5.00E+13	504	48	100,000	1,318	315	57,641	88
164	HUNW9A-01	33.3	59%	19.8	91	3,257	0.2	20,733	2	64	1.90E+13	145	20	24,461	473	107	19,077	29
165	HUNW9A-02	25.2	64%	16.1	73	2,216	0.1	16,965	2	53	1.60E+13	114	3	15,095	364	88	13,971	18
195	HUSANDR-01	35.9	71%	25.6	114	4,384	0.3	24,462	3	77	1.60E+13	188	43	34,768	619	130	25,136	43
197	HUSE3A-01	26.6	80%	21.3	94	3,413	0.2	18,146	3	59	1.30E+13	155	38	28,148	500	103	19,899	36
198	HUSE3A-02	29.0	78%	22.6	99	4,372	0.3	22,212	2	69	1.50E+13	169	51	33,755	577	116	24,440	43
201	HUSE5A-05	17.3	81%	14.0	61	2,565	0.2	13,375	1	41	7.80E+12	99	31	20,084	343	68	13,853	25
202	HUSFED-01	41.9	42%	17.6	82	2,503	0.3	14,655	3	48	2.00E+13	129	24	26,764	415	84	13,117	24
203	HUSFED-02	28.7	75%	21.4	94	3,420	0.3	17,538	4	58	1.60E+13	158	41	29,255	505	102	19,989	38
204	HUSFED-03	13.1	73%	9.6	43	1,413	0.1	8,258	2	27	8.20E+12	70	13	11,585	221	47	8,582	15
227	HUSUNR-01	143.5	34%	49.4	238	6,982	0.3	51,750	6	162	6.40E+13	346	14	58,700	1,136	269	39,471	53
245	HUSW4A-01	48.5	52%	25.1	119	3,399	0.2	23,534	4	73	2.90E+13	189	14	32,955	559	129	19,892	30
246	HUSW4A-02	26.7	48%	12.7	59	1,720	0.1	10,936	2	35	1.50E+13	93	12	17,379	286	62	9,685	16
247	HUSW4A-03	104.9	43%	45.6	212	5,289	0.5	38,692	7	124	5.10E+13	326	22	60,022	973	218	28,593	46
250	HUTR-01	84.8	41%	34.9	166	5,274	0.4	32,852	4	104	4.10E+13	251	41	50,079	840	176	28,334	47
251	HUTR-02	43.2	32%	13.6	70	1,667	0.2	12,341	2	39	2.10E+13	95	8	20,938	324	66	8,081	13
252	HUTR-03	40.9	69%	28.0	125	4,590	0.4	24,307	4	75	2.00E+13	211	49	43,015	651	133	25,870	47
253	HUTR-04	21.6	45%	9.6	47	1,522	0.1	9,004	1	28	1.00E+13	70	14	15,015	238	48	8,040	14
254	HUTR-05	110.1	29%	31.7	173	3,568	0.5	26,493	6	88	5.70E+13	239	20	53,884	774	155	16,154	31
	Total	**2,154.6**	**57%**	**1,229.2**	**5,802**	**196,191**	**13.4**	**1,193,043**	**161**	**3,688**	**1.1273E+15**	**9,169**	**1,530**	**1,733,265**	**29,371**	**6,329**	**1,109,231**	**1,821**
North Fork New River																		
1	HUBROWARD-01	97.4	57%	55.5	253	4,948	0.7	21,285	15	81	4.60E+13	329	75	77,297	990	176	26,307	67
2	HUBROWARD-02	271.8	35%	93.8	461	12,200	1.0	77,338	13	256	1.20E+14	686	100	150,000	2,176	448	60,554	111
3	HUBROWARD-03	133.8	39%	52.8	261	7,721	0.8	47,220	7	163	7.30E+13	416	67	83,393	1,355	279	39,741	71
4	HUBROWARD-05	49.0	73%	35.8	160	5,040	0.3	31,697	6	103	3.00E+13	268	33	43,599	804	182	30,698	50
6	HUC12UI-01	336.0	36%	122.4	626	14,526	1.0	100,000	12	319	1.20E+14	790	110	160,000	2,601	542	73,475	126

Notes: 1. The total impervious area percentage is an area-weighted value.
2. Existing BMPs are included
3. Flow includes septic tank flows and stormwater runoff.
4. Delivery ratios are set to 100 percent.

Table 4B-1. Average Annual WMM-Estimated Loads for the Regional Model Area per Hydrologic Unit. (continued)

Map ID	Hydrologic Unit	Area (acres)	Imp. Area (%)	Imp. Area (acres)	Flow (ac-ft/yr)	BOD (lbs/yr)	Cd (lbs/yr)	COD (lbs/yr)	Cu (lbs/yr)	DP (lbs/yr)	F-Coli (counts/yr)	NO23 (lbs/yr)	Pb (lbs/yr)	TDS (lbs/yr)	TKN (lbs/yr)	TP (lbs/yr)	TSS (lbs/yr)	Zn (lbs/yr)
62	HUHF-01	441.1	41%	182.0	903	22,878	2.0	160,000	22	452	2.10E+14	1,081	123	240,000	3,925	787	120,000	185
63	HUHF-02	609.1	67%	406.5	1,837	54,747	4.0	330,000	53	1,004	2.80E+14	2,573	541	490,000	8,544	1,742	310,000	547
91	HUMELROSEPK-01	379.9	27%	102.1	530	9,456	1.0	78,285	10	262	1.50E+14	668	50	140,000	2,164	449	40,638	72
92	HUMIDLST-01	11.8	67%	7.9	36	1,063	0.0	8,278	1	26	8.80E+12	57	1	7,112	179	44	6,834	9
137	HUNFNR-10	23.5	35%	8.1	42	947	0.1	8,156	1	25	1.30E+13	55	1	10,558	200	41	5,197	7
138	HUNFNR-11	182.5	50%	90.9	433	11,253	0.6	84,068	14	281	1.10E+14	665	43	100,000	2,165	481	66,739	100
139	HUNFNR-12	53.1	65%	34.5	156	4,526	0.2	32,792	5	103	2.90E+13	240	18	34,706	765	175	28,652	42
140	HUNFNR-13	86.7	53%	46.3	218	5,276	0.5	33,253	10	104	4.20E+13	322	40	65,032	946	197	30,396	56
141	HUNFNR-14	244.3	43%	104.8	515	13,097	1.0	80,734	19	223	8.30E+13	654	98	160,000	2,100	421	68,330	124
142	HUNFNR-15	296.8	40%	117.8	590	15,986	1.0	100,000	17	318	1.20E+14	828	110	170,000	2,616	557	84,299	143
143	HUNFNR-16	252.4	37%	92.5	472	12,342	1.0	81,360	11	252	1.10E+14	635	102	140,000	2,181	430	60,620	108
150	HUNW15A-02	50.3	35%	17.4	90	2,497	0.2	17,871	2	57	2.60E+13	131	10	25,807	433	95	12,832	19
151	HUNW15A-03	96.1	51%	49.2	233	6,816	0.2	52,239	6	164	5.60E+13	353	10	51,893	1,135	273	41,203	54
152	HUNW18A-01	120.3	48%	57.9	278	7,742	0.8	42,685	12	144	5.80E+13	421	80	86,963	1,289	263	42,430	84
155	HUNW24A-01	90.5	67%	60.5	273	7,854	0.7	42,072	13	131	4.80E+13	442	76	91,067	1,210	256	45,413	87
163	HUNW8ST-02	105.5	47%	49.8	240	7,422	0.3	53,845	6	167	5.60E+13	358	18	56,938	1,160	278	43,774	58
231	HUSUNR-05	187.9	73%	137.0	608	17,133	0.8	120,000	24	373	1.10E+14	967	78	150,000	2,850	662	110,000	166
232	HUSUNR-06	255.9	28%	72.9	391	7,286	0.5	55,062	9	144	6.40E+13	354	53	91,247	1,345	256	33,877	61
237	HUSW14A-01	3.8	40%	1.5	8	206	0.0	1,701	0	5	1.90E+12	11	0	1,542	36	8	1,333	2
248	HUSW7A-01	84.8	68%	57.3	258	8,098	0.3	57,154	8	193	6.10E+13	436	33	59,415	1,379	325	50,284	72
249	HUSWRIVRS-01	68.5	68%	46.2	207	4,860	0.3	29,946	11	111	4.30E+13	313	41	50,509	962	204	30,075	56
255	HUWSIST-01	32.2	50%	16.1	77	2,464	0.1	16,851	2	53	1.70E+13	117	12	19,849	387	88	14,147	21
	Total	**4,564.9**	**46%**	**2,119.5**	**10,156**	**268,384**	**19.3**	**1,763,892**	**309**	**5,514**	**2.0857E+15**	**14,170**	**1,923**	**2,756,927**	**45,897**	**9,659**	**1,477,848**	**2,498**
South Fork New River																		
44	HUDAVIE-01	87.9	51%	44.9	213	4,501	0.5	26,406	12	105	5.50E+13	321	47	58,430	980	198	25,660	55
45	HUDAVIE-02	97.9	78%	76.5	337	7,451	0.8	36,198	19	121	5.50E+13	469	86	100,000	1,331	258	42,876	92
46	HUDAVIE-03	180.3	35%	62.9	297	7,264	0.8	52,650	9	183	9.20E+13	467	33	87,915	1,464	317	37,112	61
47	HUDAVIE-04	52.1	63%	32.7	147	5,311	0.3	32,202	3	102	2.50E+13	235	44	41,947	789	169	30,005	48
48	HUDAVIE-05	61.9	36%	22.5	106	2,572	0.2	20,775	3	70	3.10E+13	162	3	27,627	524	118	13,664	19
49	HUDAVIE-06	77.9	25%	19.7	101	2,519	0.3	17,792	2	62	3.70E+13	152	13	33,302	506	105	10,911	18
50	HUDAVIE-07	23.2	66%	15.3	69	2,826	0.2	15,384	1	49	1.30E+13	116	29	21,943	396	82	15,804	27
51	HUDAVIE-08	41.3	61%	25.1	113	4,236	0.3	25,067	3	81	2.30E+13	188	36	33,259	627	135	24,159	39
65	HUI595-02	57.2	90%	51.5	223	2,025	0.2	5,171	10	20	3.10E+13	86	34	44,746	615	61	5,290	17
93	HUMLK-01	20.4	44%	8.9	41	1,390	0.1	8,356	1	27	9.90E+12	66	12	13,050	222	46	7,301	12
94	HUMLK-02	12.7	23%	2.9	15	144	0.0	1,905	0	6	2.90E+12	14	0	2,973	46	10	398	1
95	HUMLK-03	126.4	24%	30.4	157	2,123	0.3	22,786	2	74	4.40E+13	181	2	36,946	592	126	7,666	12
145	HUNNRC-03	538.8	34%	183.5	955	18,889	2.0	150,000	31	443	2.50E+14	1,162	90	260,000	4,095	785	94,789	164
146	HUNNRC-04	424.2	44%	186.8	891	16,800	1.0	130,000	25	369	1.70E+14	948	132	190,000	3,499	664	87,813	159
166	HUOC-01	138.1	34%	46.7	239	4,725	0.5	32,494	8	94	6.00E+13	269	36	67,139	970	177	23,086	45
167	HUOC-02	39.0	66%	25.8	117	3,179	0.3	17,789	6	57	2.20E+13	187	27	36,548	514	112	18,658	35
194	HUROL-01	45.5	40%	18.1	88	2,503	0.1	19,045	3	64	2.40E+13	142	5	19,560	451	108	15,381	21
207	HUSFNR-01	114.8	41%	46.6	232	5,912	0.3	47,617	6	157	7.00E+13	346	8	56,383	1,174	263	33,613	44
208	HUSFNR-02	103.9	29%	30.3	165	3,552	0.3	29,125	4	84	4.80E+13	201	8	45,505	716	144	17,916	26
209	HUSFNR-03	293.4	33%	95.4	493	10,989	1.0	90,464	13	280	1.60E+14	660	20	130,000	2,260	475	56,463	81
210	HUSFNR-04	191.2	22%	42.2	252	4,886	0.6	37,176	7	107	6.90E+13	268	23	78,606	1,035	188	20,090	36
211	HUSFNR-05	245.0	45%	110.3	536	13,530	1.0	83,266	20	248	1.10E+14	706	131	160,000	2,429	452	74,470	141
212	HUSFNR-06	310.1	34%	107.0	555	12,703	1.0	93,177	11	234	1.20E+14	590	95	170,000	2,482	406	63,560	107
213	HUSFNR-07	199.0	39%	77.3	389	7,721	0.9	50,672	18	162	9.70E+13	498	74	110,000	1,662	305	40,749	86
214	HUSFNRSPUR-01	41.8	27%	11.3	60	1,208	0.2	9,543	2	33	2.30E+13	92	3	19,885	281	59	5,113	9
215	HUSFNRSPUR-02	218.9	23%	50.9	282	5,911	0.8	48,554	6	175	1.10E+14	413	6	87,439	1,366	294	23,890	36
216	HUSFNRSPUR-03	99.8	28%	27.9	140	2,210	0.2	22,204	2	69	3.10E+13	162	2	30,439	528	117	9,948	14
217	HUSFNRSPUR-04	223.1	38%	85.6	406	10,916	1.0	68,540	14	227	1.00E+14	620	87	130,000	1,925	401	57,045	105
220	HUSNRC-01	643.8	51%	326.6	1,550	26,147	2.0	170,000	79	406	2.20E+14	1,582	358	430,000	5,987	873	160,000	353
221	HUSNRC-02	382.9	37%	140.8	718	16,107	1.0	110,000	16	206	1.00E+14	607	175	220,000	2,965	385	83,244	152
222	HUSNYDERPK-01	54.0	14%	7.5	50	766	0.1	4,918	2	8	6.50E+12	34	9	15,591	148	19	3,023	8

Notes: 1. The total impervious area percentage is an area-weighted value.
2. Existing BMPs are included
3. Flow includes septic tank flows and stormwater runoff.
4. Delivery ratios are set to 100 percent.

Table 4B-1. Average Annual WMM-Estimated Loads for the Regional Model Area per Hydrologic Unit. (continued)

Map ID	Hydrologic Unit	Area (acres)	Imp. Area (%)	Imp. Area (acres)	Flow (ac-ft/yr)	BOD (lbs/yr)	Cd (lbs/yr)	COD (lbs/yr)	Cu (lbs/yr)	DP (lbs/yr)	F-Coli (counts/yr)	NO23 (lbs/yr)	Pb (lbs/yr)	TDS (lbs/yr)	TKN (lbs/yr)	TP (lbs/yr)	TSS (lbs/yr)	Zn (lbs/yr)
223	HUSNYDERPK-02	153.9	47%	73.0	351	10,381	0.6	71,119	10	214	5.70E+13	524	40	99,007	1,572	373	57,547	85
225	HUSR84-02	95.2	24%	22.6	118	3,235	0.4	18,624	4	63	3.00E+13	171	27	41,300	538	112	15,048	29
226	HUSR84-03	152.7	79%	120.5	530	18,023	1.0	100,000	18	291	7.30E+13	928	127	190,000	2,417	554	100,000	175
235	HUSW12A-01	128.0	42%	53.6	265	7,364	0.6	49,525	8	169	7.20E+13	423	49	74,764	1,356	291	40,666	68
236	HUSW12A-02	61.2	73%	44.6	199	5,008	0.4	33,421	6	78	2.70E+13	251	26	62,627	736	157	25,595	42
238	HUSW14ST-01	29.6	23%	6.8	35	667	0.1	5,680	1	21	1.50E+13	52	1	11,056	171	36	2,497	4
239	HUSW15A-01	40.5	52%	20.8	94	2,650	0.2	15,619	4	54	2.30E+13	154	24	28,364	465	98	15,072	28
240	HUSW15CT-01	125.7	30%	38.2	184	3,556	0.3	31,483	3	102	4.80E+13	239	8	44,487	780	171	17,066	25
241	HUSW20ST-01	114.6	33%	37.8	191	5,723	0.6	33,927	5	116	5.30E+13	292	52	63,601	974	198	27,919	51
242	HUSW20ST-02	73.1	47%	34.1	163	4,848	0.3	33,776	5	114	4.10E+13	259	21	41,744	840	192	27,808	41
243	HUSW24ST-01	22.3	61%	13.6	62	1,690	0.1	13,107	2	44	1.80E+13	98	4	12,355	321	75	10,547	15
244	HUSW27A-01	271.1	37%	100.6	480	12,976	1.0	95,577	12	323	1.40E+14	758	44	130,000	2,437	546	69,039	101
	Total	**6,414.3**	**40%**	**2,580.2**	**12,609**	**287,137**	**23.6**	**1,981,134**	**416**	**5,912**	**2.8063E+15**	**16,093**	**2,051**	**3,558,538**	**55,186**	**10,655**	**1,518,501**	**2,687**
Prospect Recharge																		
177	HUPAG-01	76.6	38%	29.1	147	2,810	0.1	26,510	2	53	3.30E+13	92	2	26,475	518	92	10,982	13
178	HUPAG-02	186.9	43%	79.6	392	7,686	0.2	72,009	6	150	8.40E+13	271	6	69,462	1,428	261	32,059	40
181	HUPRL-01	69.1	50%	34.3	162	2,425	0.2	16,593	7	39	2.70E+13	125	26	37,101	564	81	12,007	26
182	HUPRN-01	192.2	51%	97.2	461	8,146	0.6	54,323	20	138	8.70E+13	412	83	100,000	1,671	279	38,522	85
183	HUPRN-02	235.4	49%	115.6	552	9,735	0.4	84,155	16	172	1.20E+14	394	51	100,000	1,963	327	40,210	72
184	HUPRN-03	160.6	31%	50.0	267	3,805	0.4	33,794	7	78	7.40E+13	205	24	61,966	948	148	16,438	32
185	HUPRN-04	58.1	67%	38.9	176	5,212	0.3	37,304	6	109	3.40E+13	282	14	47,339	815	194	32,024	45
186	HUPRN-05	51.3	34%	17.2	90	2,128	0.2	17,377	2	56	3.10E+13	131	2	23,967	422	95	11,026	15
187	HUPRN-06	41.9	82%	34.4	151	5,510	0.5	28,363	5	82	2.10E+13	266	55	56,643	730	156	31,444	57
188	HUPRN-07	147.2	39%	56.8	278	6,456	0.5	51,301	8	149	6.00E+13	351	17	68,499	1,207	258	33,253	49
189	HUPRN-08	169.0	64%	108.0	488	16,434	1.0	94,493	15	243	6.80E+13	818	118	180,000	2,144	474	91,948	154
190	HUPRN-09	143.3	66%	95.0	430	14,146	1.0	80,612	13	202	6.00E+13	706	106	160,000	1,830	401	78,270	133
192	HUPRSW-01	169.6	15%	25.5	171	1,992	0.2	18,925	4	20	2.20E+13	75	20	47,551	488	42	7,653	17
193	HUPRSW-02	142.2	24%	34.0	192	4,063	0.3	27,225	6	66	3.20E+13	181	34	53,808	716	122	20,239	38
	Total	**1,843.4**	**44%**	**815.4**	**3,957**	**90,548**	**5.6**	**642,984**	**117**	**1,557**	**7.5300E+14**	**4,309**	**558**	**1,032,811**	**15,444**	**2,930**	**456,075**	**776**
S36																		
20	HUC13MRC-02	404.2	41%	166.7	827	24,766	2.0	150,000	22	469	1.90E+14	1,164	213	250,000	4,030	803	130,000	223
58	HUFLEA-01	311.2	81%	253.0	1,109	24,422	2.0	110,000	61	374	1.70E+14	1,425	316	320,000	4,358	798	140,000	302
59	HUFLEA-02	327.4	85%	278.1	1,205	12,584	1.0	33,738	58	138	1.70E+14	611	228	260,000	3,524	386	42,995	132
83	HULL-01	52.0	77%	40.2	175	5,123	0.5	32,095	5	71	2.40E+13	276	19	68,657	632	152	27,652	43
84	HULL-02	21.0	81%	17.0	74	2,920	0.3	15,573	2	43	1.00E+13	133	26	29,080	365	80	16,421	28
85	HULL-03	25.5	81%	20.6	90	2,872	0.3	17,235	3	40	1.30E+13	162	11	37,623	345	86	16,296	26
86	HULL-04	152.1	64%	97.0	434	11,443	0.7	74,563	11	175	5.80E+13	473	93	120,000	1,835	323	56,687	98
87	HULL-05	155.2	50%	78.3	368	8,543	0.3	68,172	9	168	6.50E+13	379	41	79,667	1,559	291	47,022	70
88	HULL-06	64.9	79%	51.0	224	8,741	0.8	42,234	7	131	3.10E+13	377	108	80,018	1,182	234	48,789	93
89	HULL-07	131.8	68%	89.1	402	13,452	1.0	76,206	15	229	7.00E+13	657	114	130,000	1,924	418	77,504	134
90	HULL-08	510.7	34%	173.0	902	21,718	2.0	150,000	19	397	2.10E+14	956	157	250,000	3,810	692	100,000	177
	Total	**2,156.2**	**59%**	**1,264.2**	**5,810**	**136,584**	**10.8**	**769,816**	**212**	**2,235**	**1.0110E+15**	**6,613**	**1,326**	**1,625,045**	**23,564**	**4,263**	**703,366**	**1,326**
S37A																		
30	HUC14CCC-02	1,086.3	60%	646.5	2,978	100,000	8.0	560,000	92	1,569	4.50E+14	4,506	980	1,000,000	14,077	2,863	550,000	989
31	HUC14CCC-03	427.9	32%	138.9	719	18,266	0.8	140,000	15	346	1.50E+14	707	75	170,000	2,912	589	87,579	128
32	HUC14CCC-04	177.6	32%	56.8	301	6,518	0.2	56,561	5	128	6.60E+13	232	5	60,074	1,105	218	28,461	35
33	HUC14CCC-05	61.9	71%	44.1	197	7,040	0.5	39,181	3	101	2.80E+13	232	79	59,882	1,005	170	34,032	61
34	HUC14CCC-06	54.5	76%	41.6	184	6,182	0.5	29,962	6	90	2.60E+13	260	85	59,187	925	163	33,185	68
35	HUC14CCC-07	145.7	75%	108.9	484	15,126	1.0	85,802	15	214	6.70E+13	683	129	170,000	2,099	416	76,998	138
36	HUC14CCC-08	189.6	73%	137.7	614	17,492	1.0	89,513	26	272	9.60E+13	815	231	180,000	2,870	508	95,388	197
37	HUC14CCC-09	167.0	67%	112.5	508	15,302	1.0	83,397	21	255	8.40E+13	757	170	150,000	2,411	470	88,986	169
147	HUNPOWR-01	268.7	80%	215.9	945	22,257	2.0	120,000	37	315	1.20E+14	1,079	220	280,000	3,595	651	110,000	218
191	HUPRN-10	215.4	71%	153.8	688	15,335	0.7	110,000	6	171	8.10E+13	322	125	160,000	2,707	317	41,234	74
	Total	**2,794.7**	**59%**	**1,656.8**	**7,618**	**223,518**	**15.6**	**1,314,416**	**226**	**3,461**	**1.1680E+15**	**9,593**	**2,099**	**2,289,143**	**33,706**	**6,365**	**1,145,863**	**2,077**
Total (Regional Model)		**40,319.00**	**47%**	**18,962.7**	**90,367**	**2,402,116**	**178.2**	**15,744,330**	**2,673**	**46,384**	**1.8550E+16**	**120,576**	**17,820**	**25,449,398**	**407,533**	**81,930**	**12,907,094**	**21,964**

Notes: 1. The total impervious area percentage is an area-weighted value.
2. Existing BMPs are included
3. Flow includes septic tank flows and stormwater runoff.
4. Delivery ratios are set to 100 percent.

Appendix 4C
Best Management Practices

The following section summarizes standard structural and non-structural Best Management Practices.

1 Structural Best Management Practices (BMPs)

Detention refers to the temporary onsite storage of excess runoff prior to a gradual release, after the peak of the storm inflow has passed. Runoff is held for a period of time and is slowly released to a natural or manmade watercourse, usually at a rate no greater than the pre-development peak discharge rate. For water quantity, detention facilities will not reduce the total volume of runoff, but will redistribute the rate of runoff over a longer period of time by providing temporary storage for the stormwater. Another objective of a detention facility is to remove pollutants produced from the tributary area.

1.1 Wet Detention Ponds

A wet detention system includes a permanent pool of water, often a shallow littoral zone with aquatic plants, and the capacity to provide detention for an extended time necessary for the treatment of a required volume of runoff. In wet detention basins, pollutant removal occurs primarily within a permanent pool during the period of time between storm events. They are typically sized to provide at least a 2-week hydraulic residence time during the wet season. The primary mechanism for the removal of particulate forms of pollutants in wet detention basins is sedimentation.

Wet detention basins can also achieve substantial reductions in soluble nutrients due to biological and physical/chemical processes within the permanent pool, as shown on **Figure 4C-1**. Uptake by algae and rooted aquatic plants is probably the most important process for the removal of nutrients. As may be seen, the facility consists of a permanent storage pool (i.e., section of the basin that holds water at all times), and, for new developments or where site conditions allow, an overlying zone of temporary storage to accommodate the attenuation of peak flows. Since basins that exhibit thermal stratification (i.e., separation of the permanent pool into an upper layer of high temperature and a lower layer of low temperature) are likely to exhibit anaerobic bottom waters during the summer months, relatively shallow (< 12 feet deep) permanent pools that maximize vertical mixing are preferable to relatively deep basins. Water depth should be great enough to prohibit nuisance aquatic plant species in the open water portion of the basin (> six feet deep). A minimum depth of 6 to 12 inches should also be maintained in the littoral zone of the permanent pool to support a fish population capable of controlling mosquito larvae. Wet detention facilities are particularly well suited for high groundwater conditions, as the groundwater serves to maintain water in the littoral zone during the dry season.

Wet detention BMPs do offer some other advantages that should be considered in BMP selection. Wet detention basins are usually more visually appealing than dry basins, particularly if there is desirable wetland vegetation around the perimeter of the permanent pool. When properly designed and constructed, wet detention basins are actually considered as property value amenities in many areas. Also, wet detention basins offer the advantage that sediment and debris accumulate within the permanent pool. Since these accumulations are out-of-sight and well below the basin outlet, wet detention basins tend to require less frequent clean-outs to maintain an attractive appearance and prevent clogging. Sediment forebay areas (or sumps) are recommended whenever possible to facilitate cleaning.

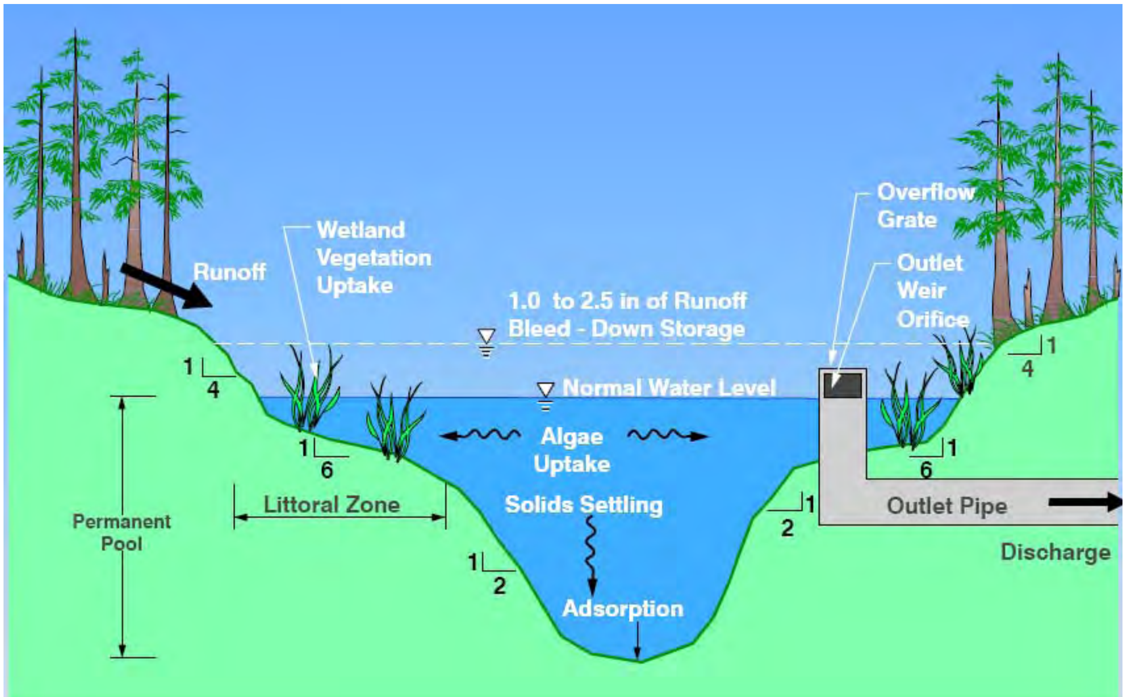


Figure 4C-1. Wet Detention Pond Cross Section and Design Components.

Potential Benefits of a Wet Detention Basin

- Reduction of downstream flooding problems by attenuating the peak rate of flow.
- Reduction in pollutant loadings to receiving waters for dissolved and suspended pollutants.
- Reduction in cost for downstream conveyance facilities.
- Creation of local wildlife habitat.
- Enhanced property values as an aesthetic annuity for lots adjacent to properly designed, constructed, and maintained basins.
- Creation of fill that can be used on site or be sold.
- Low frequency of failure.
- Can be used in areas with high water tables and less permeable soils.
- Pollutant removal can be optimized with pretreatment such as retention swales, baffle boxes, or alum injection.

Potential Limitations of a Wet Detention Basin

- Potential safety hazards, if not designed and constructed properly (safety bench is desirable).
- Occasional nuisance problems such as odors, algae, debris, and mosquitoes.

- Regular maintenance of the littoral zone is required to prevent nuisance plant species from dominating this zone.
- Eventual need for sediment removal from the permanent pool or sediment forebay.

SFWMD Wet Detention Design Criteria

- *"Live" Detention Volume* — A bleed-down, or live storage volume, should be greater than 1.0 inch of runoff from the developed project area, or 2.5 inches times the percentage of impervious area. Minimum area of a 0.5 acre. Commercial or industrial areas must provide 0.5 inches of pretreatment through dry detention or retention prior to discharge to a wet detention facility.
- *Live Detention Storage Recovery* - Basin outlets should be designed to discharge no more than 0.5 inches of the detention volume in the first 24 hours following a storm event. Perforated standpipes or orifice control structures are commonly used with an emergency overflow weir or spillway. This gradual release also controls erosion.
- *Minimum Width* - The minimum width is 100 feet for linear areas in excess of 200 feet in length. Irregular areas must average at least 100 feet in width
- *Side Slopes* — Side slopes cannot be steeper than 4:1 out to a depth of two feet below the control elevation. (Alternative criteria regulate wet detention facilities on golf courses). A minimum operational easement of 20 feet in width is required.
- *Wetland Littoral Zones* are shallow areas provided for biological removal or wetland habitat. These areas must be less than 6 feet in depth (below the control elevation). The minimum area is the lesser of 20 percent of the wet retention/ detention area, or 2.5 percent of the treatment area and contributing area.
- *Maximum Permanent Pool Depths*. SFWMD recommends that wet detention/ retention area should be at least 12 feet deep.
- *Skimmers* - Facilities that receive stormwater from contributing areas with greater than 50 percent impervious surface, or that are a potential source of oil and grease contamination must include a baffle, skimmer, and grease trap to prevent these substances from being discharged from the facility.

General Recommendation for Wet Detention Design

- *Inlet Structures* should be designed to dissipate the energy of waters entering the facility and to help prevent short-circuiting.
- *Length to Width Ratio* - By maximizing the distance between the inlet and outlet point of a detention basin, the greatest opportunity of suspended solids settling is obtained. Therefore, a minimum length to width ratio of 3:1 is recommended. A length to width ratio of 4:1 to 7:1 is preferred (Youseff et al., 1990). Note that length is defined by the distance from the inflow point to the outflow point, and width is defined as the surface area divided by the length. To avoid short-circuiting, diversion barriers can be incorporated into the basin design. These barriers may be created by small islands, peninsulas, or concrete baffles.

- *A Sediment Forebay* is often used to provide pretreatment and reduce maintenance costs.
- *Side Slopes* - Side slopes should be 6:1 or flatter to provide a littoral shelf and safety bench from the side of the facility out to a point 2 to 3 feet below the permanent pool elevation. Side slopes above the littoral zone should be no steeper than 4:1. Side slopes below the littoral zone can be 2:1 in order to maximize permanent pool volumes where needed.

1.2 Dry Detention Basins

Dry detention basins (and extended dry detention basins) are designed to increase detention times of runoff to provide treatment for the captured first-flush runoff to enhance solids settling and the removal of suspended pollutants. The basins are designed to be dry prior to the storm event and to recover to a dry condition after holding the runoff for a period of time. In an extended dry detention facility, runoff is detained longer than in a simple detention system. The captured runoff is slowly released through a control structure at a rate that is slow enough to achieve maximum pollutant removal by sedimentation. These types of detention basins can be designed to achieve heavy metal loading reductions (e.g., 75 percent for lead and 45 percent for zinc) that are similar to wet detention basins, since heavy metals in urban runoff tend to be primarily in suspended form. Dry detention basins require much less storage, and they cost less than wet detention basins because they rely solely upon sedimentation processes, without the expense of additional storage for the pool (Le., portion of the basin that holds water at all times). Extended dry detention may be useful in areas where retrofit of BMPs is required. **Figure 4C-2** shows an example of a dry detention basin. Dry detention basins appear to be falling out of favor with some regulatory agencies and permitting feasibility should be confirmed prior to design phase.

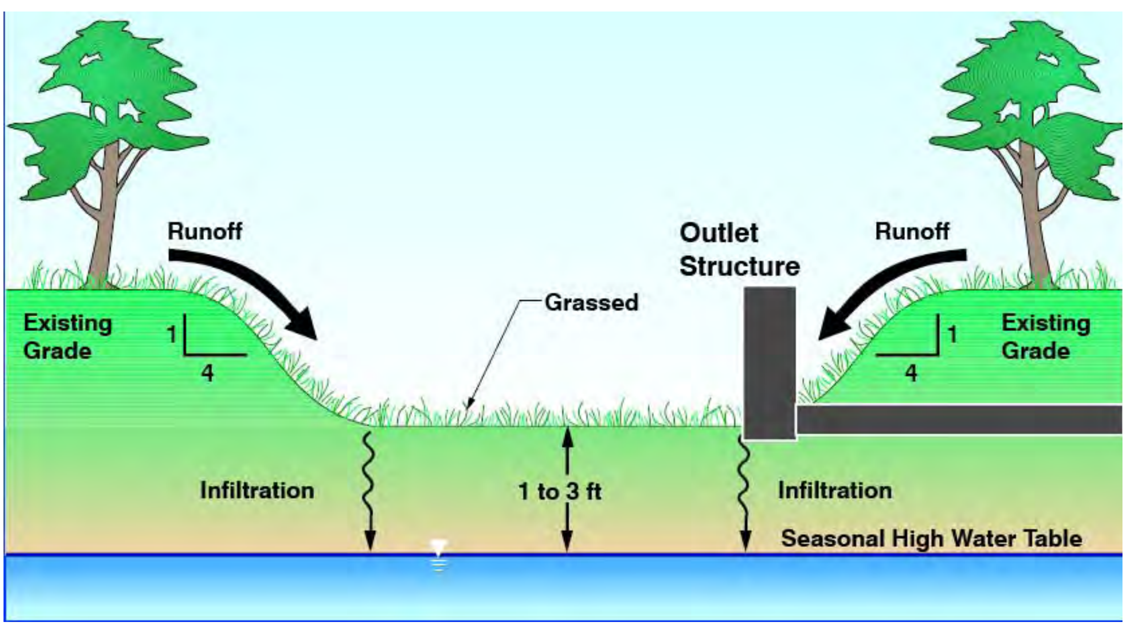


Figure 4C-2. Dry Detention Pond Cross Section and Design Criteria.

Potential Benefits of a Dry Detention Basin

- Reduction of downstream flooding problems by attenuating the peak rate of flow.
- Some removal of pollutant loadings to receiving bodies of water for suspended pollutants.
- Reduction in cost for downstream channel improvements.
- Creation of fill that may be used on site or be sold (basin sediment removal).
- Low frequency of failure as compared with exfiltration and retention systems.

Potential Limitations of a Dry Detention Basin

- Does not remove dissolved pollutants (nutrients).
- Requires frequent clean-outs to minimize "eye-sore" potential.
- Potential safety hazards, if not designed and constructed properly.
- No permanent pool to store sediment inflow.
- Occasional nuisance problems such as debris and mosquitoes.
- Regular maintenance is required to prevent nuisance plant species from emerging and to remove accumulated sediments.
- Must have reasonably good depth to seasonally high water table in order to have dry conditions.

SFWMD Dry Detention Design Criteria

- *Treatment Volume* - The dry detention treatment volume shall be 75 percent of the treatment volume required for wet detention (e.g. the greater of 0.75 inches of runoff from the project or 1.9 inches times the percent impervious.) Commercial or industrial projects must provide a 0.5-inch retention/ detention pretreatment prior to discharge into a dry retention facility.
- *Detention Volume Recovery* - Basin outlets should be designed to discharge no more than 0.5 inches of the detention volume in the first 24 hours following a storm event.
- *Skimmers* — Facilities that receive stormwater from contributing areas with greater than 50 percent impervious surface, or that are a potential source of oil and grease contamination must include a baffle, skimmer, and grease trap to prevent these substances from being discharged from the facility.

1.3 Exfiltration Trenches

An exfiltration trench is the onsite retention of stormwater accomplished through underground exfiltration. The trench can be off-line or online, with online volume requirements being greater than off-line. The subsurface retention facilities most commonly used are excavated trenches with perforated pipe backfilled with coarse graded aggregate. Stormwater runoff is collected for temporary storage and infiltration. Water is exfiltrated from the pipe and trench walls for groundwater recharge and treatment. The addition of the pipe increases the storage available in the system and helps promote infiltration by causing the runoff waters to be more effectively and evenly distributed over the entire length of the trench.

Exfiltration trenches are used to retain the "first flush" of stormwater runoff. This promotes pollutant load reductions to receiving waters, reduces the runoff volume and peak discharge rate from a site, filters suspended pollutants out of groundwater discharges, and promotes the recharge of groundwater.

Exfiltration trenches are likely to have limited application in areas with shallow groundwater table. Exfiltration trenches are practical in highly permeable soils (Hydrologic Soil Group A), where the subsoil is sufficiently permeable to provide a reasonable rate of infiltration, and where the water table is sufficiently lower than the design depth of the facility to allow for recovery of the storage prior to the next storm event (generally required in 72 hours). It is frequently used for the disposal of runoff from roof drains, parking lots, and roadways. This practice is not recommended where runoff water contains high concentrations of suspended materials, unless a pre-settling or filtering mechanism is provided. Likewise, grease and oil traps are also highly recommended prior to discharge to these systems. Providing sediment sumps in inlets or raising inlet tops above grade for pretreatment in swales will reduce sediment buildup in the trench. These precautions are primarily for maintenance, since exfiltration systems are very susceptible to clogging and sediment buildup, which reduces their hydraulic efficiency and storage capacity to unacceptable levels. **Figure 4C-3** shows a profile view of a typical exfiltration trench.

Potential Benefits of an Exfiltration Trench

- They mimic the natural groundwater recharge capabilities of the site.
- Are relatively easy to fit into the margins, perimeters, and other space-constrained areas of a development site, including under pavement.
- Can provide offline treatment for environmentally sensitive waters.
- Can be used to retrofit already developed sites where space is limited.

Potential Limitations of an Exfiltration Trench

- Very susceptible to clogging. Have relative short life spans, before replacement or extensive restoration/ maintenance of system is required.
- Require highly permeable soils to function properly.
- Difficulties in keeping sediment out of the structure during site construction.
- Not recommended for clayey or highly erodible soils.
- Not recommended for area with shallow bedrock.
- Often more costly than other treatment alternatives, especially when operation and maintenance costs are considered.

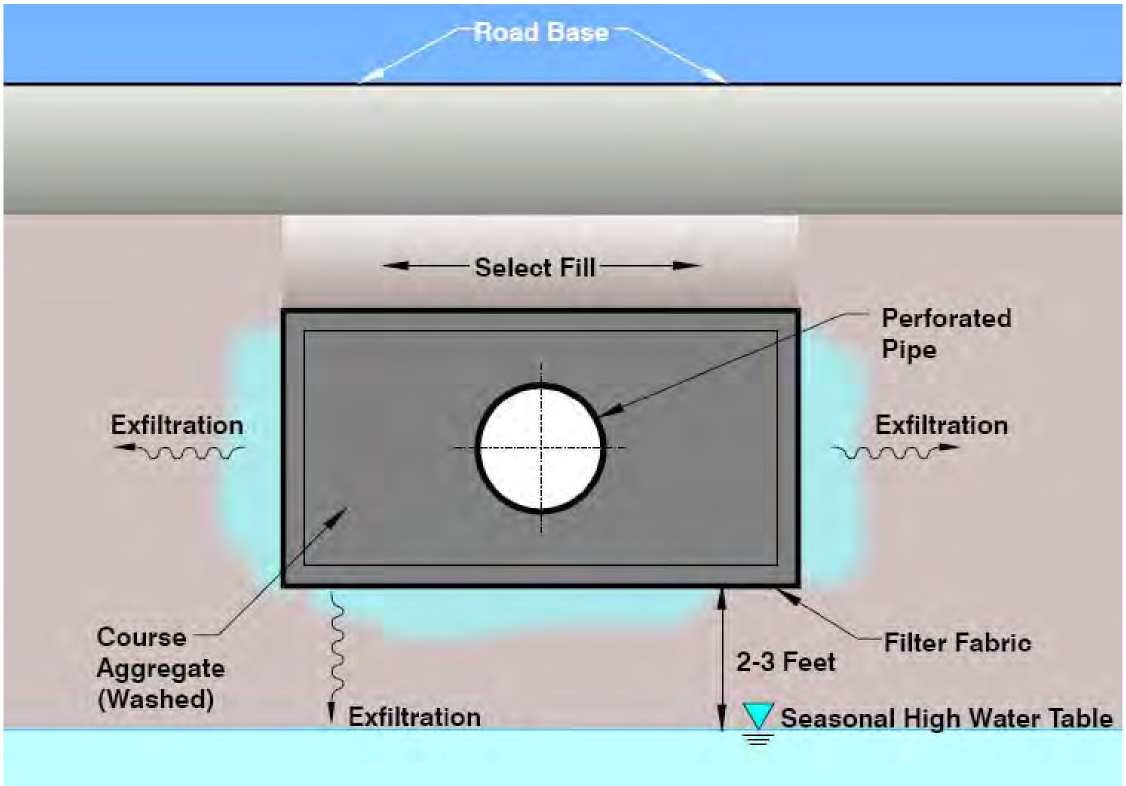


Figure 4C-3. Exfiltration Trench Cross Section and Design Criteria.

SFWMD Design Criteria for Exfiltration Trench

- *Treatment Volume* - Exfiltration trenches must have the same treatment volume as retention systems. The retention treatment volume shall be 50 percent of the treatment volume required for wet detention (e.g., the greater of 0.5 inches of runoff from the project or 1.25 inches times the percent impervious). Commercial or industrial projects must provide a 0.5-inch of retention/ detention pretreatment prior to discharge into a dry retention facility,
- Minimum Pipe Diameter - The minimum pipe diameter shall be 12 inches.
- Trench Width - The minimum trench width must be 3 feet.
- Filter Media - Rock in the trench must be enclosed in filter material on top and sides.
- Exfiltration Rate - Must exfiltrate treatment volume over one hour, prior to overflow.

1.4 Shallow Grassed Swales

Shallow grassed swales are shallow trenches shaped or gradually graded to required dimensions and planted with suitable vegetation for the storage, treatment, and potentially the conveyance of runoff. A swale can be defined as a manmade trench that:

- Has a top width-to-depth ratio of the cross section equal to or greater than 6:1, or side slopes equal to or greater than three feet horizontal to one foot vertical.

- Contains contiguous areas of standing or flowing water only following a rainfall event.
- Is planted with or has stabilized vegetation suitable for soil stabilization, stormwater treatment, and nutrient uptake.
- Is designed to take into account the soil erodability, soil percolation, slope length, and drainage area to prevent erosion and reduce the pollutant concentration of any discharge.

Swales are normally used for conveyance systems to transport runoff off site or to a stormwater facility. They are best suited for major highways and at sites with soils of moderate-to-high infiltration capacity (usually Hydrologic Soil Groups A or B). With slight modification (e.g., check dams, raised inlets, or swale blocks), swales can be used to add retention storage, control erosion, provide aquifer recharge, and/ or further reduce the pollutant load from concentrated stormwater runoff in urban areas. They also may be used as pretreatment in the overall treatment train stormwater system. Implementation examples of swales include outlet channels from detention systems, stormwater collection and treatment along roadways or residential areas, and pretreatment to reduce stormwater pollutant loads before conveying stormwater or other management practices or off site. **Figure 4C-4** shows an example of a typical swale.

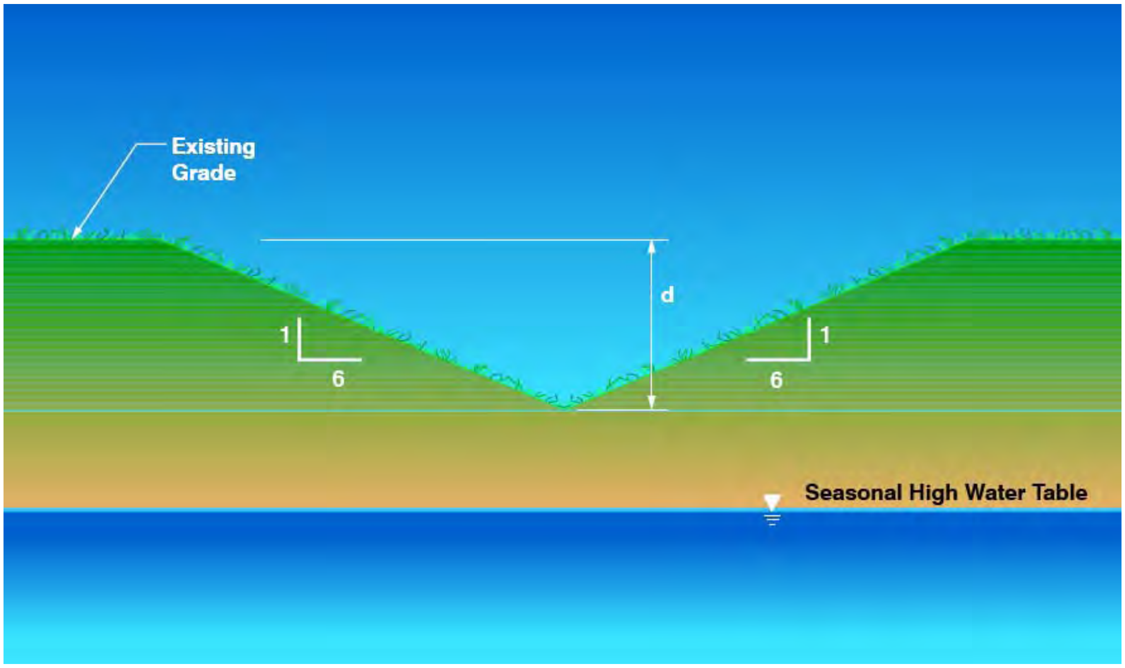


Figure 4C-4. Grassed Swale Cross Section and Design Criteria.

Potential Benefits of Shallow Grassed Swales

- Usually less expensive than installing curb and gutters, and usually less expensive than other water quality treatment controls.
- Hardly noticeable if shallow swales (0.5 to 1.0 foot maximum depth) are designed and constructed with gradual slopes (4:1 to 6:1).

- Can provide offline treatment for environmentally sensitive waters.
- Can reduce peak rates of discharge by storing, detaining, or attenuating flows.
- Can reduce the volume of runoff discharged from a site by infiltrating runoff with a raised inlet or check dam.
- Maintenance can be performed by the adjacent owner.
- Can be used in space-constrained areas such as along lot lines, rear of lots, and along roadside.
- Can be used as water quality treatment or pretreatment with other BMPs in a treatment train.
- Recovers storage and treatment volumes quickly where soils are permeable.
- Can be used as recessed residential or commercial landscape areas (part of green space requirement), and runoff collection becomes the source for irrigation and some nutrients (saving money), provided the use does not impact long-term maintenance or impact existing trees.

Potential Limitations of Shallow Grassed Swales

- Effective only as a conveyance system in unsuitable soils.
- Possible nuisances such as odors, mosquitoes, or nuisance plant species can occur if not designed, constructed, or maintained properly.
- Aesthetically unpleasing if improperly designed and constructed (deep with steep side slopes - looks like a ditch).
- May not be suitable or may require geotextile matting in areas that serve as vehicle parking areas.

1.5 Infiltration Basins and Retention Basins

A retention basin is an infiltration system designed to retain stormwater on site, thus reducing pollution, recharging groundwater, and controlling flood waters. Typically, these basins have dry bottoms covered with native grasses. The site characteristics where retention basins function best are where soils are highly permeable and the seasonal high water table is situated well below the soil surface (at least 2 to 3 feet below basin bottom). These systems can be incorporated into multipurpose park areas when designed with very gradual slopes. As discussed earlier, retention basins need to be inspected regularly to check for infiltration capacity.

Infiltration controls are typically best suited for onsite applications (off-line from the primary stormwater conveyance system) where the contributing area is limited to a single development site or subdivision (e.g., 1 to 50 acres). To be most effective, retention controls must be an integral part of the initial design and construction of a site. Retention BMPs may be suitable for use at individual urban redevelopment or retrofit sites within the basin. The application of retention BMPs should be considered on a case-by-case basis within the study area, where soils and water table conditions are suitable.

Potential Benefits of a Retention Basin

- Mimics the natural water balance of a site by promoting groundwater recharge close to the point of runoff generation.
- Can provide offline or online treatment for environmentally sensitive waters.
- Reduces peak rate and volume of flood discharge by retaining water on site.
- Can be used as sediment traps during the construction phase of a project.
- Are reasonably cost-effective in comparison with other BMPs for both construction and maintenance costs (where soils are favorable).
- Effectively reduce pollutant loadings to receiving waters.

Potential Limitations of a Retention Basin

- Susceptible to clogging due to accumulation of fine suspended solids and oil and grease in the upper layers of the basin floor.
- Require well drained soils to function properly.
- Not appropriate in areas with shallow bedrock.
- Unsuitable soils limit drawdown capacity, thereby reducing pollutant removal and flood control capacity.
- Soluble pollutants can be conveyed into groundwater.
- Possible nuisances such as odors, mosquitoes, and nuisance vegetation can occur if not designed, constructed, or maintained properly.

SFWMD Retention Design Criteria

- *Treatment Volume* - The retention treatment volume shall be 50 percent of the treatment volume required for wet detention (e.g. the greater of 0.5 inches of runoff from the project or 1.25 inches times the percent impervious.) Commercial or industrial projects must provide a 0.5-inch retention/ detention pretreatment prior to discharge into a dry retention facility.
- *Retention Volume Recovery* - Basin outlets should be designed to discharge no more than a 0.5-inch of the retention volume in the first 24 hours following a storm event.
- *Skimmers* - Facilities that receive stormwater from contributing areas with greater than 50 percent impervious surface, or t.hat are a potential source of oil and grease contamination must include a baffle, skimmer, and grease trap to prevent these substances from being discharged from the facility.

1.6 Water Quality Inlets, Baffle Boxes, and Oil-Water Separators

Water quality inlets are designed to prevent sediment, oil, and grease from entering storm drains and stormwater infiltration systems. Water quality inlets are typically installed at catch basins, and baffle boxes are typically installed further downstream in the storm sewer.

Two basic designs of baffle boxes are described by Schueler (MWCOG, 1987): the Montgomery County (Maryland) design and the Rockville (Maryland) design.

- The Montgomery County design consists of a rectangular concrete box divided into three chambers where sediment, grit, and oil are separated from stormwater runoff as it passes through the chambers before exiting through an outlet to the storm drain system. The first chamber is designed for sediment trapping, and the second chamber is designed for oil separation. Each chamber contains a permanent pool and is accessible through manhole covers.
- The Rockville design also consists of three chambers. However, runoff is allowed to exfiltrate into the subsoil through weep holes located at the bottom of the chambers. These holes prevent the formation of permanent pools and provide additional pollutant removal through exfiltration.

Baffle boxes, when used in conjunction with pretreatment measures such as street sweeping, may be the most feasible water quality control device in areas where the other more traditional measures, discussed previously, may not be applicable due to various constraints. The design of a baffle box is identical to a primary clarifier with the addition of a skimmer for floatables. Target pollutant sizes are fine sands and larger size particles. There are limited pollutant removal data on these devices, but the quantity removed can be quantified, when the box is cleaned of sediment and debris.

Precast oil/water separators are also available and can be installed on small commercial and industrial sites. The new coalescent plate separators are relatively efficient (50 percent to 80 percent removals are reported). These could be used for gas station and industrial area applications.

Water quality inlets are generally designed for sites of one acre or less. These inlets are typically used on commercial sites where high loads of sediments and/ or oil and grease are generated (e.g., gas stations, commercial stores, and small parking lots). Applications in residential areas are also becoming more frequent. Water quality inlets are typically designed to trap heavy sediments and/ or oil and grease. Removal mechanisms are usually settling, filtration, and/ or adsorption.

Maintenance requirements vary by device and application, but generally require cleaning the chambers four to six times a year to remove pollutants. Frequent maintenance is essential for the effective removal of pollutants using these systems. The cleaning process from these devices includes pumping out the contents of each chamber into a tank truck. If the entire contents are pumped out as a slurry, they are then transferred to a sewage treatment system. If the runoff is separated from the sediments by onsite siphoning, the sediments can be trucked to a landfill for final disposal.

The Continuous Deflective Separation (CDS), Stormceptor and Vortechs units are relatively smaller, but still require a significant space for installation. For example, the smallest Stormceptor, currently listed, extends 5.3 feet below the pipe invert. The incoming stormwater and pollutants enter a diversion chamber where oils and floatable particulate matter rise to the surface and sediments settle out to the bottom. During high flow events, the excess stormwater bypasses the lower treatment chamber and flows directly to the downstream storm drain system.

The Stormceptor is divided into two water quality chambers. Stormwater flows into the upper chamber and is diverted by a V-shaped weir down a drop pipe and into the lower chamber, from where is directed horizontally around the circular walls to an oulet pipe.

The Vortechs system consists of four chambers. The chambers are in charge of sequentially removing particulate material through settling, trapping oil, controlling flow, and discharging incoming flow.

1.7 Porous Pavement

A porous pavement generally consists of a layer of porous or pervious concrete, overlying an underground reservoir filled with stone aggregates. It is mainly designed to treat rain that falls on the pavement. After stormwater runoff infiltrates through the pavement, it is collected in reservoirs where it infiltrates into the subsoil. Porous pavements are typically used in the construction of parking lots as a built-in stormwater treatment device.

The design of a porous pavement can be modified to enable the system to accept runoff from surrounding areas and rooftops. This modification includes the installation of perforated inflow pipes to distribute the runoff throughout the stone reservoir. In addition, a pretreatment system is needed to remove trash, sediment, oil, and grease to prevent them from clogging the reservoirs. The FDEP has found these surfaces to be very effective in certain applications (FDEP, Livingston, personal communication).

The cost-effectiveness of porous pavement can be estimated by determining the additional expenses incurred for constructing a parking lot with a porous pavement instead of conventional pavement, and by deducting the savings resulting from reduced land consumption and elimination of the need for additional BMPs. Porous pavements reduce stormwater volumes discharged to surface waters, thereby reducing pollutant loadings and increasing groundwater recharge. This is achieved by sorption, trapping and straining, bacterial reduction, and groundwater diversion.

Porous pavements are not intended for the removal of coarse particulate pollutants; however, they are efficient in the removal of fine particulate pollutants. Estimates of cost-effectiveness can be made on a case-by-case basis only because of variables such as parking lot dimension, site size, amount of offsite runoff, and pretreatment requirements. In general, porous pavements are more cost-effective on sites between 3 acres and 10 acres in size.

The construction of a porous pavement system requires that rigorous construction practices be implemented. Adequate field testing and subgrade preparation are required before construction. Sediment control is needed before, during, and after construction. If regular maintenance is ignored, then the pores will clog and will not allow infiltration. Monthly (and possibly bi-monthly) vacuuming may be required.

Also, porous pavement does not stand up very well against heavy traffic loads. Porous pavements are best suited for sites with the following features:

- Infiltration rate greater than 0.3 inches per hour.
- Soil with clay content less than 30 percent.
- Slope less than 5 percent.
- Minimum of 2- to 4-foot clearance between the bottom of the reservoir and the seasonally high water table.

1.8 Underdrains and Stormwater Filter Systems

These types of systems typically consist of a settling basin and a filter. The settling basin is essential to avoid rapid clogging of the filter. Treated water that passes through the filter bed is discharged through an underdrain. The biggest concern with this type of system is clogging of the filter bed. This system also tends to work better off-line so there is no continuous base flow. This allows the system to dry out, which allows for the raking/ removal of debris from the filter bed and promotes proper pollutant removal mechanisms (aeration).

1.9 Alum Injection Systems

Alum injection is a chemical treatment process that uses coagulation to achieve a reduction in colloidal or fine suspended matter from stormwater. The alum is applied upstream of a treatment basin by means of an injection system. The basin must be designed to provide sufficient detention time, to allow the alum and coagulated particles to settle out.

There are both benefits and concerns when using an alum injection system. Benefits are significant reductions in solids and some nutrients. Concerns are the added capital/ operating costs and the alum sludge that is accumulated over time. This can be very effective for colloidal solids that are difficult to settle through typical physical processes.

1.10 Skimmers

Oil and grease skimmers are a cost-effective method of prohibiting oil and grease from flowing onto receiving waterbodies. Oil and grease skimmers are easily installed and maintained. Skimmers should also be considered in the design phase of all storage/ treatment facilities such as the wet detention basins.

1.11 Maintenance of Structural Controls

Inspections should be performed at regular intervals to assure that the detention basin is operating as designed. Semi-annual inspection should be considered at a minimum, with additional inspections following storm events. For the inspection following a major storm, the inspector should visit the site at the end of the specified drawdown period to ensure that the extended detention device is draining properly. Some inspections can be arranged to coincide with scheduled maintenance visits in order to minimize site visits and to ascertain that maintenance activities are performed satisfactorily. At the time of all site visits, the inspector should check the accumulations of debris and sediment. The weir or controlling structure and side slopes of the basin should be checked to ensure that they do not show signs of erosion, settlement, slope failure, or vehicular damage.

Vegetated littoral zones should be inspected to ensure that water level elevations are appropriate to enhance vegetative growth that acceptable survival rates for planted species are maintained, and that vegetative cover is at acceptable limits.

Routine Maintenance
Routine or preventive maintenance refers to scheduled procedures which are performed on a regular basis in order to keep the basin in proper working order. Routine maintenance should include debris removal, silt/ sediment removal, and clearing of vegetation around the extended detention control device to prevent clogging. For wet detention basins, it is recommended that clean-outs be performed every four to ten years, while dry detention basins should be cleaned every one to two years.

Mowing
The side slopes, embankments, emergency spillways, and other grassed areas of stormwater facilities must be periodically mowed to prohibit woody growth and control weeds. More frequent mowing may be required in residential areas by adjacent homeowners. Mowing usually constitutes the largest routine maintenance expense. The use of native or introduced grasses which are water-tolerant, pest-tolerant, and slow growing are recommended.

Debris and Litter Removal
Debris and litter accumulate near stormwater facility control structures and should be removed during regular mowing operations. Particular attention should be paid to floatable debris that can eventually clog the control structure or riser. Trash screens or racks can be strategically placed near inflow or outflow points to capture debris.

Sediment Removal and Disposal
Sediment removal is a very important maintenance activity for detention basins, because these facilities are designed to remove pollutants by sedimentation.

Sediments collect at the bottom of the basin, reduce storage volume, and increase the likelihood of clogging the orifices of the extended detention outlet structure. Dry extended detention basins may have to be cleaned out more frequently than wet detention basins for aesthetic reasons.

Sediment deposition should be regularly monitored. Sediments removed from detention basins, especially in highly urbanized areas may contain high levels of toxins (e.g., heavy metals, organics). In addition to monitoring sediment deposition rates, core samples from detention basins every few years could be used to monitor the buildup of pollutants. If bottom sediment concentrations approach levels which would restrict disposal on site or in local landfills, then clean-out may be required more frequently than every four to ten years.

Under existing EPA regulations (40 CFR 261), material cleaned from a detention basin should periodically be screened with the Extraction Procedure (EP) toxicity test. This test should be carried out on accumulated sediment within the basin. If the sediment fails the test, it is subject to the Resource Conservation and Recovery Act (RCRA) regulations, and must be disposed of in an approved manner at an RCRA-approved facility. If the EP toxicity test is negative, then sediments are subject to state and local solid waste disposal regulations.

For sediment, which is not classified as a hazardous waste, two major options of disposal are available: onsite and landfill disposal. The area required for onsite disposal must be determined to assure adequate space for sediment disposal. The disposal area should be large enough to stockpile two sediment clean-outs, assuming the area can accept a 12-inch depth of wet sediment for each clean-out (MWCOG, 1987). Any onsite disposal areas must be protected with sediment control measures to prevent material from re-entering the watercourses. The disposal area should be neither in the 100-year floodplain nor in wetlands.

If onsite disposal areas are not available or are inadequate in size, then steps must be taken to transport the material to local landfills. Detention basin sediment is typically accepted at landfills by local government departments of solid waste, if the material has been sufficiently dried to be a "workable material" and can pass an EP toxicity test.

Non-Routine Maintenance
Non-routine or corrective maintenance refers to a rehabilitative activity that is not performed on a regular basis. This would include control structure replacement or a major harvesting of aquatic vegetation.

Erosion and Structural Repair
Areas of erosion and slope failure should be filled and compacted, if necessary, and reseeded (or sodded) as soon as possible. Eroded areas near the inlet or outlet should be revegetated and, if necessary, be filled, compacted, and revegetated or lined with riprap. Damaged side slopes and embankments should be repaired using fill dirt of adequate permeability. Any major damage to outlet structures should be repaired as soon as possible.

Access to detention basins is necessary for excavating equipment, trucks, mowers, and personnel for routine maintenance and erosion repair and for the removal of sediment accumulation. Where access is particularly difficult or impractical, basins should be over-designed to allow for additional sediment accumulation to extend the maintenance interval.

2 Nonstructural BMPs

2.1 Land Use Planning

Land use planning and management during redevelopment present an important opportunity to reduce / minimize pollutants in stormwater runoff and control flooding. Management measures may include modification or restrictions of certain land use activities, or requirements regarding onsite flood control. Greater restrictions may be warranted where development can affect impaired, threatened, or significant waterbodies. Because increased pollutant loadings and flooding correspond to increase in impervious cover, land use planning can become an effective control measure.

2.2 Public Information Program

A public information and participation plan provides the City with a strategy for informing its employees, the public, and businesses about the importance of protecting stormwater from improperly used, stored, and disposed pollutants. Many people do not realize that yard debris or trash thrown into ditches today will worsen tomorrow's flooding and pollute surface waters. Municipal employees must be trained, especially those that work in departments not directly related to stormwater, but whose actions affect stormwater. Residents must become aware that a variety of hazardous products are used in the home, and that its improper use and disposal can pollute stormwater. Likewise, improper disposal of oils, antifreeze, paints, and solvents can end up in streams and lakes, poisoning fish and wildlife. If care is taken by individuals to properly dispose of yard debris, trash, and hazardous materials, many problems can be reduced in magnitude or avoided. Increased public awareness also facilitates public scrutiny of industrial and municipal activities and will likely increase public reporting of incidents. Businesses, particularly smaller ones that may not be regulated by Federal, State, or local regulations, must be informed of ways to reduce their potential to pollute stormwater.

2.3 Fertilizer Application Control

Fertilizer application control is a voluntary control mechanism by citizens who use fertilizer as part of their landscaping activities. Fertilizer application controls are implemented through a public information program by making the public aware of the principals of environmental landscape maintenance and the problems associated with overuse of fertilizers. Overuse of fertilizers will cause excessive runoff of nutrients to surface waters, thereby wasting money for the homeowner and potentially degrading the receiving waterbody. This is especially true during heavy rainfall periods that produce yard and neighborhood flooding. Information programs should also be extended to professional fertilizer users.

2.4 Pesticide Use Control

Pesticide use control is also a voluntary control by citizens who use pesticides as part of their housekeeping and lawn maintenance activities. Some pesticides are priority pollutants (e. g., Endrin, Lindane, and Silvex), which can be toxic. Overuse of these chemicals can cause excessive runoff to surface waters and entry into the food chain.

Many professional applicators of pesticides are using approved pesticides in a safe and proper manner. An information program on pesticide use will help to reduce the amount of pesticides entering the stormwater system.

2.5 Solid Waste Management

In some instances, problems can arise from trash and other debris flowing into, and obstructing, open channels, culverts, and storm sewers. It is recommended that additional public information be provided to advise citizens of the adverse impacts of littering and poor solid waste management, including pet droppings, and illegal dumping into storm drains, wooded areas, and ditches. Pet droppings can be a source of coliform bacteria and other pathogens.

2.6 DCIA Minimization

Another non-structural BMP option available is to minimize the amount of DCIA on a site and promote the use of green buffer zones around paved areas for infiltration. For example, roof runoff from structures can be directed to green buffer zones or shallow swales around houses instead of driveways, leading directly to the street. In addition, parking lots and driveways can be graded to landscaped/grassed areas or swales, reducing direct runoff to the storm drainage system.

2.7 Street Sweeping

Street sweeping can be an effective method of improving street aesthetics in developed areas and, depending on the type of equipment used, can be an effective pretreatment method of water quality control. The newer vacuum sweepers use both brushes and high-powered vacuums to provide a relatively high level of pollutant removal (Sutherland, 1995). It should be noted that the older sweeping technologies have the potential to increase pollution problems by breaking particulate into finer particles and dispersing these away from the road edge as dust. Therefore, if street sweeping is considered, vacuum sweepers should be used to maximize the effort.

2.8 Erosion and Sediment Control on Construction Sites

Erosion and sediment control on construction sites provides for the protection of receiving waters from sediment loads. Proper control during construction can be accomplished with gravel filter weirs, sediment fences, and temporary berms or swales for pretreatment and detention areas (temporary or permanent) for down slope control.

2.9 Operation and Maintenance (O&M)

Experience has shown that many treatment facilities are not properly maintained and, therefore, do not provide the intended pollutant removal effectiveness. Because of this, one of the most effective non-structural BMPs is routine maintenance of existing treatment facilities. For publicly owned treatment facilities, routine maintenance and inspection should be performed at least quarterly. For privately owned facilities, maintenance is not typically performed by a municipality. There are several options that can be pursued by a municipality to help ensure that proper maintenance is being conducted. These options include a certification program, initiated by a municipality, that requires all approved subdivision ponds (private) to be recertified by the owner on a predetermined time interval (e.g., annually). The recertification may be done by a state certified/trained inspector or engineer. Enforcement of maintenance is one of the most difficult problems for privately owned facilities.

Under the NPDES Phase II stormwater permitting program, the City is liable for the quality from private facilities, if the private facility discharges into a conveyance system, owned and operated by the City. Potential enforcement measures may include intervention (after sufficient notification), where critical maintenance is done by the City, and the cost of the maintenance is billed to the owner or by other means, as deemed necessary to the municipality. Another option would be to consider the assessment of fines.

Appendix 5A
Wetlands Quality Evaluation Study
Field Data

The following tables present the evaluations data collected from field visits to various wetlands within the City of Fort Lauderdale SWMP study area.

Wetland Qualitative Evaluation Summary

Project:	Ft. Lauderdale
Photo ID:	
Observer:	BB, KH
Wetland Name:	Davie Blvd Ramp

1. Wetland ID	A	2. Date	7/22/2008	3. Time:	11:37AM	4. Wetland Type	6300
5. Plant Association				6a. Percent Cover Vegetation:	90%		
6. Plant Species				6b. Percent Cover Bare Ground:		6c. Diversity	
Royal Palm (*Roystonea regia*)							
Plantain *(Musa sp.)*							
Coconut Palm (*Cocos nucifera*)							
Java wood *(Bischofia trifoliata)*							
Water Primrose *(Ludwigia sp.)*							
Cabbage Palm (*Sabal palmetto*)							
Air Potato (*Dioscorea bulbifera*)							
Willow (*Salix sp.*)							

7. Wetland Disturbance Classification

	a. Undisturbed	X	1. Altered hydroperiod		6. Invasion by nuisance species___%
	b. Partially disturbed		2. Logging		7. Peat oxidation
X	c. Disturbed		3. Agriculture		8. Root exposure
			4. Cattle		9. Tree fall
			5. Invasion by exotic species	50%	10. Tree mortality

8. Wetland Drainage History

	a. Undrained	X	c. Ditch along perimeter		e. Influent ditch	
	b. Ditched in adjacent upland		d. Ditch transecting wetland		f. Effluent ditch	

9. Chemistry Water Quality		10. Biological Water Quality			
a. Turbidity		a. *Lemna* sp. __%		f. *Utricularis* sp.__%	
b. DO		b. *Spirodela* sp.__%		g. Moss line (ht):	
c. Conductivity		c. *Azolla* sp.__%		h. Lichen line (ht):	
d. pH		d. *Salvinia* sp. __%		i. Sphagum moss __%	
e. Water: Clear__ Tannic__		e. Liverworts __%			

11. Wildlife usage [Rating 1 (low) - 4 (high)]				12. T & E Species (presence of absence)	
2	a. Avian	1	d. Amphibians	a. Plants	No
1	b. Mammals		e. Invertebrates	b. Animals	No
2	c. Reptiles		f. Fish		

13. Connectedness

14. Additional Observations

Miscellaneous trash and debris in wetland

Wetland Qualitative Evaluation Summary

Project: Ft. Lauderdale
Photo ID:
Observer: BB, KH
Wetland Name: Riverside Dr.

1. Wetland ID	B	2. Date 7/22/2008	3. Time: 2:30PM	4. Wetland Type	6300
5. Plant Association		6a. Percent Cover Vegetation:			
6. Plant Species		6b. Percent Cover Bare Ground:		6c. Diversity	
Slash Pine (*Pinus elliottii*)					
Queensland Umbrella Tree (*Brassaia actinophylla*)					
Brazilian Pepper (*Schinus terebinthifolius*)					
Weeping Banyan (*Ficus benjamina*)					
Bald Cypress *(Taxodium distichum)*					
Seaside Mahoe (*Thespesia populnea*)					
Philodendron (*Philodendron sp*.)					

7. Wetland Disturbance Classification

	a. Undisturbed	X	1. Altered hydroperiod		6. Invasion by nuisance species___%
	b. Partially disturbed		2. Logging		7. Peat oxidation
X	c. Disturbed		3. Agriculture		8. Root exposure
			4. Cattle		9. Tree fall
			5. Invasion by exotic species	40%	10. Tree mortality

8. Wetland Drainage History

	a. Undrained	X	c. Ditch along perimeter		e. Influent ditch	
	b. Ditched in adjacent upland		d. Ditch transecting wetland		f. Effluent ditch	

9. Chemistry Water Quality / **10. Biological Water Quality**

a. Turbidity		a. *Lemna* sp. __%		f. *Utricularis* sp.__%	
b. DO		b. *Spirodela* sp.__%		g. Moss line (ht):	
c. Conductivity		c. *Azolla* sp.__%		h. Lichen line (ht):	
d. pH		d. *Salvinia* sp. __%		i. Sphagum moss __%	
e. Water: Clear__ Tannic__		e. Liverworts __%			

11. Wildlife usage [Rating 1 (low) - 4 (high)] / **12. T & E Species (presence of absence)**

2	a. Avian	1	d. Amphibians	a. Plants	No
1	b. Mammals		e. Invertebrates	b. Animals	No
2	c. Reptiles		f. Fish		

13. Connectedness

14. Additional Observations

Wetland Qualitative Evaluation Summary

Project: Ft. Lauderdale
Photo ID:
Observer: BB, KH
Wetland Name: Mills Pond

1. Wetland ID	C	2. Date	7/22/2008	3. Time:	10:46AM	4. Wetland Type	6410/6300

5. Plant Association	6a. Percent Cover Vegetation:		
6. Plant Species	6b. Percent Cover Bare Ground:	6c. Diversity	
Bald Cypress (*Taxodium distichum*)			
Cabbage Palm (*Sabal palmetto*)			
Royal Palm (*Roystonea regia*)			
Brazilian Pepper (*Schinus terebinthifolius*)			
Java wood *(Bischofia trifoliata)*			
Sedges (*Carex sp.*)			
Wild Coffee (*Psychotria sp.*)			

7. Wetland Disturbance Classification

	a. Undisturbed	X	1. Altered hydroperiod		6. Invasion by nuisance species___%
	b. Partially disturbed		2. Logging		7. Peat oxidation
X	c. Disturbed		3. Agriculture		8. Root exposure
			4. Cattle		9. Tree fall
			5. Invasion by exotic species	50%	10. Tree mortality

8. Wetland Drainage History

	a. Undrained	X	c. Ditch along perimeter		e. Influent ditch	
	b. Ditched in adjacent upland		d. Ditch transecting wetland		f. Effluent ditch	

9. Chemistry Water Quality		10. Biological Water Quality			
a. Turbidity		a. *Lemna* sp. __%		f. *Utricularis* sp.__%	
b. DO		b. *Spirodela* sp.__%		g. Moss line (ht):	
c. Conductivity		c. *Azolla* sp.__%		h. Lichen line (ht):	
d. pH		d. *Salvinia* sp. __%		i. Sphagum moss __%	
e. Water: Clear__ Tannic__		e. Liverworts __%			

11. Wildlife usage [Rating 1 (low) - 4 (high)]					12. T & E Species (presence of absence)		
2	a. Avian	1	d. Amphibians		a. Plants	No	
1	b. Mammals		e. Invertebrates		b. Animals	No	
2	c. Reptiles		f. Fish				

13. Connectedness

14. Additional Observations

Wetland Qualitative Evaluation Summary

Project:	Ft. Lauderdale
Photo ID:	
Observer:	BB, KH
Wetland Name:	NW 23rd Ave.

1. Wetland ID	D	2. Date	7/22/2008	3. Time:	3:30 PM	4. Wetland Type	6200/6300

5. Plant Association	6a. Percent Cover Vegetation:		
6. Plant Species	6b. Percent Cover Bare Ground:	6c. Diversity	
Red Maple (*Acer rubrum*)			
Bald Cypress (*Taxodium distichum*)			
Java wood (*Bischofia trifoliata*)			
Java plum (*Syzygium cumini*)			
Cabbage Palm *(Sabal palmetto)*			
Elderberry (*Sambucus canadensis*)			
Red bay (*Persea palustris*)			
Wild Coffee (*Psychotria sp.*)			
Sea grape (*Coccoloba uvifera*)			
Pteridales (*Acrostizhum sp.*)			

7. Wetland Disturbance Classification

	a. Undisturbed	X	1. Altered hydroperiod		6. Invasion by nuisance species___%
	b. Partially disturbed		2. Logging		7. Peat oxidation
X	c. Disturbed		3. Agriculture		8. Root exposure
			4. Cattle		9. Tree fall
			5. Invasion by exotic species	25%	10. Tree mortality

8. Wetland Drainage History

	a. Undrained		c. Ditch along perimeter		e. Influent ditch	
	b. Ditched in adjacent upland		d. Ditch transecting wetland		f. Effluent ditch	

9. Chemistry Water Quality		10. Biological Water Quality			
a. Turbidity		a. *Lemna* sp. __%		f. *Utricularis* sp.__%	
b. DO		b. *Spirodela* sp.__%		g. Moss line (ht):	
c. Conductivity		c. *Azolla* sp.__%		h. Lichen line (ht):	
d. pH		d. *Salvinia* sp. __%		i. Sphagum moss __%	
e. Water: Clear__ Tannic__		e. Liverworts __%			

11. Wildlife usage [Rating 1 (low) - 4 (high)]				12. T & E Species (presence of absence)	
2	a. Avian		d. Amphibians	a. Plants	No
1	b. Mammals		e. Invertebrates	b. Animals	No
2	c. Reptiles		f. Fish		

13. Connectedness

14. Additional Observations

Wetland Qualitative Evaluation Summary

Project:	Ft. Lauderdale
Photo ID:	
Observer:	BB, KH
Wetland Name:	NW 65th Way

1. Wetland ID	E	2. Date	7/22/2008	3. Time:	3:50 PM	4. Wetland Type	6200

5. Plant Association	6a. Percent Cover Vegetation:			
6. Plant Species	6b. Percent Cover Bare Ground:	70%	6c. Diversity	
Red Maple (*Acer rubrum*)				
Bald Cypress (*Taxodium distichum*)				
Java plum (*Syzygium cumini*)				
Royal Palm (*Roystonea regia*)				
Brazilian Pepper (*Schinus terebinthifolius*)				
Cabbage Palm (*Sabal palmetto*)				

7. Wetland Disturbance Classification

	a. Undisturbed	X	1. Altered hydroperiod		6. Invasion by nuisance species___%
	b. Partially disturbed		2. Logging		7. Peat oxidation
X	c. Disturbed		3. Agriculture		8. Root exposure
			4. Cattle		9. Tree fall
			5. Invasion by exotic species	25%	10. Tree mortality

8. Wetland Drainage History

	a. Undrained	X	c. Ditch along perimeter		e. Influent ditch	
	b. Ditched in adjacent upland		d. Ditch transecting wetland		f. Effluent ditch	

9. Chemistry Water Quality		10. Biological Water Quality			
a. Turbidity		a. *Lemna* sp. __%		f. *Utricularis* sp.__%	
b. DO		b. *Spirodela* sp.__%		g. Moss line (ht):	
c. Conductivity		c. *Azolla* sp.__%		h. Lichen line (ht):	
d. pH		d. *Salvinia* sp. __%		i. Sphagum moss __%	
e. Water: Clear__ Tannic__		e. Liverworts __%			

11. Wildlife usage [Rating 1 (low) - 4 (high)]				12. T & E Species (presence of absence)	
1	a. Avian		d. Amphibians	a. Plants	No
1	b. Mammals		e. Invertebrates	b. Animals	No
1	c. Reptiles		f. Fish		

13. Connectedness

14. Additional Observations

Miscellaneous trash and debris in wetland

Wetland Qualitative Evaluation Summary

Project:	Ft. Lauderdale
Photo ID:	
Observer:	BB, KH
Wetland Name:	NW 64th St.

1. Wetland ID	F	2. Date	7/22/2008	3. Time:	4:00 PM	4. Wetland Type	6300

5. Plant Association	6a. Percent Cover Vegetation:		
6. Plant Species	6b. Percent Cover Bare Ground:	6c. Diversity	
Red Maple (*Acer rubrum*)			
Bald Cypress (*Taxodium distichum*)			
Cabbage Palm (*Sabal palmetto*)			
Lizzard's Tail (*Saururus cernuus*)			
Swamp fern (*Blechnum serrulatum*)			
Sword Fern (*Nephrolepis sp.*)			

7. Wetland Disturbance Classification

	a. Undisturbed	X	1. Altered hydroperiod		6. Invasion by nuisance species___%
	b. Partially disturbed		2. Logging		7. Peat oxidation
X	c. Disturbed		3. Agriculture		8. Root exposure
			4. Cattle		9. Tree fall
			5. Invasion by exotic species	35%	10. Tree mortality

8. Wetland Drainage History

	a. Undrained	X	c. Ditch along perimeter		e. Influent ditch	
	b. Ditched in adjacent upland		d. Ditch transecting wetland		f. Effluent ditch	

9. Chemistry Water Quality		10. Biological Water Quality			
a. Turbidity		a. *Lemna* sp. __%		f. *Utricularis* sp.__%	
b. DO		b. *Spirodela* sp.__%		g. Moss line (ht):	
c. Conductivity		c. *Azolla* sp.__%		h. Lichen line (ht):	
d. pH		d. *Salvinia* sp. __%		i. Sphagum moss __%	
e. Water: Clear__ Tannic__		e. Liverworts __%			

11. Wildlife usage [Rating 1 (low) - 4 (high)]					12. T & E Species (presence of absence)		
1	a. Avian		d. Amphibians		a. Plants	No	
1	b. Mammals		e. Invertebrates		b. Animals	No	
1	c. Reptiles		f. Fish				

13. Connectedness

14. Additional Observations

Miscellaneous trash and debris in wetland

Wetland Qualitative Evaluation Summary

Project:	Ft. Lauderdale
Photo ID:	
Observer:	BB, KH
Wetland Name:	Corporate Dr.

1. Wetland ID	G	2. Date	7/23/2008	3. Time:	9:17AM	4. Wetland Type	6200
5. Plant Association				6a. Percent Cover Vegetation:			
6. Plant Species				6b. Percent Cover Bare Ground:		6c. Diversity	

Brazilian Pepper (*Schinus terebinthifolius*)		
Java plum (*Syzygium cumini*)		
Bald Cypress (*Taxodium distichum*)		
Red Maple (*Acer rubrum*)		
Leather Fern (*Acrostichum sp.*)		
Cabbage Palm (*Sabal palmetto*)		
Willow (*Salix sp.*)		
Queenland Umbrella Tree (*Brassaia actinophylla*)		
Cattail (*Typha latifolia*)		

7. Wetland Disturbance Classification

	a. Undisturbed	X	1. Altered hydroperiod		6. Invasion by nuisance species 70%
	b. Partially disturbed		2. Logging		7. Peat oxidation
X	c. Disturbed		3. Agriculture		8. Root exposure
			4. Cattle		9. Tree fall
			5. Invasion by exotic species	70%	10. Tree mortality

8. Wetland Drainage History

	a. Undrained	X	c. Ditch along perimeter		e. Influent ditch	
	b. Ditched in adjacent upland		d. Ditch transecting wetland		f. Effluent ditch	

9. Chemistry Water Quality		10. Biological Water Quality			
a. Turbidity		a. *Lemna* sp. __%		f. *Utricularis* sp.__%	
b. DO		b. *Spirodela* sp.__%		g. Moss line (ht):	
c. Conductivity		c. *Azolla* sp.__%		h. Lichen line (ht):	
d. pH		d. *Salvinia* sp. __%		i. Sphagum moss __%	
e. Water: Clear__ Tannic__		e. Liverworts __%			

11. Wildlife usage [Rating 1 (low) - 4 (high)]				12. T & E Species (presence of absence)		
3	a. Avian		d. Amphibians	a. Plants	No	
1	b. Mammals		e. Invertebrates	b. Animals	No	
2	c. Reptiles		f. Fish			

13. Connectedness

14. Additional Observations

Miscellaneous trash and debris in wetland

Wetland Qualitative Evaluation Summary

Project:	Ft. Lauderdale
Photo ID:	
Observer:	BB, KH
Wetland Name:	SW 15th St.

1. Wetland ID	H	2. Date	7/23/2008	3. Time:	10:15AM	4. Wetland Type	6200

5. Plant Association	6a. Percent Cover Vegetation:		
6. Plant Species	6b. Percent Cover Bare Ground: 65%	6c. Diversity	
Bald Cypress (*Taxodium distichum*)			
Cabbage Palm (*Sabal palmetto*)			
Umbrella Tree (*Brassaia actinophylla*)			
Brazilian Pepper (*Schinus terebinthifolius*)			
Java wood (*Bischofia trifoliata*)			
Wild Coffee (*Psychotria sp.*)			
Castor Bean (*Ricinus communis*)			

7. Wetland Disturbance Classification

	a. Undisturbed	X	1. Altered hydroperiod		6. Invasion by nuisance species 70%
	b. Partially disturbed		2. Logging		7. Peat oxidation
X	c. Disturbed		3. Agriculture		8. Root exposure
			4. Cattle		9. Tree fall
			5. Invasion by exotic species	25%	10. Tree mortality

8. Wetland Drainage History

	a. Undrained	X	c. Ditch along perimeter		e. Influent ditch	
	b. Ditched in adjacent upland		d. Ditch transecting wetland		f. Effluent ditch	

9. Chemistry Water Quality		10. Biological Water Quality			
a. Turbidity		a. *Lemna* sp. __%		f. *Utricularis* sp.__%	
b. DO		b. *Spirodela* sp.__%		g. Moss line (ht):	
c. Conductivity		c. *Azolla* sp.__%		h. Lichen line (ht):	
d. pH		d. *Salvinia* sp. __%		i. Sphagum moss __%	
e. Water: Clear__ Tannic__		e. Liverworts __%			

11. Wildlife usage [Rating 1 (low) - 4 (high)]				12. T & E Species (presence of absence)	
1	a. Avian		d. Amphibians	a. Plants	No
1	b. Mammals		e. Invertebrates	b. Animals	No
1	c. Reptiles		f. Fish		

13. Connectedness

14. Additional Observations

Miscellaneous trash and debris in wetland

Wetland Qualitative Evaluation Summary

Project: Ft. Lauderdale
Photo ID:
Observer: BB, KH
Wetland Name: SW 12th Ave

1. Wetland ID	I	2. Date 7/23/2008	3. Time: 11:30	4. Wetland Type	6410	
5. Plant Association			6a. Percent Cover Vegetation:			
6. Plant Species			6b. Percent Cover Bare Ground: 65%	6c. Diversity		
Bald Cypress (*Taxodium distichum*)						
Royal Palm (*Roystonea regia*)						
Blue flag (*Iris sp.*)						
Brazilian Pepper (*Schinus terebinthifolius*)						

7. Wetland Disturbance Classification

	a. Undisturbed	X	1. Altered hydroperiod		6. Invasion by nuisance species 70%
	b. Partially disturbed		2. Logging		7. Peat oxidation
X	c. Disturbed		3. Agriculture		8. Root exposure
			4. Cattle		9. Tree fall
			5. Invasion by exotic species	25%	10. Tree mortality

8. Wetland Drainage History

	a. Undrained		c. Ditch along perimeter		e. Influent ditch	
	b. Ditched in adjacent upland		d. Ditch transecting wetland		f. Effluent ditch	

9. Chemistry Water Quality		10. Biological Water Quality			
a. Turbidity		a. *Lemna* sp. __%		f. *Utricularis* sp.__%	
b. DO		b. *Spirodela* sp.__%		g. Moss line (ht):	
c. Conductivity		c. *Azolla* sp.__%		h. Lichen line (ht):	
d. pH		d. *Salvinia* sp. __%		i. Sphagum moss __%	
e. Water: Clear__ Tannic__		e. Liverworts __%			

11. Wildlife usage [Rating 1 (low) - 4 (high)]				12. T & E Species (presence of absence)	
3	a. Avian		d. Amphibians	a. Plants	No
2	b. Mammals		e. Invertebrates	b. Animals	No
1	c. Reptiles		f. Fish		

13. Connectedness

14. Additional Observations

Wetland Qualitative Evaluation Summary

Project:	Ft. Lauderdale
Photo ID:	
Observer:	BB, KH
Wetland Name:	SE 9th Ave

1. Wetland ID	J	2. Date	7/23/2008	3. Time:	12:00PM	4. Wetland Type	6412
5. Plant Association				6a. Percent Cover Vegetation:			
6. Plant Species				6b. Percent Cover Bare Ground:	65%	6c. Diversity	
Cattail (*Typha latifolia*)							
Water Primrose (*Ludwigia sp*.)							
Royal Palm (*Roystonea regia*)							

7. Wetland Disturbance Classification

	a. Undisturbed	X	1. Altered hydroperiod		6. Invasion by nuisance species 70%
	b. Partially disturbed		2. Logging		7. Peat oxidation
X	c. Disturbed		3. Agriculture		8. Root exposure
			4. Cattle		9. Tree fall
			5. Invasion by exotic species	25%	10. Tree mortality

8. Wetland Drainage History

	a. Undrained		c. Ditch along perimeter		e. Influent ditch	
	b. Ditched in adjacent upland		d. Ditch transecting wetland		f. Effluent ditch	

9. Chemistry Water Quality		10. Biological Water Quality			
a. Turbidity		a. *Lemna* sp. __%		f. *Utricularis* sp.__%	
b. DO		b. *Spirodela* sp.__%		g. Moss line (ht):	
c. Conductivity		c. *Azolla* sp.__%		h. Lichen line (ht):	
d. pH		d. *Salvinia* sp. __%		i. Sphagum moss __%	
e. Water: Clear__ Tannic__		e. Liverworts __%			

11. Wildlife usage [Rating 1 (low) - 4 (high)]				12. T & E Species (presence of absence)	
2	a. Avian		d. Amphibians	a. Plants	No
1	b. Mammals		e. Invertebrates	b. Animals	No
1	c. Reptiles		f. Fish		

13. Connectedness

14. Additional Observations

Appendix 6A
Surface Water Management Model Results

The following tables present the model results for simulations of Alternative No. 1 (System Maintenance) for the City of Fort Lauderdale regional EPA SWMM.

Table 6A-1. Alternative No. 1, Maintenance Condition for the 2-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 2-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
C12UI010	6.6	6.6	6.6	6.5	0.0	-0.1	-0.1
C12UI015	6.8	6.8	6.8	6.8	0.0	0.0	0.0
C12UI020	6.9	6.9	6.8	6.8	0.0	0.0	0.0
C12UICS18005	5.5	5.5	5.5	5.5	0.0	0.0	0.0
C13IC005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
C13IC010	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13IC011	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13IC015	2.7	2.7	2.7	2.7	0.0	0.0	0.0
C13IC020	2.8	2.8	2.8	2.8	0.0	0.0	0.0
C13IC025	3.5	3.4	3.4	3.4	0.0	0.0	0.0
C13ICSPUR002	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13ICSPUR005	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13MR001	3.5	3.5	3.5	3.5	0.0	0.0	0.0
C13MR005	3.5	3.5	3.5	3.5	0.0	0.0	0.0
C13MR010	3.6	3.6	3.6	3.5	0.0	0.0	0.0
C13MR015	3.7	3.7	3.7	3.7	0.0	0.0	0.0
C13MR016	3.7	3.7	3.7	3.7	0.0	0.0	0.0
C13MR020	3.9	3.9	3.8	3.8	0.0	0.0	-0.1
C13MR021	3.9	3.9	3.9	3.8	0.0	0.0	0.0
C13MR024	3.9	3.9	3.9	3.9	0.0	0.0	-0.1
C13MR025	3.9	3.9	3.9	3.9	0.0	0.0	-0.1
C13MR030	4.0	4.0	3.9	3.9	0.0	0.0	-0.1
C13MR031	4.0	4.0	4.0	3.9	0.0	0.0	0.0
C13MRC005	3.7	3.7	3.7	3.7	0.0	0.0	0.0
C13MRC006	3.8	3.8	3.8	3.8	0.0	0.0	0.0
C13MRC007	3.8	3.8	3.8	3.8	0.0	0.0	0.0
C13MRC008	3.9	3.9	3.9	3.8	0.0	0.0	-0.1
C13MRC009	3.9	3.9	3.9	3.9	0.0	0.0	0.0
C13MRC010	4.0	4.0	3.9	3.9	0.0	0.0	-0.1
C13MRC012	4.0	4.0	4.0	3.9	0.0	0.0	0.0
C13MRC014	4.0	4.0	4.0	4.0	0.0	0.0	0.0
C13MRC015	4.0	4.0	4.0	4.0	0.0	0.0	0.0
C13MRC017	4.0	4.0	4.0	4.0	0.0	0.0	0.0
C13MRC018	4.0	4.0	4.0	4.0	0.0	0.0	0.0
C13MRC-02	7.6	7.7	7.7	7.7	0.0	0.0	0.1
C13MRC020	4.0	4.0	4.0	4.0	0.0	0.0	0.0
C13MRC022	4.0	4.0	4.0	4.0	0.0	0.0	0.0
C13MRC023	4.0	4.0	4.0	4.0	0.0	0.0	-0.1
C13MRC024	4.0	4.0	4.0	4.0	0.0	0.0	0.0
C13MRC025	4.1	4.0	4.0	4.0	0.0	0.0	0.0
C13MRC-03	4.2	4.2	4.3	4.4	0.0	0.1	0.2
C13MRC035	4.1	4.1	4.1	4.0	0.0	0.0	0.0
C13MRC042	4.5	4.5	4.5	4.5	0.0	0.0	0.0
C13MRC043	4.5	4.5	4.5	4.5	0.0	0.0	0.0
C13MRC045	4.6	4.6	4.6	4.6	0.0	0.0	0.0
C13MRSPUR005	3.5	3.5	3.5	3.5	0.0	0.0	0.0
C14CCC005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
C14CCC008	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C14CCC010	2.7	2.7	2.7	2.7	0.0	0.0	0.0
C14CCC020	2.8	2.8	2.8	2.8	0.0	0.0	0.0

Table 6A-1. Alternative No. 1, Maintenance Condition for the 2-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 2-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
C14CCC022	2.8	2.8	2.8	2.8	0.0	0.0	0.0
C14CCC025	2.9	2.9	2.9	2.9	0.0	0.0	0.0
C14CCC027	2.9	2.9	2.9	2.9	0.0	0.0	0.0
C14CCC038	3.4	3.4	3.4	3.4	0.0	0.0	0.0
C14CCC039	3.4	3.4	3.4	3.4	0.0	0.0	0.0
C14CCC040	3.4	3.4	3.4	3.4	0.0	0.0	0.0
C14CCC045	3.5	3.5	3.5	3.5	0.0	0.0	0.0
CCCSPUR005	3.0	3.0	2.9	2.9	0.0	0.0	0.0
CCCSPUR010	3.0	3.0	3.0	3.0	0.0	0.0	0.0
CCCSPUR015	3.1	3.1	3.1	3.1	0.0	0.0	0.0
CCCSPUR020	5.7	5.8	5.9	6.0	0.1	0.2	0.4
CCCSPUR021	5.7	5.8	5.9	6.0	0.1	0.2	0.4
CRCC-05	4.9	4.9	4.9	4.9	0.0	0.0	0.0
CRDVA-05	3.6	3.6	3.6	3.6	0.0	0.0	0.0
DUM_IC006	2.5	2.5	2.5	2.5	0.0	0.0	0.0
EBROW-05	4.1	4.2	4.2	4.2	0.0	0.1	0.1
ECOMM-05	6.0	6.0	6.0	6.0	0.0	0.0	0.0
ECOMM-10	6.2	6.3	6.3	6.4	0.0	0.1	0.2
ECOMM-20	6.4	6.5	6.5	6.5	0.0	0.1	0.1
ELOSO-05	3.6	3.7	3.9	4.2	0.1	0.3	0.5
EOAKPRK-05	4.9	4.9	4.9	5.0	0.0	0.0	0.0
ESUNR-01	6.6	6.6	6.7	6.7	0.0	0.0	0.1
ESUNR-05	6.6	6.6	6.7	6.7	0.0	0.0	0.1
ESUNR-07	7.1	7.1	7.1	7.1	0.0	0.0	0.0
ESUNR-10	6.8	6.8	6.9	6.9	0.0	0.1	0.1
FLEA-05	10.1	10.1	10.1	10.1	0.0	0.0	0.0
FLEA-10	11.9	11.9	11.9	11.9	0.0	0.0	0.0
G16005	2.7	2.7	2.7	2.7	0.0	0.0	0.0
G16007	2.7	2.7	2.7	2.7	0.0	0.0	0.0
G54_HW	2.5	2.5	2.5	2.5	0.0	0.0	0.0
G54_TW	3.9	3.9	3.9	3.8	0.0	0.0	0.0
G57_TW	2.8	2.8	2.8	2.8	0.0	0.0	0.0
GALT-05	8.3	8.7	9.0	9.2	0.4	0.7	0.9
HCOPWCD2005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
HF010	6.8	6.8	6.9	6.9	0.0	0.1	0.1
HF015	6.8	6.8	6.9	6.9	0.0	0.1	0.1
HF020	6.8	6.8	6.9	6.9	0.0	0.1	0.1
HFCS17005	6.8	6.8	6.9	6.9	0.0	0.1	0.2
HFCS55025	7.4	7.4	7.5	7.6	0.1	0.1	0.2
I595-05	7.4	7.4	7.4	7.4	0.0	0.0	0.0
I595-10	5.3	5.3	5.3	5.3	0.0	0.0	0.0
I595-15	5.5	5.6	5.7	5.7	0.1	0.1	0.2
IC022	2.5	2.5	2.5	2.5	0.0	0.0	0.0
IC025	2.6	2.6	2.6	2.6	0.0	0.0	0.0
IC030	2.7	2.7	2.7	2.7	0.0	0.0	0.0
IC032	2.7	2.7	2.7	2.7	0.0	0.0	0.0
IC035	2.7	2.7	2.7	2.7	0.0	0.0	0.0
IC040	2.7	2.7	2.7	2.7	0.0	0.0	0.0
IC042	2.7	2.7	2.7	2.7	0.0	0.0	0.0
IC043	2.7	2.7	2.7	2.7	0.0	0.0	0.0

Table 6A-1. Alternative No. 1, Maintenance Condition for the 2-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 2-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
IC044	2.7	2.7	2.7	2.7	0.0	0.0	0.0
IC045	2.7	2.7	2.7	2.7	0.0	0.0	0.0
IC050	2.7	2.7	2.7	2.7	0.0	0.0	0.0
LAKEEMERALD-05	4.1	4.1	4.1	4.1	0.0	0.0	0.0
LKMELVA-05	4.4	4.4	4.4	4.4	0.0	0.0	0.0
LL005	6.0	6.1	6.2	6.3	0.1	0.2	0.3
LL015	6.0	6.1	6.2	6.3	0.1	0.2	0.3
LL020	6.0	6.1	6.2	6.3	0.1	0.2	0.3
LL025	6.0	6.1	6.2	6.3	0.1	0.2	0.3
LL026	6.0	6.1	6.2	6.3	0.1	0.2	0.3
LL030	6.0	6.1	6.2	6.3	0.1	0.2	0.3
LL035	4.7	4.7	4.7	4.7	0.0	0.0	0.1
LLAKE040	6.7	6.8	6.8	6.9	0.0	0.1	0.2
MELROSEPK-05	7.5	7.5	7.6	7.7	0.0	0.1	0.2
MELROSEPK-06	7.6	7.6	7.6	7.7	0.0	0.1	0.1
MELROSEPK-10	7.7	7.7	7.7	7.7	0.0	0.0	0.0
MIDLST-05	4.1	4.2	4.4	4.8	0.1	0.3	0.6
MLKPOND-05	4.0	4.0	4.0	4.0	0.0	0.0	0.0
NANDR-05	6.6	6.7	6.7	6.7	0.0	0.1	0.1
NANDR-10	6.2	6.2	6.2	6.2	0.0	0.0	0.0
NANDR-15	5.0	5.1	5.1	5.1	0.0	0.0	0.0
NDIXIE-02	7.0	7.0	7.0	7.0	0.0	0.0	0.0
NDIXIE-05	6.5	6.5	6.5	6.5	0.0	0.0	0.0
NE11ST-04	7.0	7.0	7.0	7.1	0.0	0.0	0.1
NE11ST-05	7.3	7.3	7.3	7.3	0.0	0.0	0.0
NE13ST-05	6.2	6.3	6.5	6.6	0.1	0.3	0.4
NE13ST-10	6.4	6.4	6.5	6.6	0.1	0.1	0.3
NE13ST-15	6.4	6.4	6.4	6.4	0.0	0.0	0.0
NE15A-05	3.9	3.9	3.9	3.9	0.0	0.0	0.0
NE15A-10	5.3	5.3	5.4	5.4	0.0	0.0	0.1
NE3A-05	6.4	6.4	6.4	6.4	0.0	0.0	0.0
NE3A-07	6.1	6.1	6.1	6.2	0.0	0.0	0.1
NE3A-10	5.3	5.3	5.3	5.3	0.0	0.0	0.0
NE3CT-05	7.6	7.6	7.6	7.7	0.0	0.1	0.1
NE4A-05	6.1	6.1	6.2	6.2	0.0	0.0	0.1
NE4A-10	6.5	6.5	6.5	6.5	0.0	0.0	0.0
NE4A-15	6.8	6.9	6.9	6.9	0.0	0.0	0.0
NE65-05	5.0	5.1	5.3	5.5	0.2	0.3	0.5
NFED-05	5.8	5.9	5.9	6.0	0.0	0.1	0.1
NFED-10	5.6	5.7	5.9	6.0	0.1	0.2	0.4
NFED-12	5.7	5.8	5.9	6.1	0.1	0.2	0.4
NFED-15	6.4	6.4	6.4	6.4	0.0	0.0	0.0
NFED-20	6.4	6.4	6.4	6.4	0.0	0.0	0.1
NFED-22	6.6	6.6	6.6	6.7	0.0	0.0	0.1
NFED-25	7.2	7.3	7.3	7.3	0.0	0.0	0.0
NFED-30	9.1	9.1	9.1	9.2	0.0	0.0	0.0
NFED-35	6.3	6.3	6.4	6.4	0.0	0.1	0.1
NFED-37	5.1	5.1	5.1	5.2	0.0	0.0	0.0
NFED-40	6.3	6.3	6.4	6.4	0.0	0.1	0.1
NFED-45	8.3	8.4	8.5	8.7	0.1	0.3	0.4

Table 6A-1. Alternative No. 1, Maintenance Condition for the 2-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 2-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
NFED-50	8.0	8.0	8.1	8.1	0.0	0.1	0.1
NFED-52	4.5	4.5	4.5	4.5	0.0	0.0	0.0
NFED-53	4.0	3.9	3.9	3.9	0.0	0.0	0.0
NFED-55	6.1	6.1	6.1	6.2	0.0	0.0	0.1
NFED-60	7.1	7.1	7.1	7.1	0.0	0.0	0.0
NFED-65	6.2	6.2	6.2	6.2	0.0	0.0	0.0
NFED-67	5.0	5.0	5.1	5.2	0.0	0.1	0.2
NFED-70	4.3	4.4	4.5	4.6	0.1	0.2	0.3
NFNR001	2.6	2.6	2.6	2.6	0.0	0.0	0.0
NFNR005	2.6	2.6	2.6	2.6	0.0	0.0	0.0
NFNR008	2.9	2.9	2.9	2.8	0.0	0.0	0.0
NFNR010	3.1	3.1	3.0	3.0	0.0	0.0	0.0
NFNR011	3.1	3.1	3.1	3.1	0.0	0.0	0.0
NFNR015	3.2	3.2	3.2	3.2	0.0	0.0	0.0
NFNR016	3.3	3.3	3.2	3.2	0.0	0.0	0.0
NFNR020	3.3	3.3	3.3	3.3	0.0	0.0	0.0
NFNR021	3.4	3.4	3.3	3.3	0.0	0.0	0.0
NFNR025	3.4	3.4	3.4	3.4	0.0	0.0	0.0
NFNR030	3.9	3.9	3.8	3.8	0.0	0.0	-0.1
NFNR035	4.3	4.3	4.2	4.2	0.0	-0.1	-0.1
NFNR040	4.3	4.3	4.3	4.2	0.0	-0.1	-0.1
NFNR042	4.5	4.5	4.5	4.4	0.0	-0.1	-0.1
NFNR043	4.6	4.6	4.5	4.5	0.0	-0.1	-0.1
NFNR045	4.8	4.7	4.7	4.7	0.0	-0.1	-0.1
NFNR046	4.8	4.8	4.7	4.7	0.0	-0.1	-0.1
NFNR050	5.2	5.1	5.1	5.0	0.0	-0.1	-0.2
NFNR051	5.2	5.1	5.1	5.0	0.0	-0.1	-0.2
NFNR054	5.3	5.2	5.2	5.1	0.0	-0.1	-0.2
NFNR055	5.3	5.2	5.2	5.1	0.0	-0.1	-0.2
NFNRSPUR004	2.6	2.6	2.6	2.6	0.0	0.0	0.0
NFNRSPUR005	2.7	2.7	2.7	2.6	0.0	0.0	0.0
NFNRSPUR010	2.8	2.8	2.8	2.8	0.0	0.0	0.0
NFSPUR005	3.9	3.9	3.8	3.8	0.0	0.0	-0.1
NNRC005	3.6	3.6	3.5	3.5	0.0	0.0	0.0
NNRC010	3.8	3.8	3.7	3.7	0.0	0.0	0.0
NNRC015	3.8	3.8	3.8	3.8	0.0	0.0	0.0
NNRC020	3.8	3.8	3.8	3.8	0.0	0.0	0.0
NPOWRL-03	7.1	7.2	7.2	7.3	0.0	0.1	0.1
NPOWRL-05	7.0	7.0	7.0	7.0	0.0	0.0	0.0
NPOWRL-10	8.8	8.8	8.8	8.8	0.0	0.0	0.0
NW10TR-05	10.3	10.3	10.3	10.3	0.0	0.0	0.0
NW15A-05	7.5	7.5	7.5	7.5	0.0	0.0	0.0
NW15A-10	6.1	6.2	6.2	6.2	0.0	0.0	0.1
NW15A-15	5.9	6.0	6.0	6.1	0.0	0.1	0.1
NW18A-05	6.6	6.6	6.6	6.6	0.0	0.0	0.0
NW22ST-05	6.2	6.2	6.2	6.2	0.0	0.0	0.0
NW22ST-10	7.4	7.5	7.5	7.6	0.0	0.1	0.1
NW24A-05	6.5	6.5	6.6	6.6	0.0	0.0	0.1
NW28-05	9.8	9.9	9.9	10.0	0.0	0.1	0.1
NW29-05	11.2	11.2	11.2	11.3	0.0	0.1	0.1

Table 6A-1. Alternative No. 1, Maintenance Condition for the 2-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 2-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
NW31ST-05	6.0	6.0	6.0	6.0	0.0	0.0	0.0
NW35-05	9.1	9.3	9.5	9.7	0.2	0.4	0.6
NW35-10	9.0	9.1	9.1	9.2	0.1	0.1	0.2
NW35-15	8.6	8.8	8.9	9.0	0.1	0.2	0.4
NW4A-05	6.5	6.5	6.5	6.6	0.0	0.1	0.1
NW4A-10	6.5	6.5	6.5	6.6	0.0	0.1	0.1
NW5A-05	6.4	6.4	6.5	6.6	0.1	0.1	0.2
NW5A-07	6.3	6.3	6.3	6.3	0.0	0.0	0.1
NW5A-10	6.2	6.2	6.3	6.3	0.0	0.0	0.1
NW7A-05	6.7	6.7	6.7	6.8	0.0	0.0	0.0
NW7A-10	6.6	6.6	6.6	6.6	0.0	0.0	0.0
NW8ST-05	6.4	6.5	6.5	6.5	0.0	0.0	0.0
NW8ST-10	6.4	6.5	6.5	6.5	0.0	0.0	0.0
NW9A-05	6.7	6.8	6.8	6.8	0.0	0.0	0.0
NW9A-10	6.8	6.8	6.8	6.8	0.0	0.0	0.1
NWFLAG-05	4.3	4.3	4.3	4.4	0.0	0.0	0.1
OC005	3.9	3.9	3.9	3.9	0.0	0.0	0.0
OC010	3.8	3.8	3.8	3.8	0.0	0.0	0.0
OC015	3.8	3.8	3.8	3.8	0.0	0.0	0.0
OC020	3.6	3.6	3.6	3.6	0.0	0.0	0.0
OC021	3.6	3.6	3.6	3.5	0.0	0.0	0.0
OP015	4.1	4.1	4.2	4.4	0.1	0.2	0.3
OPEB001	3.7	3.7	3.7	3.7	0.0	0.0	0.0
OPEB002	3.7	3.7	3.7	3.7	0.0	0.0	0.0
OPEB003	3.7	3.7	3.7	3.7	0.0	0.0	0.0
OPEB004	3.7	3.7	3.7	3.7	0.0	0.0	0.0
OPEB005	3.7	3.7	3.7	3.7	0.0	0.0	0.0
OPEB006	3.8	3.8	3.8	3.8	0.0	0.0	0.0
OPEB007	3.8	3.8	3.8	3.8	0.0	0.0	0.0
OPEB008	3.8	3.8	3.8	3.8	0.0	0.0	0.0
OPEB009	3.8	3.8	3.8	3.8	0.0	0.0	0.0
OPEB010	3.8	3.8	3.8	3.8	0.0	0.0	0.0
OPEB011	3.8	3.8	3.8	3.8	0.0	0.0	0.0
OPEB015	3.8	3.8	3.8	3.8	0.0	0.0	0.0
OPL005	4.1	4.1	4.1	4.1	0.0	0.0	0.0
OPL010	4.1	4.1	4.1	4.1	0.0	0.0	0.0
OPL015	4.6	4.6	4.7	4.7	0.0	0.0	0.1
OPL020	4.6	4.6	4.7	4.7	0.0	0.0	0.1
OPL025	4.9	5.0	5.2	5.4	0.2	0.3	0.6
OPL030	4.7	4.7	4.7	4.7	0.0	0.0	0.1
OPL035	4.7	4.7	4.7	4.7	0.0	0.0	0.1
OUT_IC005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
OUT_IC010	2.5	2.5	2.5	2.5	0.0	0.0	0.0
OUT_IC015	2.5	2.5	2.5	2.5	0.0	0.0	0.0
OUT_IC020	2.5	2.5	2.5	2.5	0.0	0.0	0.0
OUT_IC055	2.5	2.5	2.5	2.5	0.0	0.0	0.0
PAG005	8.6	8.6	8.6	8.6	0.0	0.0	0.0
PORTSPUR005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
PRLAKE010	8.3	8.3	8.2	8.2	0.0	-0.1	-0.1
PRN001	4.1	4.1	4.0	4.0	0.0	0.0	0.0

Table 6A-1. Alternative No. 1, Maintenance Condition for the 2-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 2-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
PRN005	8.4	8.4	8.4	8.4	0.0	0.0	0.0
PRN010	8.4	8.5	8.5	8.5	0.0	0.0	0.0
PRN015	8.4	8.5	8.5	8.5	0.0	0.0	0.0
PRN018	8.5	8.5	8.5	8.5	0.0	0.0	0.0
PRN020	8.5	8.5	8.5	8.5	0.0	0.0	0.0
PRN025	9.2	9.2	9.2	9.2	0.0	0.1	0.1
PRN030	9.2	9.2	9.2	9.3	0.0	0.1	0.1
PRN035	6.9	6.9	7.0	7.1	0.0	0.1	0.2
PRN038	6.9	6.9	7.0	7.1	0.0	0.1	0.2
PRN039	6.9	6.9	7.0	7.0	0.0	0.1	0.2
PRN040	6.8	6.8	6.8	6.8	0.0	0.0	0.0
PRN045	7.0	7.0	7.1	7.1	0.0	0.1	0.2
PRN1005	8.4	8.5	8.5	8.5	0.0	0.0	0.0
PRN1006	8.4	8.4	8.4	8.4	0.0	0.0	0.0
PRN1010	8.4	8.4	8.4	8.4	0.0	0.0	0.0
PRN1011	8.6	8.6	8.6	8.6	0.0	0.0	0.0
PRSWLAKE020	7.9	7.9	7.9	7.9	0.0	0.0	0.0
PRSWLAKE025	7.8	7.7	7.7	7.7	0.0	0.0	0.0
RIVRPS	2.5	2.5	2.5	2.5	0.0	0.0	0.0
ROL-05	4.7	4.7	4.7	4.7	0.0	0.0	0.0
RVRLND-05	7.3	7.3	7.3	7.3	0.0	0.0	0.0
S33_HW	2.6	2.6	2.6	2.6	0.0	0.0	0.0
S33_TW	5.3	5.3	5.2	5.2	0.0	-0.1	-0.2
S36_TW	4.1	4.1	4.1	4.1	0.0	0.0	-0.1
S36-HW	4.3	4.3	4.3	4.3	0.0	0.0	0.0
S37A_TW	2.9	2.9	2.9	2.9	0.0	0.0	0.0
S37A-HW	3.4	3.4	3.4	3.4	0.0	0.0	0.0
S37B_HW	4.0	4.0	4.0	4.0	0.0	0.0	0.0
S37B_TW	3.6	3.6	3.6	3.6	0.0	0.0	0.0
SANDR-05	5.8	5.8	5.8	5.8	0.0	0.0	0.1
SE10A-05	5.4	5.4	5.5	5.5	0.0	0.1	0.2
SE3A-05	3.8	3.9	4.0	4.1	0.1	0.2	0.3
SE3A-10	5.0	5.1	5.1	5.1	0.0	0.0	0.1
SE3A-15	7.3	7.3	7.4	7.4	0.0	0.1	0.1
SE4A-10	7.5	7.6	7.8	7.9	0.2	0.3	0.5
SE5A-05	4.2	4.2	4.3	4.3	0.0	0.1	0.1
SeepOut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SFED-05	5.7	5.8	5.8	5.9	0.0	0.1	0.2
SFED-10	6.1	6.1	6.2	6.2	0.0	0.0	0.1
SFED-15	7.3	7.3	7.4	7.4	0.0	0.1	0.1
SFED-20	7.3	7.3	7.4	7.4	0.0	0.1	0.1
SFED-25	7.3	7.3	7.4	7.4	0.0	0.1	0.1
SFNR005	3.4	3.4	3.4	3.4	0.0	0.0	-0.1
SFNR006	3.4	3.4	3.4	3.4	0.0	0.0	0.0
SFNR010	3.5	3.4	3.4	3.4	0.0	0.0	0.0
SFNR015	3.5	3.5	3.5	3.5	0.0	0.0	0.0
SFNR020	3.5	3.5	3.5	3.5	0.0	0.0	0.0
SFNR025	3.5	3.5	3.5	3.5	0.0	0.0	0.0
SFNR030	3.6	3.5	3.5	3.5	0.0	0.0	0.0
SFNRC005	3.6	3.5	3.5	3.5	0.0	0.0	0.0

Table 6A-1. Alternative No. 1, Maintenance Condition for the 2-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 2-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
SFNRSPUR005	3.5	3.4	3.4	3.4	0.0	0.0	0.0
SFNRSPUR010	3.5	3.5	3.5	3.5	0.0	0.0	0.0
SFNRSPUR013	3.5	3.5	3.5	3.5	0.0	0.0	0.0
SFNRSPUR014	3.5	3.5	3.5	3.5	0.0	0.0	0.0
SFNRSPUR015	3.5	3.5	3.5	3.5	0.0	0.0	0.0
SFNRSPUR018	3.5	3.5	3.5	3.5	0.0	0.0	0.0
SMIAMI-05	7.9	8.0	8.1	8.1	0.1	0.2	0.2
SMIAMI-10	6.7	7.0	7.3	7.7	0.3	0.6	1.0
SNYDERPK-05	6.1	6.1	6.1	6.1	0.0	0.0	0.0
SNYDERPK-10	6.1	6.1	6.1	6.1	0.0	0.0	0.0
SR84-05	6.3	6.4	6.4	6.6	0.1	0.2	0.3
SR84-10	8.3	8.3	8.4	8.4	0.0	0.1	0.1
SR84-15	7.8	7.8	7.8	7.9	0.0	0.0	0.0
SR84-20	4.6	4.7	4.7	4.8	0.0	0.1	0.2
SR84LAKE005	3.6	3.5	3.5	3.5	0.0	0.0	0.0
SR84LAKE010	3.6	3.6	3.5	3.5	0.0	0.0	0.0
SW12A-05	6.1	6.1	6.1	6.1	0.0	0.0	0.0
SW12A-10	6.2	6.2	6.2	6.2	0.0	0.0	0.0
SW14A-05	4.1	4.3	4.4	4.8	0.1	0.3	0.7
SW14ST-05	5.6	5.7	5.7	5.8	0.0	0.1	0.2
SW14ST-10	6.7	6.7	6.8	6.8	0.0	0.0	0.1
SW15A-05	6.4	6.4	6.4	6.4	0.0	0.0	0.0
SW15CT-05	6.8	6.9	6.9	7.0	0.1	0.1	0.2
SW16ST-05	4.3	4.3	4.3	4.3	0.0	0.0	0.0
SW20ST-05	4.3	4.3	4.4	4.5	0.0	0.1	0.2
SW20ST-10	4.3	4.3	4.4	4.4	0.0	0.1	0.1
SW24ST-05	4.7	4.7	4.7	4.7	0.0	0.0	0.1
SW27A-05	8.0	8.0	8.0	7.9	0.0	0.0	0.0
SW3A-05	4.3	4.4	4.5	4.6	0.1	0.2	0.4
SW4A-05	6.2	6.2	6.3	6.3	0.0	0.1	0.1
SW4A-10	6.4	6.5	6.5	6.6	0.1	0.1	0.2
SW4A-15	6.8	6.8	6.8	6.9	0.0	0.0	0.1
SW7A-05	5.7	5.7	5.8	5.8	0.0	0.1	0.1
SWFLAG-05	3.3	3.3	3.4	3.4	0.0	0.1	0.1
SWFLAG-10	4.6	4.6	4.6	4.6	0.0	0.0	0.0
SWFLAG-15	7.3	7.3	7.4	7.4	0.0	0.1	0.1
SWMLK-05	4.8	4.8	4.9	4.9	0.0	0.0	0.1
SWMLK-10	4.8	4.8	4.8	4.9	0.0	0.0	0.1
SWMLK-12	5.0	5.1	5.2	5.3	0.1	0.2	0.3
SWRIVRS-05	6.4	6.4	6.5	6.5	0.0	0.1	0.1
TR005	2.7	2.7	2.7	2.7	0.0	0.0	0.0
TR006	2.7	2.7	2.7	2.7	0.0	0.0	0.0
TR010	2.7	2.7	2.7	2.7	0.0	0.0	0.0
TR011	2.7	2.7	2.7	2.7	0.0	0.0	0.0
TR015	2.9	2.9	2.9	2.9	0.0	0.0	0.0
TR016	3.0	2.9	2.9	2.9	0.0	0.0	0.0
TR020	3.2	3.2	3.1	3.1	0.0	0.0	0.0
TR021	3.2	3.2	3.2	3.2	0.0	0.0	0.0
TR025	3.2	3.2	3.2	3.2	0.0	0.0	0.0
TR026	3.3	3.2	3.2	3.2	0.0	0.0	0.0

Table 6A-1. Alternative No. 1, Maintenance Condition for the 2-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 2-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
TR030	3.3	3.3	3.3	3.2	0.0	0.0	0.0
TR031	3.3	3.3	3.3	3.3	0.0	0.0	0.0
TR035	3.3	3.3	3.3	3.3	0.0	0.0	0.0
TR037	3.3	3.3	3.3	3.3	0.0	0.0	0.0
TR038	3.4	3.4	3.4	3.3	0.0	0.0	0.0
TR040	3.4	3.4	3.4	3.3	0.0	0.0	0.0
TWNLKS-05	8.7	8.7	8.7	8.8	0.0	0.0	0.1
TWNLKS-10	8.5	8.5	8.5	8.4	0.0	0.0	0.0
W5A-15	4.1	4.1	4.1	4.1	0.0	0.0	-0.1
WBROW-05	6.1	6.1	6.2	6.2	0.0	0.0	0.0
WBROW-10	6.1	6.2	6.3	6.4	0.1	0.2	0.3
WBROW-15	8.1	8.1	8.1	8.1	0.0	0.0	0.0
WBROW-20	7.5	7.5	7.6	7.7	0.0	0.1	0.2
WDAV-05	5.7	5.8	5.8	5.9	0.0	0.1	0.2
WDAV-10	7.1	7.1	7.1	7.2	0.0	0.1	0.1
WDAV-12	7.1	7.1	7.1	7.2	0.0	0.1	0.1
WDAV-15	8.1	8.1	8.1	8.1	0.0	0.0	0.0
WDAV-20	7.5	7.6	7.6	7.7	0.0	0.1	0.1
WDAV-25	7.4	7.4	7.4	7.5	0.0	0.1	0.1
WDAV-30	11.0	11.1	11.2	11.2	0.1	0.1	0.2
WESTLL-05	9.0	9.0	9.0	9.0	0.0	0.0	0.0
WSIST-05	6.1	6.1	6.1	6.1	0.0	0.0	0.0
WSIST-10	6.1	6.2	6.2	6.2	0.0	0.0	0.1
WSUNR-05	6.5	6.5	6.5	6.6	0.0	0.1	0.1
WSUNR-10	6.6	6.6	6.6	6.7	0.0	0.0	0.1
WSUNR-15	7.4	7.4	7.4	7.5	0.0	0.0	0.1
WSUNR-20	5.7	5.7	5.7	5.8	0.0	0.0	0.0

Table 6A-2. Alternative No. 1, Maintenance Condition for the 5-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 5-year, 72-hour Storm						Delta (Alt. 1 - Base, ft)				
	Base	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged
C12UI010	7.3	7.3	7.2	7.2	7.2	7.1	0.0	0.0	0.0	0.0	-0.1
C12UI015	7.4	7.4	7.4	7.4	7.4	7.3	0.0	0.0	0.0	0.0	-0.1
C12UI020	7.4	7.4	7.4	7.4	7.4	7.3	0.0	0.0	0.0	0.0	-0.1
C12UICS18005	6.7	6.7	6.7	6.7	6.8	6.5	0.0	0.0	0.1	0.1	-0.2
C13IC005	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
C13IC010	2.7	2.7	2.7	2.7	2.7	2.7	0.0	0.0	0.0	0.0	0.0
C13IC011	2.8	2.8	2.8	2.8	2.8	2.8	0.0	0.0	0.0	0.0	0.0
C13IC015	2.8	2.8	2.8	2.8	2.8	2.8	0.0	0.0	0.0	0.0	0.0
C13IC020	3.0	3.0	3.0	3.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0
C13IC025	4.1	4.1	4.1	4.1	4.1	4.1	0.0	0.0	0.0	-0.1	0.0
C13ICSPUR002	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0	0.0	0.0
C13ICSPUR005	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0	0.0	0.0
C13MR001	4.3	4.3	4.3	4.3	4.2	4.3	0.0	0.0	0.0	-0.1	0.0
C13MR005	4.3	4.3	4.2	4.2	4.2	4.2	0.0	0.0	0.0	-0.1	0.0
C13MR010	4.3	4.3	4.3	4.3	4.3	4.3	0.0	0.0	0.0	-0.1	0.0
C13MR015	4.5	4.5	4.5	4.5	4.4	4.5	0.0	0.0	0.0	-0.1	0.0
C13MR016	4.6	4.6	4.5	4.5	4.5	4.6	0.0	0.0	0.0	-0.1	0.0
C13MR020	4.7	4.7	4.7	4.7	4.7	4.7	0.0	0.0	0.0	-0.1	0.0
C13MR021	4.7	4.7	4.7	4.7	4.7	4.7	0.0	0.0	0.0	-0.1	0.0
C13MR024	4.8	4.8	4.7	4.7	4.7	4.8	0.0	0.0	0.0	-0.1	0.0
C13MR025	4.8	4.8	4.8	4.7	4.7	4.8	0.0	0.0	0.0	-0.1	0.0
C13MR030	4.9	4.8	4.8	4.8	4.8	4.8	0.0	0.0	0.0	-0.1	0.0
C13MR031	4.9	4.9	4.8	4.8	4.8	4.8	0.0	0.0	0.0	-0.1	0.0
C13MRC005	4.6	4.6	4.6	4.6	4.5	4.6	0.0	0.0	0.0	-0.1	0.0
C13MRC006	4.6	4.6	4.6	4.6	4.6	4.6	0.0	0.0	0.0	-0.1	0.0
C13MRC007	4.7	4.6	4.6	4.6	4.6	4.7	0.0	0.0	0.0	-0.1	0.0
C13MRC008	4.7	4.7	4.7	4.7	4.7	4.7	0.0	0.0	0.0	-0.1	0.0
C13MRC009	4.8	4.8	4.7	4.7	4.7	4.8	0.0	0.0	0.0	-0.1	0.0
C13MRC010	4.8	4.8	4.8	4.8	4.8	4.8	0.0	0.0	0.0	-0.1	0.0
C13MRC012	4.8	4.8	4.8	4.8	4.8	4.8	0.0	0.0	0.0	-0.1	0.0
C13MRC014	4.9	4.9	4.9	4.9	4.8	4.9	0.0	0.0	0.0	-0.1	0.0
C13MRC015	4.9	4.9	4.9	4.9	4.8	4.9	0.0	0.0	0.0	-0.1	0.0
C13MRC017	4.9	4.9	4.9	4.9	4.8	4.9	0.0	0.0	0.0	-0.1	0.0

Table 6A-2. Alternative No. 1, Maintenance Condition for the 5-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 5-year, 72-hour Storm						Delta (Alt. 1 - Base, ft)				
	Base	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged
C13MRC018	4.9	4.9	4.9	4.9	4.8	4.9	0.0	0.0	0.0	-0.1	0.0
C13MRC-02	8.0	8.1	8.1	8.1	8.1	8.2	0.0	0.0	0.0	0.0	0.2
C13MRC020	4.9	4.9	4.9	4.9	4.8	4.9	0.0	0.0	0.0	-0.1	0.0
C13MRC022	5.0	4.9	4.9	4.9	4.9	4.9	0.0	0.0	0.0	-0.1	0.0
C13MRC023	5.0	5.0	5.0	4.9	4.9	5.0	0.0	0.0	0.0	-0.1	0.0
C13MRC024	5.0	5.0	5.0	5.0	4.9	5.0	0.0	0.0	0.0	-0.1	0.0
C13MRC025	5.0	5.0	5.0	5.0	5.0	5.0	0.0	0.0	0.0	-0.1	0.0
C13MRC-03	5.1	5.1	5.1	5.1	5.0	5.1	0.0	0.0	0.0	-0.1	0.0
C13MRC035	5.1	5.1	5.1	5.1	5.0	5.1	0.0	0.0	0.0	-0.1	0.0
C13MRC042	5.5	5.5	5.4	5.4	5.4	5.4	0.0	0.0	0.0	-0.1	0.0
C13MRC043	5.5	5.5	5.4	5.4	5.4	5.5	0.0	0.0	0.0	-0.1	0.0
C13MRC045	5.5	5.5	5.5	5.5	5.4	5.5	0.0	0.0	0.0	-0.1	0.0
C13MRSPUR005	4.3	4.3	4.3	4.3	4.2	4.3	0.0	0.0	0.0	-0.1	0.0
C14CCC005	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
C14CCC008	2.7	2.7	2.7	2.7	2.7	2.7	0.0	0.0	0.0	0.0	0.0
C14CCC010	2.8	2.8	2.8	2.8	2.8	2.8	0.0	0.0	0.0	0.0	0.0
C14CCC020	3.0	3.0	3.0	3.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0
C14CCC022	3.0	3.0	3.0	3.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0
C14CCC025	3.1	3.1	3.1	3.1	3.1	3.1	0.0	0.0	0.0	0.0	0.0
C14CCC027	3.1	3.1	3.1	3.1	3.1	3.1	0.0	0.0	0.0	0.0	0.0
C14CCC038	4.1	4.0	4.0	4.0	4.0	3.9	0.0	0.0	0.0	0.0	-0.1
C14CCC039	4.1	4.1	4.1	4.1	4.0	4.0	0.0	0.0	0.0	0.0	-0.1
C14CCC040	4.2	4.2	4.1	4.1	4.1	4.0	0.0	0.0	0.0	0.0	-0.1
C14CCC045	4.4	4.4	4.4	4.3	4.3	4.3	0.0	0.0	0.0	0.0	-0.1
CCCSPUR005	3.3	3.3	3.3	3.3	3.2	3.2	0.0	0.0	0.0	0.0	0.0
CCCSPUR010	3.3	3.3	3.3	3.3	3.3	3.2	0.0	0.0	0.0	0.0	0.0
CCCSPUR015	3.3	3.3	3.3	3.3	3.3	3.3	0.0	0.0	0.0	0.0	0.0
CCCSPUR020	6.7	6.8	6.9	7.0	7.1	8.0	0.0	0.1	0.2	0.4	1.3
CCCSPUR021	6.7	6.8	6.9	6.9	7.1	8.0	0.1	0.1	0.2	0.4	1.3
CRCC-05	5.3	5.3	5.3	5.3	5.3	5.3	0.0	0.0	0.0	0.0	0.0
CRDVA-05	3.8	3.7	3.7	3.7	3.6	3.6	0.0	0.0	0.0	-0.1	-0.2
DUM_IC006	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
EBROW-05	4.6	4.6	4.7	4.8	5.0	5.5	0.0	0.1	0.2	0.5	0.9

Table 6A-2. Alternative No. 1, Maintenance Condition for the 5-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 5-year, 72-hour Storm						Delta (Alt. 1 - Base, ft)				
	Base	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged
ECOMM-05	6.2	6.2	6.2	6.2	6.1	6.2	0.0	0.0	0.0	0.0	0.0
ECOMM-10	6.6	6.7	6.7	6.7	6.8	7.0	0.0	0.0	0.1	0.2	0.3
ECOMM-20	6.7	6.7	6.7	6.7	6.8	6.8	0.0	0.0	0.0	0.1	0.1
ELOSO-05	4.5	4.6	4.7	4.8	5.0	5.5	0.0	0.1	0.3	0.5	1.0
EOAKPRK-05	5.1	5.1	5.1	5.1	5.1	5.2	0.0	0.0	0.0	0.0	0.0
ESUNR-01	7.0	7.0	7.0	7.0	7.1	7.3	0.0	0.0	0.0	0.1	0.3
ESUNR-05	7.0	7.0	7.0	7.0	7.1	7.3	0.0	0.0	0.1	0.1	0.3
ESUNR-07	7.3	7.3	7.3	7.3	7.3	7.5	0.0	0.0	0.0	0.1	0.2
ESUNR-10	7.0	7.1	7.1	7.1	7.1	7.2	0.0	0.0	0.0	0.1	0.2
FLEA-05	10.4	10.4	10.4	10.4	10.4	10.4	0.0	0.0	0.0	0.0	0.0
FLEA-10	12.1	12.1	12.1	12.1	12.1	12.1	0.0	0.0	0.0	0.0	0.0
G16005	2.8	2.8	2.8	2.8	2.8	2.8	0.0	0.0	0.0	0.0	0.0
G16007	2.8	2.8	2.8	2.8	2.8	2.8	0.0	0.0	0.0	0.0	0.0
G54_HW	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
G54_TW	4.6	4.6	4.6	4.6	4.6	4.5	0.0	0.0	0.0	0.0	-0.1
G57_TW	2.9	2.9	2.9	2.9	2.9	2.9	0.0	0.0	0.0	0.0	0.0
GALT-05	9.4	9.5	9.6	9.7	9.8	10.0	0.1	0.2	0.3	0.4	0.6
HCOPWCD2005	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
HF010	7.5	7.5	7.5	7.5	7.5	7.7	0.0	0.0	0.1	0.1	0.2
HF015	7.5	7.5	7.5	7.5	7.5	7.7	0.0	0.0	0.0	0.0	0.2
HF020	7.5	7.5	7.5	7.5	7.6	7.7	0.0	0.0	0.0	0.1	0.2
HFCS17005	7.5	7.5	7.5	7.5	7.5	7.7	0.0	0.0	0.0	0.1	0.2
HFCS55025	8.2	8.2	8.2	8.3	8.3	8.4	0.0	0.1	0.1	0.1	0.2
I595-05	7.7	7.7	7.7	7.7	7.7	7.7	0.0	0.0	0.0	0.0	0.0
I595-10	5.5	5.5	5.5	5.5	5.5	6.6	0.0	0.0	0.0	0.0	1.1
I595-15	6.6	6.6	6.6	6.7	6.7	6.7	0.0	0.0	0.0	0.0	0.1
IC022	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0	0.0	0.0
IC025	2.7	2.7	2.7	2.7	2.7	2.7	0.0	0.0	0.0	0.0	0.0
IC030	2.8	2.8	2.8	2.8	2.8	2.8	0.0	0.0	0.0	0.0	0.0
IC032	2.8	2.8	2.8	2.8	2.8	2.8	0.0	0.0	0.0	0.0	0.0
IC035	2.9	2.9	2.9	2.9	2.9	2.9	0.0	0.0	0.0	0.0	0.0
IC040	2.9	2.9	2.9	2.9	2.9	2.9	0.0	0.0	0.0	0.0	0.0
IC042	2.9	2.8	2.8	2.9	2.9	2.9	0.0	0.0	0.0	0.0	0.0

Table 6A-2. Alternative No. 1, Maintenance Condition for the 5-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 5-year, 72-hour Storm						Delta (Alt. 1 - Base, ft)				
	Base	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged
IC043	2.8	2.8	2.8	2.8	2.8	2.8	0.0	0.0	0.0	0.0	0.0
IC044	2.8	2.8	2.8	2.8	2.8	2.8	0.0	0.0	0.0	0.0	0.0
IC045	2.9	2.9	2.9	2.9	2.9	2.9	0.0	0.0	0.0	0.0	0.0
IC050	2.9	2.9	2.8	2.8	2.8	2.9	0.0	0.0	0.0	0.0	0.0
LAKEEMERALD-05	4.7	4.7	4.7	4.7	4.7	4.7	0.0	0.0	0.0	0.0	0.0
LKMELVA-05	5.5	5.5	5.5	5.5	5.5	5.5	0.0	0.0	0.0	0.0	0.0
LL005	7.3	7.3	7.3	7.4	7.3	7.6	0.0	0.1	0.1	0.1	0.3
LL015	7.3	7.3	7.3	7.4	7.3	7.6	0.0	0.1	0.1	0.1	0.3
LL020	7.3	7.3	7.3	7.4	7.3	7.6	0.0	0.1	0.1	0.1	0.3
LL025	7.3	7.3	7.3	7.4	7.3	7.6	0.0	0.1	0.1	0.1	0.3
LL026	7.3	7.3	7.4	7.4	7.4	7.5	0.0	0.1	0.1	0.1	0.2
LL030	7.3	7.3	7.4	7.4	7.4	7.5	0.0	0.1	0.1	0.1	0.2
LL035	6.2	6.2	6.2	6.3	6.4	7.4	0.0	0.1	0.1	0.2	1.3
LLAKE040	8.2	8.3	8.3	8.4	8.4	7.9	0.1	0.1	0.2	0.2	-0.3
MELROSEPK-05	8.3	8.4	8.4	8.5	8.6	8.9	0.1	0.1	0.2	0.3	0.6
MELROSEPK-06	8.3	8.3	8.4	8.4	8.5	8.9	0.1	0.1	0.2	0.3	0.6
MELROSEPK-10	8.4	8.4	8.5	8.5	8.6	8.9	0.0	0.1	0.1	0.2	0.5
MIDLST-05	5.0	5.1	5.1	5.2	5.3	5.4	0.0	0.1	0.2	0.3	0.4
MLKPOND-05	5.0	5.0	5.0	5.0	5.0	5.0	0.0	0.0	0.0	0.0	0.0
NANDR-05	6.9	6.9	6.9	6.9	7.0	7.1	0.0	0.0	0.1	0.1	0.2
NANDR-10	6.3	6.3	6.3	6.3	6.4	6.4	0.0	0.0	0.0	0.0	0.1
NANDR-15	5.3	5.3	5.3	5.3	5.3	5.5	0.0	0.0	0.0	0.0	0.2
NDIXIE-02	7.3	7.3	7.3	7.3	7.3	7.3	0.0	0.0	0.0	0.0	0.0
NDIXIE-05	6.7	6.7	6.7	6.7	6.7	6.7	0.0	0.0	0.0	0.0	0.0
NE11ST-04	7.3	7.3	7.3	7.3	7.3	7.4	0.0	0.0	0.0	0.0	0.1
NE11ST-05	7.4	7.4	7.4	7.4	7.4	7.5	0.0	0.0	0.0	0.0	0.1
NE13ST-05	6.9	7.0	7.1	7.2	7.3	7.6	0.1	0.1	0.2	0.4	0.6
NE13ST-10	7.0	7.0	7.1	7.2	7.3	7.4	0.1	0.1	0.2	0.3	0.5
NE13ST-15	6.6	6.6	6.6	6.6	6.6	6.6	0.0	0.0	0.0	0.0	0.0
NE15A-05	4.7	4.7	4.7	4.7	4.7	4.7	0.0	0.0	0.0	-0.1	0.0
NE15A-10	5.8	5.8	5.9	5.9	5.9	6.0	0.0	0.0	0.1	0.1	0.2
NE3A-05	6.5	6.5	6.5	6.5	6.6	6.6	0.0	0.0	0.0	0.0	0.1
NE3A-07	6.3	6.3	6.3	6.3	6.4	6.5	0.0	0.0	0.0	0.1	0.2

Table 6A-2. Alternative No. 1, Maintenance Condition for the 5-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 5-year, 72-hour Storm						Delta (Alt. 1 - Base, ft)				
	Base	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged
NE3A-10	5.5	5.5	5.5	5.5	5.5	5.7	0.0	0.0	0.0	0.0	0.2
NE3CT-05	7.9	7.9	7.9	7.9	8.0	8.1	0.0	0.0	0.0	0.1	0.2
NE4A-05	6.3	6.3	6.3	6.4	6.4	6.4	0.0	0.0	0.0	0.0	0.1
NE4A-10	6.7	6.7	6.7	6.7	6.7	6.8	0.0	0.0	0.0	0.0	0.1
NE4A-15	7.0	7.1	7.1	7.1	7.1	7.2	0.0	0.0	0.0	0.1	0.2
NE65-05	5.7	5.8	5.9	6.0	6.2	7.0	0.1	0.2	0.3	0.5	1.2
NFED-05	6.3	6.3	6.4	6.4	6.4	7.0	0.0	0.1	0.1	0.1	0.7
NFED-10	6.3	6.4	6.4	6.5	6.7	7.1	0.1	0.2	0.3	0.4	0.8
NFED-12	6.3	6.4	6.5	6.6	6.8	7.1	0.1	0.2	0.3	0.4	0.8
NFED-15	6.6	6.6	6.6	6.6	6.6	6.6	0.0	0.0	0.0	0.0	0.0
NFED-20	6.6	6.6	6.6	6.6	6.7	6.7	0.0	0.0	0.0	0.1	0.1
NFED-22	6.8	6.8	6.9	6.9	6.9	7.0	0.0	0.0	0.0	0.1	0.1
NFED-25	7.5	7.5	7.5	7.6	7.6	7.6	0.0	0.0	0.0	0.1	0.1
NFED-30	9.3	9.3	9.3	9.3	9.3	9.3	0.0	0.0	0.0	0.0	0.1
NFED-35	6.6	6.6	6.6	6.6	6.6	6.7	0.0	0.0	0.0	0.1	0.1
NFED-37	5.6	5.7	5.7	5.7	5.7	5.7	0.0	0.0	0.0	0.1	0.1
NFED-40	6.6	6.6	6.6	6.6	6.7	6.7	0.0	0.0	0.0	0.1	0.1
NFED-45	9.0	9.0	9.1	9.1	9.2	9.3	0.0	0.1	0.1	0.2	0.3
NFED-50	8.2	8.2	8.2	8.2	8.3	8.3	0.0	0.0	0.1	0.1	0.1
NFED-52	5.0	5.0	5.0	5.0	4.9	5.0	0.0	0.0	0.0	0.0	0.0
NFED-53	4.6	4.5	4.5	4.5	4.5	4.5	0.0	0.0	0.0	-0.1	0.0
NFED-55	6.4	6.4	6.4	6.4	6.5	6.6	0.0	0.0	0.0	0.1	0.3
NFED-60	7.2	7.2	7.2	7.2	7.2	7.2	0.0	0.0	0.0	0.0	0.0
NFED-65	6.4	6.4	6.4	6.4	6.4	6.6	0.0	0.0	0.0	0.1	0.2
NFED-67	5.7	5.8	5.9	6.0	6.2	6.5	0.1	0.2	0.3	0.5	0.9
NFED-70	5.4	5.6	5.7	5.9	6.2	6.5	0.1	0.3	0.5	0.8	1.1
NFNR001	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0	0.0	0.0
NFNR005	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0	0.0	0.0
NFNR008	3.2	3.1	3.1	3.1	3.1	3.1	0.0	0.0	0.0	-0.1	-0.1
NFNR010	3.5	3.5	3.5	3.4	3.4	3.4	0.0	0.0	0.0	-0.1	-0.1
NFNR011	3.5	3.5	3.5	3.5	3.4	3.4	0.0	0.0	0.0	-0.1	-0.1
NFNR015	3.7	3.7	3.7	3.7	3.6	3.6	0.0	0.0	0.0	-0.1	-0.1
NFNR016	3.8	3.8	3.8	3.7	3.7	3.6	0.0	0.0	0.0	-0.1	-0.1

Table 6A-2. Alternative No. 1, Maintenance Condition for the 5-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 5-year, 72-hour Storm						Delta (Alt. 1 - Base, ft)				
	Base	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged
NFNR020	3.9	3.9	3.9	3.9	3.8	3.8	0.0	0.0	0.0	-0.1	-0.1
NFNR021	3.9	3.9	3.9	3.9	3.9	3.8	0.0	0.0	0.0	-0.1	-0.1
NFNR025	4.0	4.0	4.0	4.0	3.9	3.9	0.0	0.0	0.0	-0.1	-0.2
NFNR030	4.7	4.7	4.6	4.6	4.6	4.6	0.0	0.0	-0.1	-0.1	-0.1
NFNR035	5.2	5.2	5.2	5.2	5.1	5.2	0.0	0.0	-0.1	-0.1	0.0
NFNR040	5.3	5.3	5.3	5.2	5.2	5.3	0.0	0.0	-0.1	-0.1	0.0
NFNR042	5.5	5.5	5.5	5.4	5.4	5.4	0.0	0.0	-0.1	-0.1	-0.1
NFNR043	5.6	5.6	5.6	5.5	5.5	5.5	0.0	-0.1	-0.1	-0.1	-0.1
NFNR045	5.8	5.8	5.8	5.7	5.7	5.7	0.0	-0.1	-0.1	-0.2	-0.1
NFNR046	5.8	5.8	5.8	5.8	5.7	5.7	0.0	0.0	-0.1	-0.1	-0.1
NFNR050	6.3	6.3	6.2	6.2	6.1	6.1	0.0	-0.1	-0.1	-0.2	-0.2
NFNR051	6.3	6.3	6.3	6.2	6.1	6.2	0.0	-0.1	-0.1	-0.2	-0.2
NFNR054	6.4	6.4	6.4	6.3	6.2	6.2	0.0	-0.1	-0.1	-0.2	-0.2
NFNR055	6.4	6.4	6.4	6.3	6.2	6.2	0.0	-0.1	-0.1	-0.2	-0.2
NFNRSPUR004	2.8	2.8	2.7	2.7	2.7	2.7	0.0	0.0	0.0	0.0	-0.1
NFNRSPUR005	2.9	2.8	2.8	2.8	2.8	2.8	0.0	0.0	0.0	-0.1	-0.1
NFNRSPUR010	2.9	2.9	2.9	2.9	2.8	2.8	0.0	0.0	0.0	-0.1	-0.1
NFSPUR005	4.7	4.7	4.6	4.6	4.6	4.6	0.0	0.0	-0.1	-0.1	-0.1
NNRC005	4.2	4.2	4.2	4.2	4.2	4.1	0.0	0.0	0.0	-0.1	-0.2
NNRC010	4.5	4.5	4.5	4.5	4.4	4.4	0.0	0.0	0.0	0.0	-0.1
NNRC015	4.5	4.5	4.5	4.5	4.5	4.4	0.0	0.0	0.0	0.0	-0.1
NNRC020	4.6	4.6	4.6	4.5	4.5	4.5	0.0	0.0	0.0	0.0	-0.1
NPOWRL-03	7.5	7.6	7.6	7.6	7.7	7.8	0.0	0.0	0.1	0.1	0.3
NPOWRL-05	7.2	7.2	7.2	7.2	7.2	7.2	0.0	0.0	0.0	0.0	0.1
NPOWRL-10	9.2	9.2	9.2	9.2	9.2	9.2	0.0	0.0	0.0	0.0	0.0
NW10TR-05	10.5	10.5	10.5	10.5	10.5	10.5	0.0	0.0	0.0	0.0	0.0
NW15A-05	7.7	7.7	7.7	7.7	7.7	7.7	0.0	0.0	0.0	0.0	0.0
NW15A-10	6.4	6.4	6.4	6.4	6.5	6.5	0.0	0.0	0.0	0.1	0.2
NW15A-15	6.3	6.3	6.3	6.3	6.4	6.5	0.0	0.0	0.0	0.1	0.2
NW18A-05	6.8	6.8	6.8	6.8	6.8	6.9	0.0	0.0	0.0	0.0	0.1
NW22ST-05	6.7	6.7	6.7	6.7	6.7	6.7	0.0	0.0	0.0	0.0	0.1
NW22ST-10	8.0	8.0	8.0	8.0	8.0	8.1	0.0	0.0	0.0	0.0	0.1
NW24A-05	6.9	6.9	6.9	6.9	6.9	7.1	0.0	0.0	0.0	0.1	0.2

Table 6A-2. Alternative No. 1, Maintenance Condition for the 5-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 5-year, 72-hour Storm						Delta (Alt. 1 - Base, ft)				
	Base	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged
NW28-05	10.2	10.2	10.3	10.3	10.4	11.0	0.0	0.1	0.1	0.2	0.8
NW29-05	11.4	11.4	11.4	11.4	11.4	11.4	0.0	0.0	0.0	0.0	0.1
NW31ST-05	7.1	7.1	7.1	7.1	7.2	7.4	0.0	0.0	0.1	0.2	0.4
NW35-05	10.1	10.1	10.2	10.3	10.5	11.5	0.1	0.2	0.3	0.5	1.4
NW35-10	9.5	9.5	9.5	9.5	9.6	9.7	0.0	0.0	0.1	0.1	0.3
NW35-15	9.2	9.2	9.2	9.3	9.4	9.7	0.0	0.1	0.1	0.2	0.6
NW4A-05	6.9	6.9	6.9	6.9	7.0	7.1	0.0	0.0	0.1	0.1	0.2
NW4A-10	6.9	6.9	6.9	6.9	7.0	7.1	0.0	0.0	0.1	0.1	0.2
NW5A-05	6.9	6.9	6.9	6.9	7.0	7.1	0.0	0.0	0.1	0.1	0.2
NW5A-07	6.5	6.6	6.6	6.6	6.7	6.9	0.0	0.0	0.1	0.1	0.4
NW5A-10	6.5	6.5	6.5	6.5	6.6	6.7	0.0	0.0	0.1	0.1	0.3
NW7A-05	6.9	6.9	6.9	6.9	6.9	7.1	0.0	0.0	0.0	0.1	0.2
NW7A-10	6.8	6.8	6.8	6.9	6.9	7.1	0.0	0.1	0.1	0.1	0.3
NW8ST-05	6.7	6.7	6.7	6.7	6.7	6.7	0.0	0.0	0.0	0.0	0.1
NW8ST-10	6.7	6.7	6.7	6.7	6.7	6.7	0.0	0.0	0.0	0.0	0.1
NW9A-05	6.9	6.9	6.9	6.9	6.9	6.9	0.0	0.0	0.0	0.0	0.0
NW9A-10	7.0	7.0	7.0	7.0	7.1	7.1	0.0	0.0	0.0	0.1	0.1
NWFLAG-05	4.7	4.6	4.5	4.5	4.5	5.5	-0.1	-0.2	-0.2	-0.3	0.8
OC005	4.7	4.8	4.8	4.9	5.1	6.6	0.0	0.1	0.1	0.4	1.9
OC010	4.6	4.6	4.6	4.7	5.0	6.6	0.0	0.0	0.1	0.4	2.0
OC015	4.6	4.6	4.6	4.6	4.8	5.3	0.0	0.0	0.0	0.2	0.7
OC020	4.4	4.4	4.4	4.4	4.6	5.3	0.0	0.0	0.1	0.2	0.9
OC021	4.3	4.2	4.2	4.2	4.2	4.0	0.0	0.0	0.0	-0.1	-0.3
OP015	5.1	5.1	5.2	5.3	5.5	5.1	0.1	0.2	0.3	0.5	0.1
OPEB001	4.6	4.6	4.6	4.6	4.5	4.6	0.0	0.0	0.0	-0.1	0.0
OPEB002	4.6	4.6	4.6	4.7	4.7	4.7	0.0	0.0	0.0	0.0	0.0
OPEB003	4.7	4.7	4.7	4.7	4.7	4.7	0.0	0.0	0.0	0.0	0.0
OPEB004	4.7	4.7	4.7	4.7	4.8	4.7	0.0	0.0	0.0	0.1	0.0
OPEB005	4.7	4.7	4.7	4.7	4.8	4.7	0.0	0.0	0.0	0.1	0.0
OPEB006	4.8	4.8	4.8	4.8	4.9	4.8	0.0	0.0	0.0	0.1	0.0
OPEB007	4.8	4.8	4.8	4.8	4.9	4.8	0.0	0.0	0.0	0.1	0.0
OPEB008	4.8	4.8	4.8	4.9	4.9	4.8	0.0	0.0	0.0	0.1	0.0
OPEB009	4.8	4.8	4.8	4.9	5.0	4.9	0.0	0.0	0.0	0.1	0.0

Table 6A-2. Alternative No. 1, Maintenance Condition for the 5-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 5-year, 72-hour Storm						Delta (Alt. 1 - Base, ft)				
	Base	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged
OPEB010	4.8	4.8	4.8	4.9	5.0	4.9	0.0	0.0	0.0	0.1	0.0
OPEB011	4.8	4.8	4.8	4.9	5.0	4.9	0.0	0.0	0.0	0.2	0.0
OPEB015	4.8	4.8	4.8	4.9	5.0	4.9	0.0	0.0	0.0	0.2	0.0
OPL005	5.1	5.1	5.0	5.0	5.0	5.0	0.0	0.0	0.0	-0.1	0.0
OPL010	5.1	5.1	5.0	5.0	5.0	5.0	0.0	0.0	0.0	-0.1	0.0
OPL015	5.7	5.7	5.7	5.7	5.7	5.6	0.0	0.0	0.0	0.0	-0.1
OPL020	5.7	5.7	5.7	5.7	5.7	5.6	0.0	0.0	0.0	0.0	-0.1
OPL025	6.6	6.7	6.9	7.1	7.2	7.4	0.2	0.3	0.5	0.7	0.8
OPL030	6.2	6.2	6.2	6.3	6.4	7.4	0.0	0.1	0.1	0.2	1.3
OPL035	6.2	6.2	6.2	6.3	6.4	7.4	0.0	0.1	0.1	0.2	1.3
OUT_IC005	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
OUT_IC010	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
OUT_IC015	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
OUT_IC020	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
OUT_IC055	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
PAG005	9.0	9.0	9.0	9.0	9.0	9.1	0.0	0.0	0.0	0.0	0.1
PORTSPUR005	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
PRLAKE010	8.9	8.9	8.8	8.8	8.7	8.4	0.0	-0.1	-0.1	-0.2	-0.5
PRN001	4.9	4.9	4.9	4.9	4.9	4.8	0.0	0.0	0.0	0.0	-0.1
PRN005	9.4	9.4	9.4	9.4	9.5	9.5	0.0	0.0	0.0	0.1	0.1
PRN010	9.4	9.4	9.4	9.5	9.5	9.5	0.0	0.0	0.1	0.1	0.1
PRN015	9.4	9.4	9.4	9.5	9.5	9.5	0.0	0.0	0.1	0.1	0.1
PRN018	9.4	9.4	9.4	9.5	9.5	9.5	0.0	0.0	0.1	0.1	0.1
PRN020	9.4	9.4	9.5	9.5	9.5	9.5	0.0	0.0	0.1	0.1	0.1
PRN025	9.7	9.7	9.7	9.7	9.7	9.9	0.0	0.0	0.0	0.0	0.2
PRN030	9.7	9.7	9.7	9.7	9.7	9.9	0.0	0.0	0.0	0.0	0.2
PRN035	7.7	7.7	7.7	7.7	7.7	7.9	0.0	0.0	0.0	0.0	0.2
PRN038	7.7	7.7	7.7	7.7	7.7	7.9	0.0	0.0	0.0	0.0	0.2
PRN039	7.7	7.7	7.7	7.7	7.7	7.9	0.0	0.0	0.0	0.0	0.2
PRN040	7.7	7.7	7.7	7.7	7.7	7.9	0.0	0.0	0.0	0.0	0.2
PRN045	7.7	7.7	7.7	7.7	7.7	7.9	0.0	0.0	0.0	0.1	0.2
PRN1005	9.4	9.4	9.4	9.5	9.5	9.5	0.0	0.0	0.1	0.1	0.1
PRN1006	9.0	9.0	9.0	8.9	8.8	7.6	0.0	0.0	-0.1	-0.2	-1.4

Table 6A-2. Alternative No. 1, Maintenance Condition for the 5-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 5-year, 72-hour Storm						Delta (Alt. 1 - Base, ft)				
	Base	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged
PRN1010	9.0	9.0	9.0	8.9	8.8	7.6	0.0	0.0	-0.1	-0.2	-1.4
PRN1011	9.0	9.0	9.0	9.0	9.0	9.1	0.0	0.0	0.0	0.0	0.1
PRSWLAKE020	8.5	8.5	8.5	8.5	8.6	8.8	0.0	0.0	0.0	0.1	0.3
PRSWLAKE025	8.2	8.2	8.2	8.2	8.2	8.1	0.0	0.0	0.0	-0.1	-0.1
RIVRPS	3.3	2.9	2.5	2.5	2.5	5.5	-0.4	-0.8	-0.8	-0.8	2.2
ROL-05	5.0	5.0	5.0	5.0	5.0	5.2	0.0	0.0	0.0	0.0	0.2
RVRLND-05	7.4	7.4	7.4	7.4	7.4	7.4	0.0	0.0	0.0	0.0	0.0
S33_HW	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0	0.0	0.0
S33_TW	6.5	6.5	6.5	6.4	6.3	6.3	0.0	-0.1	-0.1	-0.2	-0.2
S36_TW	5.2	5.2	5.1	5.1	5.1	5.2	0.0	0.0	0.0	-0.1	0.0
S36-HW	5.4	5.4	5.4	5.4	5.4	5.4	0.0	0.0	0.0	-0.1	0.0
S37A_TW	3.2	3.2	3.2	3.2	3.2	3.2	0.0	0.0	0.0	0.0	0.0
S37A-HW	3.9	3.9	3.9	3.9	3.9	3.8	0.0	0.0	0.0	-0.1	-0.1
S37B_HW	4.9	4.9	4.9	4.9	4.9	4.8	0.0	0.0	0.0	0.0	-0.1
S37B_TW	4.4	4.4	4.4	4.4	4.4	4.3	0.0	0.0	0.0	0.0	-0.1
SANDR-05	6.0	6.0	6.0	6.0	6.0	6.1	0.0	0.0	0.0	0.1	0.1
SE10A-05	6.0	6.0	6.1	6.2	6.3	6.6	0.0	0.1	0.2	0.3	0.6
SE3A-05	4.5	4.6	4.7	4.8	5.0	5.5	0.1	0.2	0.3	0.5	1.0
SE3A-10	5.2	5.2	5.2	5.2	5.3	5.3	0.0	0.0	0.0	0.0	0.1
SE3A-15	7.6	7.7	7.7	7.7	7.9	8.6	0.0	0.1	0.1	0.2	1.0
SE4A-10	8.3	8.4	8.6	8.7	8.8	9.1	0.1	0.2	0.4	0.5	0.8
SE5A-05	4.5	4.6	4.6	4.7	4.8	5.1	0.0	0.1	0.1	0.2	0.5
SeepOut	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SFED-05	6.1	6.1	6.1	6.2	6.2	6.4	0.0	0.1	0.1	0.2	0.3
SFED-10	6.4	6.4	6.4	6.4	6.5	6.5	0.0	0.0	0.0	0.1	0.1
SFED-15	7.6	7.7	7.7	7.7	7.9	8.6	0.0	0.1	0.1	0.2	1.0
SFED-20	7.6	7.7	7.7	7.7	7.9	8.6	0.0	0.1	0.1	0.2	1.0
SFED-25	7.6	7.7	7.7	7.7	7.9	8.6	0.0	0.1	0.1	0.2	1.0
SFNR005	4.0	4.0	4.0	4.0	3.9	3.9	0.0	0.0	0.0	-0.1	-0.1
SFNR006	4.0	4.0	4.0	4.0	4.0	3.9	0.0	0.0	0.0	-0.1	-0.1
SFNR010	4.1	4.1	4.1	4.0	4.0	3.9	0.0	0.0	0.0	-0.1	-0.2
SFNR015	4.1	4.1	4.1	4.1	4.1	4.0	0.0	0.0	0.0	-0.1	-0.2
SFNR020	4.1	4.1	4.1	4.1	4.1	4.0	0.0	0.0	0.0	-0.1	-0.2

Table 6A-2. Alternative No. 1, Maintenance Condition for the 5-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 5-year, 72-hour Storm						Delta (Alt. 1 - Base, ft)				
	Base	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged
SFNR025	4.2	4.2	4.2	4.2	4.1	4.0	0.0	0.0	-0.1	-0.1	-0.2
SFNR030	4.2	4.2	4.2	4.2	4.1	4.1	0.0	0.0	-0.1	-0.1	-0.2
SFNRC005	4.2	4.2	4.2	4.2	4.1	4.1	0.0	0.0	-0.1	-0.1	-0.2
SFNRSPUR005	4.1	4.1	4.1	4.0	4.0	3.9	0.0	0.0	0.0	-0.1	-0.1
SFNRSPUR010	4.1	4.1	4.1	4.1	4.1	4.0	0.0	0.0	0.0	-0.1	-0.2
SFNRSPUR013	4.2	4.2	4.2	4.2	4.1	4.0	0.0	0.0	0.0	-0.1	-0.2
SFNRSPUR014	4.2	4.2	4.2	4.2	4.1	4.0	0.0	0.0	0.0	-0.1	-0.2
SFNRSPUR015	4.2	4.2	4.2	4.2	4.1	4.0	0.0	0.0	0.0	-0.1	-0.2
SFNRSPUR018	4.2	4.2	4.2	4.2	4.1	4.0	0.0	0.0	-0.1	-0.1	-0.2
SMIAMI-05	8.3	8.3	8.3	8.3	8.4	8.4	0.0	0.0	0.1	0.1	0.2
SMIAMI-10	7.9	8.0	8.1	8.1	8.2	8.6	0.1	0.2	0.2	0.3	0.7
SNYDERPK-05	6.5	6.6	6.6	6.6	6.6	6.7	0.0	0.0	0.0	0.1	0.1
SNYDERPK-10	6.5	6.6	6.6	6.6	6.6	6.7	0.0	0.0	0.0	0.1	0.1
SR84-05	7.0	7.0	7.1	7.2	7.5	7.5	0.1	0.1	0.2	0.5	0.6
SR84-10	8.6	8.7	8.7	8.7	8.8	9.1	0.0	0.0	0.1	0.1	0.5
SR84-15	8.1	8.1	8.1	8.1	8.1	8.2	0.0	0.0	0.0	0.1	0.2
SR84-20	5.4	5.4	5.5	5.5	5.6	5.8	0.0	0.0	0.1	0.2	0.4
SR84LAKE005	4.2	4.2	4.2	4.2	4.1	4.1	0.0	0.0	-0.1	-0.1	-0.2
SR84LAKE010	4.2	4.2	4.2	4.2	4.1	4.1	0.0	0.0	-0.1	-0.1	-0.2
SW12A-05	6.5	6.6	6.6	6.6	6.6	6.7	0.0	0.0	0.0	0.1	0.1
SW12A-10	6.5	6.5	6.6	6.6	6.6	6.7	0.0	0.0	0.0	0.1	0.1
SW14A-05	5.1	5.1	5.2	5.2	5.3	5.4	0.0	0.1	0.1	0.2	0.3
SW14ST-05	6.2	6.2	6.3	6.4	6.7	7.9	0.0	0.1	0.2	0.5	1.7
SW14ST-10	7.1	7.1	7.1	7.2	7.3	7.5	0.0	0.1	0.1	0.2	0.4
SW15A-05	6.6	6.6	6.6	6.6	6.6	6.6	0.0	0.0	0.0	0.0	0.1
SW15CT-05	7.2	7.2	7.3	7.3	7.5	8.2	0.0	0.1	0.1	0.3	1.0
SW16ST-05	4.9	4.9	4.9	5.0	5.0	5.6	0.0	0.0	0.1	0.1	0.7
SW20ST-05	5.1	5.2	5.2	5.2	5.3	5.5	0.0	0.1	0.1	0.2	0.4
SW20ST-10	5.1	5.2	5.2	5.2	5.3	5.5	0.0	0.1	0.1	0.2	0.4
SW24ST-05	5.0	5.0	5.0	5.0	5.0	5.2	0.0	0.0	0.0	0.0	0.2
SW27A-05	8.2	8.2	8.2	8.2	8.2	8.2	0.0	0.0	0.0	0.0	0.1
SW3A-05	4.9	5.0	5.0	5.1	5.3	5.5	0.1	0.1	0.2	0.3	0.6
SW4A-05	6.5	6.5	6.5	6.5	6.6	6.7	0.0	0.0	0.0	0.1	0.2

Table 6A-2. Alternative No. 1, Maintenance Condition for the 5-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 5-year, 72-hour Storm						Delta (Alt. 1 - Base, ft)				
	Base	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged
SW4A-10	6.7	6.8	6.8	6.8	6.9	7.0	0.0	0.0	0.1	0.1	0.2
SW4A-15	7.1	7.1	7.1	7.1	7.1	7.2	0.0	0.0	0.0	0.1	0.1
SW7A-05	6.0	6.0	6.1	6.1	6.1	6.3	0.0	0.1	0.1	0.1	0.3
SWFLAG-05	4.1	3.9	3.6	3.5	3.5	5.5	-0.2	-0.5	-0.6	-0.6	1.4
SWFLAG-10	5.1	5.1	5.0	5.0	5.0	5.0	0.0	0.0	0.0	-0.1	-0.1
SWFLAG-15	7.6	7.7	7.7	7.7	7.9	8.6	0.0	0.1	0.1	0.2	1.0
SWMLK-05	5.2	5.2	5.3	5.4	5.6	6.2	0.0	0.1	0.2	0.5	1.1
SWMLK-10	5.2	5.2	5.3	5.3	5.5	5.6	0.0	0.1	0.2	0.3	0.4
SWMLK-12	5.4	5.5	5.6	5.7	5.8	6.5	0.1	0.1	0.2	0.4	1.1
SWRIVRS-05	6.9	7.0	7.0	7.0	7.0	7.2	0.0	0.0	0.1	0.1	0.3
TR005	2.8	2.8	2.8	2.8	2.8	2.8	0.0	0.0	0.0	0.0	0.0
TR006	2.8	2.8	2.8	2.8	2.8	2.8	0.0	0.0	0.0	0.0	0.0
TR010	3.0	3.0	3.0	3.0	2.9	2.9	0.0	0.0	0.0	0.0	0.0
TR011	3.0	3.0	3.0	3.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0
TR015	3.2	3.2	3.2	3.2	3.2	3.2	0.0	0.0	0.0	0.0	-0.1
TR016	3.4	3.4	3.3	3.4	3.3	3.3	0.0	0.0	0.0	0.0	-0.1
TR020	3.7	3.7	3.7	3.7	3.7	3.6	0.0	0.0	-0.1	-0.1	-0.1
TR021	3.7	3.7	3.7	3.7	3.7	3.6	0.0	0.0	0.0	-0.1	-0.1
TR025	3.8	3.8	3.8	3.8	3.7	3.7	0.0	0.0	0.0	-0.1	-0.1
TR026	3.8	3.8	3.8	3.8	3.8	3.7	0.0	0.0	0.0	-0.1	-0.1
TR030	3.9	3.8	3.8	3.8	3.8	3.7	0.0	0.0	0.0	-0.1	-0.2
TR031	3.9	3.9	3.9	3.9	3.8	3.7	0.0	0.0	0.0	-0.1	-0.2
TR035	3.9	3.9	3.9	3.9	3.8	3.8	0.0	0.0	0.0	-0.1	-0.2
TR037	3.9	3.9	3.9	3.9	3.9	3.8	0.0	0.0	0.0	-0.1	-0.2
TR038	4.0	4.0	4.0	3.9	3.9	3.8	0.0	0.0	0.0	-0.1	-0.2
TR040	4.0	4.0	4.0	3.9	3.9	3.8	0.0	0.0	0.0	-0.1	-0.2
TWNLKS-05	9.6	9.6	9.7	9.7	9.8	10.1	0.0	0.1	0.1	0.2	0.5
TWNLKS-10	8.6	8.6	8.6	8.6	8.5	8.5	0.0	0.0	-0.1	-0.1	-0.1
W5A-15	4.6	4.6	4.6	4.5	4.5	4.3	0.0	0.0	-0.1	-0.1	-0.3
WBROW-05	6.3	6.3	6.3	6.3	6.3	6.3	0.0	0.0	0.0	0.0	0.0
WBROW-10	6.8	6.8	6.9	6.9	7.1	7.5	0.0	0.1	0.2	0.3	0.7
WBROW-15	8.3	8.3	8.3	8.3	8.4	8.4	0.0	0.0	0.0	0.0	0.0
WBROW-20	8.3	8.4	8.4	8.5	8.6	8.9	0.0	0.1	0.2	0.3	0.5

Table 6A-2. Alternative No. 1, Maintenance Condition for the 5-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 5-year, 72-hour Storm						Delta (Alt. 1 - Base, ft)				
	Base	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged	10% Silted	20% Silted	30% Silted	30% Silted/ Increased Losses	Clogged
WDAV-05	6.3	6.3	6.3	6.3	6.3	6.4	0.0	0.0	0.0	0.1	0.2
WDAV-10	7.5	7.5	7.6	7.6	7.7	7.8	0.0	0.1	0.1	0.2	0.3
WDAV-12	7.5	7.5	7.6	7.6	7.7	7.8	0.0	0.1	0.1	0.2	0.3
WDAV-15	8.3	8.3	8.3	8.3	8.3	8.4	0.0	0.0	0.0	0.0	0.1
WDAV-20	8.1	8.1	8.1	8.2	8.2	8.2	0.0	0.0	0.1	0.1	0.1
WDAV-25	7.7	7.7	7.8	7.8	8.0	8.2	0.0	0.0	0.1	0.3	0.5
WDAV-30	11.5	11.5	11.6	11.6	11.7	11.8	0.0	0.1	0.1	0.2	0.3
WESTLL-05	9.2	9.2	9.2	9.3	9.4	9.7	0.0	0.0	0.0	0.1	0.5
WSIST-05	6.3	6.3	6.3	6.3	6.4	6.5	0.0	0.0	0.0	0.1	0.2
WSIST-10	6.4	6.4	6.4	6.4	6.5	6.5	0.0	0.0	0.0	0.1	0.2
WSUNR-05	6.9	6.9	6.9	6.9	7.0	7.1	0.0	0.0	0.1	0.1	0.2
WSUNR-10	7.0	7.0	7.1	7.1	7.2	7.6	0.0	0.1	0.1	0.2	0.6
WSUNR-15	7.7	7.7	7.8	7.8	7.8	8.0	0.0	0.0	0.0	0.1	0.2
WSUNR-20	6.9	6.9	6.9	7.0	7.1	7.3	0.0	0.0	0.1	0.2	0.4

Table 6A-3. Alternative No. 1, Maintenance Condition for the 10-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 10-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
C12UI010	7.5	7.5	7.5	7.5	0.0	0.0	0.0
C12UI015	7.5	7.5	7.5	7.5	0.0	0.0	0.0
C12UI020	7.6	7.6	7.6	7.6	0.0	0.0	0.0
C12UICS18005	7.1	7.1	7.1	7.1	0.0	0.0	0.0
C13IC005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
C13IC010	2.8	2.8	2.8	2.8	0.0	0.0	0.0
C13IC011	2.8	2.8	2.8	2.8	0.0	0.0	0.0
C13IC015	2.9	2.9	2.9	2.9	0.0	0.0	0.0
C13IC020	3.1	3.1	3.1	3.1	0.0	0.0	0.0
C13IC025	4.4	4.4	4.4	4.4	0.0	0.0	0.0
C13ICSPUR002	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13ICSPUR005	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13MR001	4.6	4.6	4.6	4.5	0.0	0.0	0.0
C13MR005	4.5	4.5	4.5	4.5	0.0	0.0	0.0
C13MR010	4.6	4.6	4.6	4.6	0.0	0.0	0.0
C13MR015	4.8	4.8	4.8	4.8	0.0	0.0	0.0
C13MR016	4.9	4.9	4.9	4.8	0.0	0.0	0.0
C13MR020	5.1	5.1	5.1	5.0	0.0	0.0	0.0
C13MR021	5.1	5.1	5.1	5.1	0.0	0.0	-0.1
C13MR024	5.2	5.2	5.1	5.1	0.0	0.0	0.0
C13MR025	5.2	5.2	5.2	5.1	0.0	0.0	0.0
C13MR030	5.3	5.3	5.3	5.3	0.0	0.0	0.0
C13MR031	5.3	5.3	5.3	5.3	0.0	0.0	0.0
C13MRC005	4.9	4.9	4.9	4.9	0.0	0.0	0.0
C13MRC006	5.0	5.0	5.0	5.0	0.0	0.0	0.0
C13MRC007	5.0	5.0	5.0	5.0	0.0	0.0	0.0
C13MRC008	5.2	5.1	5.1	5.1	0.0	0.0	0.0
C13MRC009	5.2	5.2	5.2	5.1	0.0	0.0	0.0
C13MRC010	5.3	5.3	5.3	5.2	0.0	0.0	0.0
C13MRC012	5.3	5.3	5.3	5.3	0.0	0.0	0.0
C13MRC014	5.4	5.4	5.4	5.3	0.0	0.0	0.0
C13MRC015	5.4	5.4	5.4	5.3	0.0	0.0	0.0
C13MRC017	5.4	5.4	5.4	5.3	0.0	0.0	0.0
C13MRC018	5.4	5.4	5.4	5.4	0.0	0.0	-0.1
C13MRC-02	8.1	8.2	8.2	8.2	0.0	0.0	0.0
C13MRC020	5.4	5.4	5.4	5.4	0.0	0.0	-0.1
C13MRC022	5.4	5.4	5.4	5.4	0.0	0.0	-0.1
C13MRC023	5.5	5.5	5.4	5.4	0.0	0.0	0.0
C13MRC024	5.5	5.5	5.5	5.5	0.0	0.0	0.0
C13MRC025	5.6	5.5	5.5	5.5	0.0	0.0	-0.1
C13MRC-03	5.6	5.6	5.6	5.6	0.0	0.0	0.0
C13MRC035	5.6	5.6	5.6	5.6	0.0	0.0	0.0
C13MRC042	6.1	6.0	6.0	6.0	0.0	0.0	-0.1
C13MRC043	6.1	6.0	6.0	6.0	0.0	0.0	0.0
C13MRC045	6.1	6.1	6.1	6.0	0.0	0.0	-0.1
C13MRSPUR005	4.6	4.6	4.6	4.5	0.0	0.0	0.0
C14CCC005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
C14CCC008	2.7	2.7	2.7	2.7	0.0	0.0	0.0
C14CCC010	2.8	2.8	2.8	2.8	0.0	0.0	0.0
C14CCC020	3.1	3.1	3.1	3.1	0.0	0.0	0.0

Table 6A-3. Alternative No. 1, Maintenance Condition for the 10-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 10-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
C14CCC022	3.2	3.2	3.2	3.2	0.0	0.0	0.0
C14CCC025	3.3	3.3	3.3	3.3	0.0	0.0	0.0
C14CCC027	3.3	3.3	3.3	3.3	0.0	0.0	0.0
C14CCC038	4.6	4.5	4.5	4.5	0.0	0.0	0.0
C14CCC039	4.6	4.6	4.6	4.6	0.0	0.0	0.0
C14CCC040	4.7	4.7	4.7	4.7	0.0	0.0	0.0
C14CCC045	4.9	4.9	4.9	4.9	0.0	0.0	0.0
CCCSPUR005	3.5	3.5	3.5	3.5	0.0	0.0	0.0
CCCSPUR010	3.5	3.5	3.5	3.5	0.0	0.0	0.0
CCCSPUR015	3.5	3.5	3.5	3.6	0.0	0.0	0.0
CCCSPUR020	7.1	7.1	7.2	7.3	0.0	0.1	0.2
CCCSPUR021	7.1	7.1	7.2	7.3	0.0	0.1	0.2
CRCC-05	5.4	5.4	5.4	5.4	0.0	0.0	0.0
CRDVA-05	3.8	3.8	3.8	3.8	0.0	0.0	0.0
DUM_IC006	2.5	2.5	2.5	2.5	0.0	0.0	0.0
EBROW-05	4.8	4.8	4.9	5.0	0.0	0.1	0.2
ECOMM-05	6.2	6.2	6.2	6.2	0.0	0.0	0.0
ECOMM-10	6.8	6.8	6.8	6.9	0.0	0.0	0.1
ECOMM-20	6.8	6.8	6.8	6.8	0.0	0.0	0.0
ELOSO-05	4.7	4.8	4.9	5.0	0.1	0.1	0.2
EOAKPRK-05	5.2	5.2	5.2	5.2	0.0	0.0	0.0
ESUNR-01	7.1	7.1	7.1	7.1	0.0	0.0	0.1
ESUNR-05	7.1	7.1	7.1	7.1	0.0	0.0	0.1
ESUNR-07	7.3	7.3	7.3	7.4	0.0	0.0	0.0
ESUNR-10	7.1	7.1	7.1	7.1	0.0	0.0	0.0
FLEA-05	10.6	10.6	10.6	10.6	0.0	0.0	0.0
FLEA-10	12.2	12.2	12.2	12.2	0.0	0.0	0.0
G16005	3.0	3.0	3.0	3.0	0.0	0.0	0.0
G16007	3.0	3.0	3.0	3.0	0.0	0.0	0.0
G54_HW	2.5	2.5	2.5	2.5	0.0	0.0	0.0
G54_TW	4.9	4.9	4.9	4.9	0.0	0.0	0.0
G57_TW	3.0	3.0	3.0	3.0	0.0	0.0	0.0
GALT-05	9.6	9.7	9.7	9.8	0.1	0.1	0.2
HCOPWCD2005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
HF010	7.6	7.6	7.7	7.7	0.0	0.0	0.0
HF015	7.6	7.7	7.7	7.7	0.0	0.0	0.0
HF020	7.6	7.7	7.7	7.7	0.0	0.0	0.0
HFCS17005	7.6	7.6	7.7	7.7	0.0	0.0	0.0
HFCS55025	8.4	8.4	8.4	8.4	0.0	0.0	0.1
I595-05	7.8	7.8	7.8	7.8	0.0	0.0	0.0
I595-10	5.6	5.6	5.6	5.6	0.0	0.0	0.0
I595-15	6.8	6.8	6.8	6.8	0.0	0.0	0.0
IC022	2.6	2.6	2.6	2.6	0.0	0.0	0.0
IC025	2.8	2.8	2.8	2.8	0.0	0.0	0.0
IC030	2.9	2.9	2.9	2.9	0.0	0.0	0.0
IC032	2.9	2.9	2.9	2.9	0.0	0.0	0.0
IC035	3.0	3.0	3.0	3.0	0.0	0.0	0.0
IC040	3.0	3.0	3.0	3.0	0.0	0.0	0.0
IC042	3.0	3.0	3.0	3.0	0.0	0.0	0.0
IC043	2.9	2.9	2.9	2.9	0.0	0.0	0.0

Table 6A-3. Alternative No. 1, Maintenance Condition for the 10-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 10-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
IC044	2.9	2.9	2.9	2.9	0.0	0.0	0.0
IC045	3.0	3.0	3.0	3.0	0.0	0.0	0.0
IC050	3.0	3.0	3.0	3.0	0.0	0.0	0.0
LAKEEMERALD-05	5.0	5.0	5.0	5.0	0.0	0.0	0.0
LKMELVA-05	5.9	5.9	5.9	5.9	0.0	0.0	0.0
LL005	7.6	7.6	7.6	7.7	0.0	0.0	0.0
LL015	7.6	7.6	7.6	7.7	0.0	0.0	0.0
LL020	7.7	7.7	7.7	7.7	0.0	0.0	0.0
LL025	7.7	7.7	7.7	7.7	0.0	0.0	0.0
LL026	7.8	7.8	7.8	7.8	0.0	0.0	0.0
LL030	7.8	7.8	7.8	7.9	0.0	0.0	0.0
LL035	6.9	7.0	7.0	7.1	0.0	0.1	0.2
LLAKE040	8.7	8.7	8.7	8.7	0.0	0.0	0.0
MELROSEPK-05	8.6	8.6	8.7	8.7	0.0	0.1	0.2
MELROSEPK-06	8.5	8.6	8.6	8.6	0.0	0.1	0.1
MELROSEPK-10	8.6	8.6	8.7	8.7	0.0	0.1	0.1
MIDLST-05	5.2	5.2	5.2	5.2	0.0	0.0	0.1
MLKPOND-05	5.4	5.4	5.4	5.4	0.0	0.0	0.0
NANDR-05	7.0	7.0	7.0	7.0	0.0	0.0	0.0
NANDR-10	6.4	6.4	6.4	6.4	0.0	0.0	0.0
NANDR-15	5.3	5.3	5.3	5.3	0.0	0.0	0.0
NDIXIE-02	7.4	7.4	7.4	7.4	0.0	0.0	0.0
NDIXIE-05	6.8	6.8	6.8	6.8	0.0	0.0	0.0
NE11ST-04	7.4	7.4	7.4	7.4	0.0	0.0	0.0
NE11ST-05	7.4	7.4	7.5	7.5	0.0	0.0	0.0
NE13ST-05	7.1	7.2	7.2	7.3	0.1	0.1	0.2
NE13ST-10	7.1	7.2	7.2	7.3	0.1	0.1	0.2
NE13ST-15	6.6	6.6	6.6	6.7	0.0	0.0	0.0
NE15A-05	5.0	5.0	5.0	5.0	0.0	0.0	0.0
NE15A-10	5.9	5.9	5.9	5.9	0.0	0.0	0.0
NE3A-05	6.6	6.6	6.6	6.6	0.0	0.0	0.0
NE3A-07	6.4	6.4	6.4	6.4	0.0	0.0	0.0
NE3A-10	5.6	5.6	5.6	5.6	0.0	0.0	0.0
NE3CT-05	8.0	8.0	8.0	8.0	0.0	0.0	0.0
NE4A-05	6.4	6.4	6.4	6.4	0.0	0.0	0.0
NE4A-10	6.7	6.7	6.7	6.7	0.0	0.0	0.0
NE4A-15	7.1	7.1	7.1	7.1	0.0	0.0	0.0
NE65-05	6.0	6.0	6.1	6.4	0.1	0.1	0.4
NFED-05	6.5	6.5	6.5	6.5	0.0	0.0	0.0
NFED-10	6.6	6.6	6.7	6.8	0.1	0.1	0.2
NFED-12	6.6	6.7	6.7	6.8	0.1	0.1	0.2
NFED-15	6.6	6.6	6.6	6.6	0.0	0.0	0.0
NFED-20	6.7	6.7	6.7	6.7	0.0	0.0	0.0
NFED-22	6.9	7.0	7.0	7.0	0.0	0.0	0.0
NFED-25	7.7	7.7	7.7	7.7	0.0	0.0	0.0
NFED-30	9.4	9.4	9.4	9.4	0.0	0.0	0.0
NFED-35	6.7	6.7	6.7	6.7	0.0	0.0	0.0
NFED-37	5.9	6.4	6.0	6.0	0.4	0.0	0.0
NFED-40	6.7	6.7	6.8	6.8	0.0	0.0	0.0
NFED-45	9.1	9.1	9.2	9.2	0.0	0.1	0.1

Table 6A-3. Alternative No. 1, Maintenance Condition for the 10-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 10-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
NFED-50	8.3	8.3	8.3	8.3	0.0	0.0	0.0
NFED-52	5.2	5.2	5.2	5.2	0.0	0.0	0.0
NFED-53	4.8	4.8	4.8	4.7	0.0	0.0	0.0
NFED-55	6.5	6.5	6.5	6.5	0.0	0.0	0.0
NFED-60	7.2	7.2	7.2	7.2	0.0	0.0	0.0
NFED-65	6.5	6.5	6.5	6.5	0.0	0.0	0.0
NFED-67	6.0	6.1	6.2	6.3	0.1	0.2	0.2
NFED-70	6.0	6.1	6.2	6.2	0.1	0.2	0.3
NFNR001	2.6	2.6	2.6	2.6	0.0	0.0	0.0
NFNR005	2.6	2.6	2.6	2.6	0.0	0.0	0.0
NFNR008	3.3	3.3	3.2	3.2	0.0	0.0	0.0
NFNR010	3.6	3.6	3.6	3.6	0.0	0.0	0.0
NFNR011	3.7	3.7	3.7	3.7	0.0	0.0	0.0
NFNR015	3.9	3.9	3.9	3.9	0.0	0.0	0.0
NFNR016	4.0	4.0	4.0	3.9	0.0	0.0	0.0
NFNR020	4.1	4.1	4.1	4.1	0.0	0.0	0.0
NFNR021	4.2	4.1	4.1	4.1	0.0	0.0	0.0
NFNR025	4.2	4.2	4.2	4.2	0.0	0.0	0.0
NFNR030	5.0	4.9	4.9	4.9	0.0	0.0	0.0
NFNR035	5.6	5.6	5.5	5.5	0.0	0.0	-0.1
NFNR040	5.6	5.6	5.6	5.6	0.0	0.0	0.0
NFNR042	5.9	5.8	5.8	5.8	0.0	0.0	0.0
NFNR043	6.0	6.0	5.9	5.9	0.0	0.0	-0.1
NFNR045	6.2	6.2	6.2	6.1	0.0	0.0	-0.1
NFNR046	6.2	6.2	6.2	6.2	0.0	0.0	-0.1
NFNR050	6.7	6.7	6.7	6.7	0.0	0.0	-0.1
NFNR051	6.7	6.7	6.7	6.7	0.0	0.0	-0.1
NFNR054	6.9	6.8	6.8	6.8	0.0	-0.1	-0.1
NFNR055	6.9	6.9	6.8	6.8	0.0	0.0	-0.1
NFNRSPUR004	2.8	2.8	2.8	2.8	0.0	0.0	0.0
NFNRSPUR005	2.9	2.9	2.9	2.9	0.0	0.0	0.0
NFNRSPUR010	3.0	3.0	3.0	2.9	0.0	0.0	-0.1
NFSPUR005	5.0	4.9	4.9	4.9	0.0	0.0	0.0
NNRC005	4.5	4.5	4.5	4.5	0.0	0.0	0.0
NNRC010	4.7	4.7	4.7	4.7	0.0	0.0	0.0
NNRC015	4.8	4.8	4.8	4.8	0.0	0.0	0.0
NNRC020	4.8	4.8	4.8	4.8	0.0	0.0	0.0
NPOWRL-03	7.6	7.7	7.7	7.7	0.0	0.0	0.1
NPOWRL-05	7.2	7.3	7.3	7.3	0.0	0.0	0.0
NPOWRL-10	9.2	9.2	9.2	9.2	0.0	0.0	0.0
NW10TR-05	10.6	10.6	10.6	10.6	0.0	0.0	0.0
NW15A-05	7.8	7.8	7.8	7.8	0.0	0.0	0.0
NW15A-10	6.5	6.5	6.5	6.5	0.0	0.0	0.0
NW15A-15	6.4	6.4	6.4	6.4	0.0	0.0	0.0
NW18A-05	6.9	6.9	6.9	6.9	0.0	0.0	0.0
NW22ST-05	6.8	6.8	6.8	6.8	0.0	0.0	0.0
NW22ST-10	8.1	8.1	8.1	8.1	0.0	0.0	0.0
NW24A-05	7.0	7.0	7.0	7.0	0.0	0.0	0.0
NW28-05	10.4	10.4	10.4	10.5	0.0	0.0	0.1
NW29-05	11.4	11.4	11.4	11.4	0.0	0.0	0.0

Table 6A-3. Alternative No. 1, Maintenance Condition for the 10-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 10-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
NW31ST-05	7.3	7.3	7.3	7.3	0.0	0.0	0.0
NW35-05	10.3	10.4	10.5	10.6	0.1	0.2	0.2
NW35-10	9.6	9.6	9.6	9.7	0.0	0.0	0.0
NW35-15	9.4	9.4	9.5	9.5	0.0	0.1	0.1
NW4A-05	7.0	7.0	7.0	7.0	0.0	0.0	0.1
NW4A-10	7.0	7.0	7.0	7.0	0.0	0.0	0.1
NW5A-05	7.0	7.0	7.0	7.0	0.0	0.0	0.1
NW5A-07	6.6	6.7	6.7	6.7	0.0	0.0	0.1
NW5A-10	6.6	6.6	6.6	6.6	0.0	0.0	0.1
NW7A-05	6.9	6.9	6.9	7.0	0.0	0.0	0.0
NW7A-10	6.9	6.9	6.9	7.0	0.0	0.0	0.1
NW8ST-05	6.7	6.7	6.7	6.7	0.0	0.0	0.0
NW8ST-10	6.7	6.7	6.7	6.7	0.0	0.0	0.0
NW9A-05	6.9	6.9	6.9	6.9	0.0	0.0	0.0
NW9A-10	7.0	7.0	7.1	7.1	0.0	0.0	0.0
NWFLAG-05	4.9	4.9	4.8	4.6	-0.1	-0.2	-0.3
OC005	5.2	5.2	5.3	5.4	0.0	0.1	0.1
OC010	5.0	5.0	5.1	5.2	0.0	0.1	0.2
OC015	4.9	5.0	5.0	5.0	0.0	0.0	0.1
OC020	4.7	4.7	4.7	4.8	0.0	0.0	0.1
OC021	4.6	4.5	4.5	4.5	0.0	0.0	-0.1
OP015	5.6	5.7	5.8	5.8	0.1	0.2	0.3
OPEB001	5.0	4.9	4.9	4.9	0.0	0.0	0.0
OPEB002	5.0	5.0	5.1	5.1	0.0	0.0	0.0
OPEB003	5.1	5.1	5.1	5.1	0.0	0.0	0.0
OPEB004	5.1	5.1	5.1	5.2	0.0	0.0	0.1
OPEB005	5.1	5.1	5.2	5.2	0.0	0.0	0.1
OPEB006	5.3	5.3	5.3	5.3	0.0	0.0	0.0
OPEB007	5.3	5.3	5.4	5.4	0.0	0.1	0.1
OPEB008	5.3	5.4	5.4	5.4	0.0	0.0	0.1
OPEB009	5.4	5.4	5.4	5.5	0.0	0.1	0.1
OPEB010	5.4	5.4	5.4	5.5	0.0	0.1	0.1
OPEB011	5.4	5.4	5.4	5.5	0.0	0.0	0.1
OPEB015	5.4	5.4	5.4	5.5	0.0	0.0	0.1
OPL005	5.6	5.6	5.6	5.6	0.0	0.0	0.0
OPL010	5.6	5.6	5.6	5.6	0.0	0.0	-0.1
OPL015	5.8	5.8	5.8	5.8	0.0	0.0	0.0
OPL020	5.8	5.8	5.8	5.8	0.0	0.0	0.0
OPL025	7.3	7.4	7.5	7.7	0.1	0.3	0.4
OPL030	6.9	7.0	7.0	7.1	0.0	0.1	0.2
OPL035	6.9	7.0	7.0	7.1	0.0	0.1	0.2
OUT_IC005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
OUT_IC010	2.5	2.5	2.5	2.5	0.0	0.0	0.0
OUT_IC015	2.5	2.5	2.5	2.5	0.0	0.0	0.0
OUT_IC020	2.5	2.5	2.5	2.5	0.0	0.0	0.0
OUT_IC055	2.5	2.5	2.5	2.5	0.0	0.0	0.0
PAG005	9.1	9.1	9.1	9.1	0.0	0.0	0.0
PORTSPUR005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
PRLAKE010	9.2	9.2	9.1	9.1	0.0	-0.1	-0.1
PRN001	5.4	5.4	5.4	5.4	0.0	0.0	0.0

Table 6A-3. Alternative No. 1, Maintenance Condition for the 10-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 10-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
PRN005	9.9	9.9	9.9	9.9	0.0	0.0	0.1
PRN010	9.9	9.9	9.9	10.0	0.0	0.0	0.1
PRN015	9.9	9.9	10.0	10.0	0.0	0.0	0.1
PRN018	9.9	9.9	10.0	10.0	0.0	0.0	0.1
PRN020	9.9	10.0	10.0	10.0	0.0	0.1	0.1
PRN025	9.9	9.9	9.9	9.9	0.0	0.0	0.0
PRN030	9.9	9.9	9.9	9.9	0.0	0.0	0.0
PRN035	8.0	8.0	8.0	8.0	0.0	0.0	0.0
PRN038	8.0	8.0	8.0	8.0	0.0	0.0	0.0
PRN039	8.0	8.0	8.0	8.0	0.0	0.0	0.0
PRN040	8.0	8.0	8.0	8.0	0.0	0.0	0.0
PRN045	8.0	8.0	8.0	8.0	0.0	0.0	0.0
PRN1005	9.9	9.9	9.9	10.0	0.0	0.0	0.1
PRN1006	9.2	9.1	9.1	9.1	0.0	0.0	-0.1
PRN1010	9.2	9.1	9.1	9.1	0.0	0.0	-0.1
PRN1011	9.1	9.1	9.1	9.1	0.0	0.0	0.0
PRSWLAKE020	8.8	8.8	8.8	8.8	0.0	0.0	0.0
PRSWLAKE025	8.5	8.5	8.5	8.5	0.0	0.0	0.0
RIVRPS	4.0	3.7	3.2	2.5	-0.3	-0.8	-1.5
ROL-05	5.1	5.1	5.1	5.1	0.0	0.0	0.0
RVRLND-05	7.5	7.5	7.5	7.5	0.0	0.0	0.0
S33_HW	2.6	2.6	2.6	2.6	0.0	0.0	0.0
S33_TW	7.0	6.9	6.9	6.9	0.0	-0.1	-0.1
S36_TW	5.7	5.7	5.7	5.6	0.0	0.0	-0.1
S36-HW	6.0	6.0	6.0	6.0	0.0	0.0	0.0
S37A_TW	3.5	3.5	3.5	3.5	0.0	0.0	0.0
S37A-HW	4.4	4.4	4.4	4.4	0.0	0.0	0.0
S37B_HW	5.4	5.4	5.4	5.4	0.0	0.0	0.0
S37B_TW	5.0	5.0	5.0	5.0	0.0	0.0	0.0
SANDR-05	6.0	6.0	6.0	6.1	0.0	0.0	0.0
SE10A-05	6.2	6.2	6.3	6.3	0.0	0.1	0.1
SE3A-05	4.7	4.8	4.9	5.0	0.1	0.1	0.3
SE3A-10	5.3	5.3	5.3	5.3	0.0	0.0	0.0
SE3A-15	7.8	7.8	7.8	7.9	0.0	0.1	0.1
SE4A-10	8.6	8.7	8.8	8.8	0.1	0.2	0.2
SE5A-05	4.6	4.7	4.7	4.8	0.0	0.1	0.1
SeepOut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SFED-05	6.2	6.2	6.2	6.2	0.0	0.0	0.1
SFED-10	6.5	6.5	6.5	6.5	0.0	0.0	0.0
SFED-15	7.8	7.8	7.8	7.9	0.0	0.1	0.1
SFED-20	7.8	7.8	7.8	7.9	0.0	0.1	0.1
SFED-25	7.8	7.8	7.8	7.9	0.0	0.1	0.1
SFNR005	4.2	4.2	4.2	4.2	0.0	0.0	0.0
SFNR006	4.3	4.2	4.2	4.2	0.0	0.0	0.0
SFNR010	4.3	4.3	4.3	4.3	0.0	0.0	0.0
SFNR015	4.4	4.4	4.4	4.3	0.0	0.0	-0.1
SFNR020	4.4	4.4	4.4	4.4	0.0	0.0	-0.1
SFNR025	4.5	4.5	4.4	4.4	0.0	0.0	-0.1
SFNR030	4.5	4.5	4.5	4.5	0.0	0.0	0.0
SFNRC005	4.5	4.5	4.5	4.5	0.0	0.0	0.0

Table 6A-3. Alternative No. 1, Maintenance Condition for the 10-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 10-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
SFNRSPUR005	4.3	4.3	4.3	4.3	0.0	0.0	0.0
SFNRSPUR010	4.4	4.4	4.4	4.4	0.0	0.0	0.0
SFNRSPUR013	4.5	4.5	4.5	4.4	0.0	0.0	-0.1
SFNRSPUR014	4.5	4.5	4.5	4.4	0.0	0.0	-0.1
SFNRSPUR015	4.5	4.5	4.5	4.4	0.0	0.0	0.0
SFNRSPUR018	4.5	4.5	4.5	4.5	0.0	0.0	-0.1
SMIAMI-05	8.3	8.4	8.4	8.4	0.0	0.0	0.0
SMIAMI-10	8.0	8.1	8.2	8.2	0.1	0.1	0.2
SNYDERPK-05	6.6	6.7	6.7	6.7	0.0	0.0	0.0
SNYDERPK-10	6.6	6.7	6.7	6.7	0.0	0.0	0.0
SR84-05	7.2	7.2	7.3	7.3	0.0	0.1	0.1
SR84-10	8.7	8.7	8.8	8.8	0.0	0.0	0.1
SR84-15	8.1	8.1	8.2	8.2	0.0	0.0	0.0
SR84-20	5.6	5.6	5.7	5.7	0.0	0.0	0.1
SR84LAKE005	4.5	4.5	4.5	4.5	0.0	0.0	0.0
SR84LAKE010	4.5	4.5	4.5	4.5	0.0	0.0	0.0
SW12A-05	6.6	6.7	6.7	6.7	0.0	0.0	0.0
SW12A-10	6.6	6.7	6.7	6.7	0.0	0.0	0.0
SW14A-05	5.2	5.2	5.2	5.3	0.0	0.0	0.1
SW14ST-05	6.4	6.5	6.6	6.7	0.0	0.1	0.2
SW14ST-10	7.3	7.3	7.3	7.4	0.0	0.1	0.1
SW15A-05	6.6	6.6	6.6	6.6	0.0	0.0	0.0
SW15CT-05	7.3	7.4	7.4	7.5	0.0	0.1	0.2
SW16ST-05	5.2	5.2	5.2	5.3	0.0	0.0	0.0
SW20ST-05	5.3	5.4	5.4	5.4	0.0	0.0	0.1
SW20ST-10	5.3	5.4	5.4	5.4	0.0	0.0	0.1
SW24ST-05	5.1	5.1	5.1	5.1	0.0	0.0	0.0
SW27A-05	8.3	8.3	8.3	8.3	0.0	0.0	0.0
SW3A-05	5.1	5.1	5.2	5.2	0.0	0.1	0.2
SW4A-05	6.5	6.5	6.6	6.6	0.0	0.0	0.1
SW4A-10	6.8	6.8	6.9	6.9	0.0	0.0	0.0
SW4A-15	7.2	7.2	7.2	7.2	0.0	0.0	0.0
SW7A-05	6.1	6.1	6.1	6.2	0.0	0.0	0.0
SWFLAG-05	4.5	4.3	4.1	3.7	-0.1	-0.4	-0.8
SWFLAG-10	5.3	5.2	5.2	5.2	0.0	0.0	0.0
SWFLAG-15	7.8	7.8	7.8	7.9	0.0	0.1	0.1
SWMLK-05	5.5	5.5	5.6	5.7	0.0	0.1	0.2
SWMLK-10	5.5	5.5	5.5	5.6	0.0	0.1	0.1
SWMLK-12	5.6	5.7	5.7	5.8	0.0	0.1	0.2
SWRIVRS-05	7.0	7.1	7.1	7.1	0.0	0.0	0.0
TR005	2.9	2.9	2.9	2.9	0.0	0.0	0.0
TR006	2.9	2.9	2.9	2.9	0.0	0.0	0.0
TR010	3.1	3.1	3.1	3.1	0.0	0.0	0.0
TR011	3.1	3.1	3.1	3.1	0.0	0.0	0.0
TR015	3.4	3.4	3.4	3.4	0.0	0.0	0.0
TR016	3.6	3.5	3.5	3.6	0.0	0.0	0.0
TR020	3.9	3.9	3.9	3.9	0.0	0.0	0.0
TR021	4.0	4.0	3.9	3.9	0.0	0.0	0.0
TR025	4.0	4.0	4.0	4.0	0.0	0.0	0.0
TR026	4.0	4.0	4.0	4.0	0.0	0.0	0.0

Table 6A-3. Alternative No. 1, Maintenance Condition for the 10-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 10-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
TR030	4.1	4.1	4.1	4.0	0.0	0.0	0.0
TR031	4.1	4.1	4.1	4.1	0.0	0.0	0.0
TR035	4.1	4.1	4.1	4.1	0.0	0.0	0.0
TR037	4.1	4.1	4.1	4.1	0.0	0.0	0.0
TR038	4.2	4.2	4.2	4.2	0.0	0.0	0.0
TR040	4.2	4.2	4.2	4.2	0.0	0.0	0.0
TWNLKS-05	10.0	10.0	10.1	10.1	0.0	0.1	0.1
TWNLKS-10	8.7	8.7	8.7	8.7	0.0	0.0	0.0
W5A-15	4.8	4.8	4.7	4.7	0.0	0.0	-0.1
WBROW-05	6.3	6.3	6.3	6.3	0.0	0.0	0.0
WBROW-10	7.0	7.0	7.1	7.1	0.0	0.1	0.2
WBROW-15	8.4	8.4	8.4	8.4	0.0	0.0	0.0
WBROW-20	8.6	8.6	8.7	8.7	0.0	0.1	0.2
WDAV-05	6.4	6.4	6.4	6.4	0.0	0.0	0.0
WDAV-10	7.7	7.7	7.7	7.8	0.0	0.0	0.1
WDAV-12	7.7	7.7	7.7	7.8	0.0	0.0	0.1
WDAV-15	8.3	8.3	8.4	8.4	0.0	0.0	0.0
WDAV-20	8.2	8.2	8.2	8.2	0.0	0.0	0.0
WDAV-25	7.9	8.0	8.0	8.1	0.0	0.1	0.2
WDAV-30	11.6	11.6	11.7	11.7	0.0	0.1	0.1
WESTLL-05	9.4	9.4	9.5	9.5	0.0	0.0	0.1
WSIST-05	6.4	6.4	6.4	6.4	0.0	0.0	0.0
WSIST-10	6.5	6.5	6.5	6.5	0.0	0.0	0.0
WSUNR-05	7.0	7.0	7.0	7.0	0.0	0.0	0.0
WSUNR-10	7.2	7.2	7.2	7.3	0.0	0.1	0.1
WSUNR-15	7.8	7.8	7.9	7.9	0.0	0.0	0.0
WSUNR-20	7.2	7.2	7.2	7.2	0.0	0.0	0.0

Table 6A-4. Alternative No. 1, Maintenance Condition for the 25-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 25-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
C12UI010	8.2	8.2	8.2	8.2	0.0	0.0	0.0
C12UI015	8.2	8.2	8.2	8.2	0.0	0.0	0.0
C12UI020	8.2	8.2	8.2	8.2	0.0	0.0	0.0
C12UICS18005	8.2	8.2	8.2	8.2	0.0	0.0	0.0
C13IC005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
C13IC010	2.9	2.9	2.9	2.9	0.0	0.0	0.0
C13IC011	3.0	3.0	3.0	3.0	0.0	0.0	0.0
C13IC015	3.1	3.1	3.1	3.1	0.0	0.0	0.0
C13IC020	3.4	3.4	3.4	3.4	0.0	0.0	0.0
C13IC025	5.2	5.2	5.2	5.2	0.0	0.0	0.0
C13ICSPUR002	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13ICSPUR005	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13MR001	5.4	5.4	5.4	5.4	0.0	0.0	0.0
C13MR005	5.4	5.4	5.4	5.4	0.0	0.0	0.0
C13MR010	5.5	5.5	5.5	5.5	0.0	0.0	0.0
C13MR015	5.7	5.7	5.7	5.7	0.0	0.0	0.0
C13MR016	5.8	5.8	5.8	5.8	0.0	0.0	0.0
C13MR020	6.1	6.1	6.1	6.1	0.0	0.0	0.0
C13MR021	6.1	6.1	6.1	6.1	0.0	0.0	0.0
C13MR024	6.2	6.2	6.2	6.2	0.0	0.0	0.0
C13MR025	6.3	6.3	6.3	6.3	0.0	0.0	0.0
C13MR030	6.5	6.5	6.5	6.5	0.0	0.0	0.0
C13MR031	6.5	6.5	6.5	6.5	0.0	0.0	0.0
C13MRC005	5.9	5.9	5.9	5.9	0.0	0.0	0.0
C13MRC006	6.0	6.0	6.0	6.0	0.0	0.0	0.0
C13MRC007	6.0	6.0	6.0	6.0	0.0	0.0	0.0
C13MRC008	6.2	6.2	6.2	6.2	0.0	0.0	0.0
C13MRC009	6.3	6.3	6.3	6.3	0.0	0.0	0.0
C13MRC010	6.4	6.4	6.4	6.4	0.0	0.0	0.0
C13MRC012	6.4	6.4	6.4	6.4	0.0	0.0	0.0
C13MRC014	6.6	6.6	6.6	6.5	0.0	0.0	0.0
C13MRC015	6.6	6.6	6.6	6.6	0.0	0.0	0.0
C13MRC017	6.6	6.6	6.6	6.6	0.0	0.0	0.0
C13MRC018	6.6	6.6	6.6	6.6	0.0	0.0	0.0
C13MRC-02	8.4	8.4	8.4	8.5	0.0	0.0	0.0
C13MRC020	6.6	6.6	6.6	6.6	0.0	0.0	0.0
C13MRC022	6.7	6.7	6.7	6.7	0.0	0.0	0.0
C13MRC023	6.8	6.8	6.8	6.8	0.0	0.0	0.0
C13MRC024	6.8	6.8	6.8	6.8	0.0	0.0	0.0
C13MRC025	6.9	6.9	6.9	6.9	0.0	0.0	0.0
C13MRC-03	7.0	7.0	7.0	7.0	0.0	0.0	0.0
C13MRC035	7.0	7.0	7.0	7.0	0.0	0.0	0.0
C13MRC042	8.4	8.4	8.4	8.4	0.0	0.0	0.0
C13MRC043	8.4	8.4	8.4	8.4	0.0	0.0	0.0
C13MRC045	8.4	8.4	8.4	8.4	0.0	0.0	0.0
C13MRSPUR005	5.4	5.4	5.4	5.4	0.0	0.0	0.0
C14CCC005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
C14CCC008	2.9	2.9	2.9	2.9	0.0	0.0	0.0
C14CCC010	3.1	3.1	3.1	3.1	0.0	0.0	0.0
C14CCC020	3.6	3.6	3.6	3.6	0.0	0.0	0.0

Table 6A-4. Alternative No. 1, Maintenance Condition for the 25-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 25-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
C14CCC022	3.6	3.6	3.6	3.6	0.0	0.0	0.0
C14CCC025	3.8	3.8	3.8	3.8	0.0	0.0	0.0
C14CCC027	3.9	3.9	3.9	3.9	0.0	0.0	0.0
C14CCC038	6.5	6.5	6.5	6.5	0.0	0.0	0.0
C14CCC039	6.6	6.6	6.6	6.6	0.0	0.0	0.0
C14CCC040	6.8	6.8	6.8	6.8	0.0	0.0	0.0
C14CCC045	7.3	7.3	7.3	7.3	0.0	0.0	0.0
CCCSPUR005	4.2	4.1	4.1	4.1	0.0	0.0	0.0
CCCSPUR010	4.2	4.3	4.3	4.3	0.0	0.0	0.1
CCCSPUR015	4.2	4.3	4.3	4.3	0.0	0.0	0.1
CCCSPUR020	8.4	8.4	8.4	8.4	0.0	0.0	0.0
CCCSPUR021	8.3	8.4	8.4	8.4	0.0	0.0	0.1
CRCC-05	5.8	5.8	5.8	5.8	0.0	0.0	0.0
CRDVA-05	3.9	3.9	3.9	3.9	0.0	0.0	-0.1
DUM_IC006	2.5	2.5	2.5	2.5	0.0	0.0	0.0
EBROW-05	5.2	5.2	5.3	5.4	0.0	0.1	0.2
ECOMM-05	6.3	6.3	6.3	6.3	0.0	0.0	0.0
ECOMM-10	7.0	7.0	7.0	7.0	0.0	0.0	0.1
ECOMM-20	7.0	7.0	7.0	7.0	0.0	0.0	0.0
ELOSO-05	5.2	5.2	5.3	5.4	0.0	0.1	0.2
EOAKPRK-05	5.4	5.4	5.4	5.4	0.0	0.0	0.0
ESUNR-01	7.4	7.4	7.5	7.5	0.0	0.0	0.0
ESUNR-05	7.4	7.4	7.5	7.5	0.0	0.0	0.0
ESUNR-07	7.5	7.5	7.5	7.5	0.0	0.0	0.0
ESUNR-10	7.2	7.3	7.3	7.3	0.0	0.0	0.0
FLEA-05	11.2	11.2	11.2	11.2	0.0	0.0	0.0
FLEA-10	12.4	12.4	12.4	12.4	0.0	0.0	0.0
G16005	3.4	3.4	3.4	3.4	0.0	0.0	0.0
G16007	3.4	3.4	3.4	3.4	0.0	0.0	0.0
G54_HW	2.5	2.5	2.5	2.5	0.0	0.0	0.0
G54_TW	6.0	6.0	6.0	6.0	0.0	0.0	0.0
G57_TW	3.5	3.4	3.4	3.4	0.0	0.0	0.0
GALT-05	9.8	9.8	9.9	9.9	0.0	0.1	0.1
HCOPWCD2005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
HF010	8.3	8.3	8.3	8.3	0.0	0.0	0.1
HF015	8.3	8.3	8.3	8.4	0.0	0.0	0.1
HF020	8.3	8.3	8.4	8.4	0.0	0.1	0.1
HFCS17005	8.2	8.2	8.3	8.3	0.0	0.0	0.0
HFCS55025	8.9	8.9	8.9	8.9	0.0	0.0	0.1
I595-05	8.0	8.0	8.0	8.0	0.0	0.0	0.0
I595-10	7.0	7.0	7.0	7.0	0.0	0.0	0.0
I595-15	7.5	7.6	7.6	7.6	0.0	0.0	0.0
IC022	2.7	2.7	2.7	2.7	0.0	0.0	0.0
IC025	3.0	3.0	3.0	3.0	0.0	0.0	0.0
IC030	3.0	3.0	3.0	3.0	0.0	0.0	0.0
IC032	3.1	3.1	3.1	3.1	0.0	0.0	0.0
IC035	3.2	3.2	3.2	3.2	0.0	0.0	0.0
IC040	3.3	3.3	3.3	3.3	0.0	0.0	0.0
IC042	3.2	3.2	3.2	3.2	0.0	0.0	0.0
IC043	3.1	3.1	3.1	3.1	0.0	0.0	0.0

Table 6A-4. Alternative No. 1, Maintenance Condition for the 25-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 25-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
IC044	3.1	3.1	3.1	3.1	0.0	0.0	0.0
IC045	3.1	3.1	3.2	3.2	0.0	0.0	0.0
IC050	3.1	3.1	3.1	3.1	0.0	0.0	0.0
LAKEEMERALD-05	6.8	6.8	6.8	6.8	0.0	0.0	0.0
LKMELVA-05	7.7	7.7	7.7	7.7	0.0	0.0	0.0
LL005	8.4	8.4	8.4	8.4	0.0	0.0	0.0
LL015	8.5	8.4	8.4	8.5	0.0	0.0	0.0
LL020	8.6	8.6	8.6	8.7	0.0	0.0	0.1
LL025	8.6	8.6	8.6	8.7	0.0	0.1	0.1
LL026	9.1	9.1	9.2	9.2	0.0	0.1	0.2
LL030	9.1	9.1	9.2	9.3	0.0	0.1	0.2
LL035	9.1	9.1	9.2	9.3	0.0	0.1	0.2
LLAKE040	9.1	9.1	9.2	9.3	0.0	0.1	0.2
MELROSEPK-05	9.1	9.1	9.2	9.3	0.0	0.1	0.2
MELROSEPK-06	9.1	9.2	9.2	9.3	0.0	0.1	0.1
MELROSEPK-10	9.2	9.2	9.3	9.3	0.0	0.1	0.1
MIDLST-05	5.8	5.8	5.8	5.8	0.0	0.0	0.0
MLKPOND-05	7.7	7.7	7.7	7.7	0.0	0.0	0.0
NANDR-05	7.2	7.2	7.2	7.2	0.0	0.0	0.0
NANDR-10	6.4	6.4	6.4	6.4	0.0	0.0	0.0
NANDR-15	5.5	5.5	5.5	5.5	0.0	0.0	0.0
NDIXIE-02	7.7	7.7	7.7	7.7	0.0	0.0	0.0
NDIXIE-05	7.1	7.1	7.1	7.1	0.0	0.0	0.0
NE11ST-04	7.5	7.5	7.5	7.5	0.0	0.0	0.0
NE11ST-05	7.5	7.5	7.5	7.5	0.0	0.0	0.0
NE13ST-05	7.6	7.6	7.6	7.7	0.0	0.0	0.1
NE13ST-10	7.5	7.5	7.5	7.6	0.0	0.0	0.0
NE13ST-15	6.8	6.8	6.8	6.8	0.0	0.0	0.0
NE15A-05	5.8	5.8	5.8	5.8	0.0	0.0	0.0
NE15A-10	6.1	6.1	6.1	6.1	0.0	0.0	0.0
NE3A-05	6.7	6.7	6.7	6.7	0.0	0.0	0.0
NE3A-07	6.5	6.5	6.5	6.5	0.0	0.0	0.0
NE3A-10	5.7	5.7	5.7	5.8	0.0	0.0	0.0
NE3CT-05	8.3	8.3	8.3	8.3	0.0	0.0	0.0
NE4A-05	6.5	6.5	6.5	6.6	0.0	0.0	0.0
NE4A-10	6.8	6.8	6.8	6.9	0.0	0.0	0.0
NE4A-15	7.2	7.3	7.3	7.3	0.0	0.0	0.0
NE65-05	6.6	6.7	6.7	6.8	0.0	0.1	0.2
NFED-05	6.7	6.7	6.7	6.8	0.0	0.1	0.1
NFED-10	6.9	7.0	7.0	7.1	0.0	0.1	0.1
NFED-12	7.0	7.0	7.1	7.1	0.0	0.1	0.1
NFED-15	6.8	6.8	6.8	6.8	0.0	0.0	0.0
NFED-20	6.9	6.9	6.9	6.9	0.0	0.0	0.0
NFED-22	7.2	7.2	7.2	7.2	0.0	0.0	0.0
NFED-25	8.0	8.0	8.0	8.0	0.0	0.0	0.0
NFED-30	9.5	9.5	9.5	9.5	0.0	0.0	0.0
NFED-35	6.8	6.8	6.8	6.9	0.0	0.0	0.0
NFED-37	6.4	6.4	6.4	6.4	0.0	0.0	0.0
NFED-40	7.0	7.0	7.0	7.0	0.0	0.0	0.0
NFED-45	9.2	9.2	9.3	9.3	0.0	0.0	0.0

Table 6A-4. Alternative No. 1, Maintenance Condition for the 25-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 25-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
NFED-50	8.4	8.4	8.4	8.4	0.0	0.0	0.0
NFED-52	5.7	5.7	5.7	5.7	0.0	0.0	0.0
NFED-53	5.4	5.3	5.4	5.4	0.0	0.0	0.0
NFED-55	6.6	6.6	6.6	6.7	0.0	0.0	0.0
NFED-60	7.3	7.3	7.3	7.3	0.0	0.0	0.0
NFED-65	6.7	6.8	6.8	6.8	0.0	0.0	0.1
NFED-67	6.7	6.7	6.8	6.8	0.0	0.1	0.1
NFED-70	6.7	6.7	6.8	6.8	0.0	0.1	0.1
NFNR001	2.6	2.6	2.6	2.6	0.0	0.0	0.0
NFNR005	2.7	2.7	2.7	2.7	0.0	0.0	0.0
NFNR008	3.6	3.6	3.6	3.6	0.0	0.0	0.0
NFNR010	4.1	4.1	4.1	4.1	0.0	0.0	0.0
NFNR011	4.2	4.2	4.2	4.2	0.0	0.0	0.0
NFNR015	4.5	4.5	4.5	4.5	0.0	0.0	0.0
NFNR016	4.6	4.6	4.6	4.6	0.0	0.0	0.0
NFNR020	4.8	4.8	4.8	4.8	0.0	0.0	0.0
NFNR021	4.9	4.9	4.9	4.9	0.0	0.0	0.0
NFNR025	5.0	5.0	5.0	5.0	0.0	0.0	0.0
NFNR030	5.8	5.8	5.8	5.8	0.0	0.0	0.0
NFNR035	6.4	6.4	6.4	6.4	0.0	0.0	0.0
NFNR040	6.6	6.6	6.6	6.6	0.0	0.0	0.0
NFNR042	6.8	6.8	6.8	6.8	0.0	0.0	0.0
NFNR043	6.9	6.9	6.9	6.9	0.0	0.0	0.0
NFNR045	7.2	7.2	7.2	7.2	0.0	0.0	0.0
NFNR046	7.2	7.2	7.2	7.3	0.0	0.0	0.0
NFNR050	7.8	7.8	7.9	7.9	0.0	0.0	0.0
NFNR051	7.9	7.9	7.9	7.9	0.0	0.0	0.0
NFNR054	8.0	8.0	8.0	8.1	0.0	0.0	0.0
NFNR055	8.1	8.1	8.1	8.1	0.0	0.0	0.0
NFNRSPUR004	3.0	3.0	3.0	3.0	0.0	0.0	0.0
NFNRSPUR005	3.2	3.2	3.1	3.1	0.0	0.0	0.0
NFNRSPUR010	3.6	3.7	3.8	4.0	0.1	0.2	0.3
NFSPUR005	5.8	5.8	5.8	5.8	0.0	0.0	0.0
NNRC005	5.6	5.6	5.6	5.5	0.0	0.0	0.0
NNRC010	5.9	5.9	5.9	5.8	0.0	0.0	0.0
NNRC015	5.9	5.9	5.9	5.9	0.0	0.0	0.0
NNRC020	6.0	6.0	6.0	6.0	0.0	0.0	0.0
NPOWRL-03	7.9	7.9	7.9	7.9	0.0	0.0	0.1
NPOWRL-05	7.4	7.4	7.4	7.4	0.0	0.0	0.0
NPOWRL-10	9.7	9.7	9.7	9.7	0.0	0.0	0.0
NW10TR-05	11.0	11.0	11.0	11.0	0.0	0.0	0.0
NW15A-05	8.1	8.1	8.1	8.1	0.0	0.0	0.0
NW15A-10	6.7	6.7	6.7	6.7	0.0	0.0	0.0
NW15A-15	6.6	6.6	6.6	6.6	0.0	0.0	0.0
NW18A-05	7.1	7.1	7.1	7.1	0.0	0.0	0.0
NW22ST-05	7.5	7.5	7.6	7.6	0.0	0.0	0.1
NW22ST-10	8.4	8.4	8.4	8.4	0.0	0.0	0.0
NW24A-05	7.8	7.8	7.9	7.9	0.0	0.0	0.0
NW28-05	10.6	10.7	10.7	10.7	0.0	0.0	0.1
NW29-05	11.5	11.5	11.5	11.5	0.0	0.0	0.0

Table 6A-4. Alternative No. 1, Maintenance Condition for the 25-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 25-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
NW31ST-05	8.1	8.1	8.1	8.1	0.0	0.0	0.0
NW35-05	10.7	10.8	10.8	10.9	0.0	0.1	0.2
NW35-10	10.0	10.0	10.0	10.0	0.0	0.0	0.1
NW35-15	10.0	10.0	10.0	10.0	0.0	0.0	0.1
NW4A-05	7.2	7.2	7.2	7.2	0.0	0.0	0.0
NW4A-10	7.2	7.2	7.2	7.2	0.0	0.0	0.0
NW5A-05	7.2	7.2	7.2	7.2	0.0	0.0	0.0
NW5A-07	6.9	6.9	6.9	6.9	0.0	0.0	0.0
NW5A-10	6.7	6.8	6.8	6.8	0.0	0.0	0.0
NW7A-05	7.1	7.1	7.1	7.2	0.0	0.0	0.0
NW7A-10	7.1	7.1	7.1	7.2	0.0	0.0	0.0
NW8ST-05	6.9	6.9	6.9	7.0	0.0	0.0	0.0
NW8ST-10	6.9	6.9	6.9	7.0	0.0	0.0	0.0
NW9A-05	7.0	7.0	7.0	7.0	0.0	0.0	0.0
NW9A-10	7.1	7.1	7.2	7.2	0.0	0.0	0.0
NWFLAG-05	5.3	5.3	5.3	5.4	0.0	0.0	0.1
OC005	7.0	7.0	7.0	7.0	0.0	0.0	0.0
OC010	6.5	6.5	6.6	6.7	0.0	0.1	0.2
OC015	6.1	6.1	6.1	6.1	0.0	0.0	-0.1
OC020	5.8	5.8	5.8	5.8	0.0	0.0	0.0
OC021	5.5	5.5	5.5	5.5	0.0	0.0	-0.1
OP015	6.8	6.8	6.8	6.9	0.0	0.1	0.1
OPEB001	5.9	5.9	5.9	5.9	0.0	0.0	0.0
OPEB002	5.9	5.9	6.0	6.0	0.0	0.0	0.0
OPEB003	6.0	6.0	6.0	6.0	0.0	0.0	0.0
OPEB004	6.0	6.0	6.1	6.1	0.0	0.0	0.1
OPEB005	6.0	6.1	6.1	6.1	0.0	0.0	0.0
OPEB006	6.2	6.2	6.2	6.3	0.0	0.0	0.0
OPEB007	6.3	6.3	6.3	6.4	0.0	0.0	0.1
OPEB008	6.3	6.4	6.4	6.4	0.0	0.0	0.1
OPEB009	6.4	6.4	6.5	6.5	0.0	0.1	0.1
OPEB010	6.4	6.4	6.5	6.5	0.0	0.1	0.1
OPEB011	6.4	6.4	6.5	6.5	0.0	0.1	0.1
OPEB015	6.4	6.4	6.5	6.5	0.0	0.1	0.1
OPL005	6.9	6.9	6.9	6.9	0.0	0.0	0.0
OPL010	7.0	7.0	7.0	7.0	0.0	0.0	0.0
OPL015	7.0	7.0	7.0	7.0	0.0	0.0	0.0
OPL020	7.0	7.0	7.0	7.0	0.0	0.0	0.0
OPL025	9.0	9.1	9.2	9.2	0.1	0.1	0.2
OPL030	9.1	9.1	9.2	9.3	0.0	0.1	0.2
OPL035	9.1	9.1	9.2	9.3	0.0	0.1	0.2
OUT_IC005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
OUT_IC010	2.5	2.5	2.5	2.5	0.0	0.0	0.0
OUT_IC015	2.5	2.5	2.5	2.5	0.0	0.0	0.0
OUT_IC020	2.5	2.5	2.5	2.5	0.0	0.0	0.0
OUT_IC055	2.5	2.5	2.5	2.5	0.0	0.0	0.0
PAG005	9.3	9.3	9.3	9.3	0.0	0.0	0.0
PORTSPUR005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
PRLAKE010	10.0	9.9	9.9	9.8	0.0	-0.1	-0.1
PRN001	7.8	7.8	7.8	7.8	0.0	0.0	0.0

Table 6A-4. Alternative No. 1, Maintenance Condition for the 25-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 25-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
PRN005	10.7	10.7	10.7	10.8	0.0	0.0	0.0
PRN010	10.7	10.7	10.8	10.8	0.0	0.0	0.1
PRN015	10.7	10.7	10.8	10.8	0.0	0.0	0.1
PRN018	10.7	10.8	10.8	10.8	0.0	0.0	0.1
PRN020	10.7	10.8	10.8	10.8	0.0	0.0	0.1
PRN025	10.3	10.3	10.3	10.3	0.0	0.0	0.0
PRN030	10.2	10.2	10.2	10.2	0.0	0.0	0.0
PRN035	8.7	8.7	8.7	8.7	0.0	0.0	0.0
PRN038	8.6	8.6	8.6	8.6	0.0	0.0	0.0
PRN039	8.6	8.6	8.6	8.6	0.0	0.0	0.0
PRN040	8.5	8.5	8.5	8.5	0.0	0.0	0.0
PRN045	8.6	8.6	8.6	8.6	0.0	0.0	0.0
PRN1005	10.7	10.8	10.8	10.8	0.0	0.0	0.1
PRN1006	9.4	9.4	9.4	9.3	0.0	0.0	-0.1
PRN1010	9.4	9.4	9.4	9.3	0.0	0.0	-0.1
PRN1011	9.3	9.3	9.3	9.3	0.0	0.0	0.0
PRSWLAKE020	9.4	9.4	9.4	9.4	0.0	0.0	0.0
PRSWLAKE025	9.4	9.4	9.4	9.4	0.0	0.0	0.0
RIVRPS	4.8	4.7	4.7	5.3	0.0	0.0	0.5
ROL-05	5.5	5.5	5.5	5.5	0.0	0.0	0.0
RVRLND-05	7.7	7.7	7.7	7.7	0.0	0.0	0.0
S33_HW	2.6	2.6	2.6	2.6	0.0	0.0	0.0
S33_TW	8.2	8.2	8.2	8.2	0.0	0.0	0.0
S36_TW	7.1	7.1	7.1	7.1	0.0	0.0	0.0
S36-HW	8.3	8.3	8.3	8.3	0.0	0.0	0.0
S37A_TW	4.1	4.1	4.1	4.1	0.0	0.0	0.0
S37A-HW	6.2	6.2	6.2	6.2	0.0	0.0	0.0
S37B_HW	7.8	7.8	7.8	7.8	0.0	0.0	0.0
S37B_TW	7.4	7.4	7.4	7.4	0.0	0.0	0.0
SANDR-05	6.1	6.1	6.1	6.1	0.0	0.0	0.0
SE10A-05	6.5	6.5	6.5	6.6	0.0	0.0	0.1
SE3A-05	5.2	5.2	5.3	5.4	0.0	0.1	0.2
SE3A-10	5.3	5.3	5.3	5.3	0.0	0.0	0.0
SE3A-15	8.0	8.0	8.1	8.1	0.0	0.1	0.2
SE4A-10	8.9	9.0	9.0	9.0	0.0	0.1	0.1
SE5A-05	4.9	4.9	4.9	5.0	0.0	0.0	0.1
SeepOut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SFED-05	6.5	6.5	6.5	6.5	0.0	0.0	0.0
SFED-10	6.6	6.6	6.6	6.6	0.0	0.0	0.0
SFED-15	8.0	8.0	8.1	8.1	0.0	0.1	0.2
SFED-20	8.0	8.0	8.1	8.1	0.0	0.1	0.2
SFED-25	8.0	8.0	8.1	8.1	0.0	0.1	0.2
SFNR005	5.1	5.1	5.1	5.1	0.0	0.0	0.0
SFNR006	5.2	5.2	5.1	5.1	0.0	0.0	0.0
SFNR010	5.3	5.3	5.3	5.3	0.0	0.0	0.0
SFNR015	5.4	5.4	5.4	5.4	0.0	0.0	0.0
SFNR020	5.4	5.4	5.4	5.4	0.0	0.0	0.0
SFNR025	5.5	5.5	5.5	5.5	0.0	0.0	0.0
SFNR030	5.6	5.5	5.5	5.5	0.0	0.0	0.0
SFNRC005	5.6	5.5	5.5	5.5	0.0	0.0	0.0

Table 6A-4. Alternative No. 1, Maintenance Condition for the 25-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 25-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
SFNRSPUR005	5.3	5.3	5.3	5.3	0.0	0.0	0.0
SFNRSPUR010	5.4	5.4	5.4	5.4	0.0	0.0	0.0
SFNRSPUR013	5.5	5.5	5.5	5.5	0.0	0.0	0.0
SFNRSPUR014	5.5	5.5	5.5	5.5	0.0	0.0	0.0
SFNRSPUR015	5.5	5.5	5.5	5.5	0.0	0.0	0.0
SFNRSPUR018	5.6	5.5	5.5	5.5	0.0	0.0	0.0
SMIAMI-05	8.5	8.5	8.5	8.5	0.0	0.0	0.0
SMIAMI-10	8.2	8.2	8.3	8.3	0.0	0.1	0.1
SNYDERPK-05	7.1	7.1	7.1	7.1	0.0	0.0	0.0
SNYDERPK-10	7.1	7.1	7.1	7.1	0.0	0.0	0.0
SR84-05	7.5	7.5	7.5	7.5	0.0	0.1	0.1
SR84-10	8.9	9.0	9.0	9.0	0.0	0.1	0.1
SR84-15	8.3	8.4	8.4	8.4	0.0	0.0	0.0
SR84-20	6.2	6.2	6.2	6.2	0.0	0.0	0.0
SR84LAKE005	5.6	5.5	5.5	5.5	0.0	0.0	0.0
SR84LAKE010	5.6	5.5	5.5	5.5	0.0	0.0	0.0
SW12A-05	7.1	7.1	7.1	7.1	0.0	0.0	0.0
SW12A-10	7.1	7.1	7.1	7.1	0.0	0.0	0.0
SW14A-05	5.8	5.8	5.8	5.8	0.0	0.0	0.0
SW14ST-05	7.7	7.7	7.8	7.8	0.0	0.1	0.2
SW14ST-10	8.3	8.3	8.3	8.4	0.0	0.1	0.1
SW15A-05	6.9	6.9	6.9	6.9	0.0	0.0	0.0
SW15CT-05	8.3	8.3	8.4	8.4	0.0	0.1	0.1
SW16ST-05	6.4	6.4	6.4	6.4	0.0	0.0	0.0
SW20ST-05	5.9	5.9	6.0	6.0	0.0	0.0	0.1
SW20ST-10	5.9	5.9	5.9	5.9	0.0	0.0	0.1
SW24ST-05	5.5	5.5	5.5	5.5	0.0	0.0	0.0
SW27A-05	8.6	8.6	8.6	8.6	0.0	0.0	0.0
SW3A-05	5.5	5.5	5.6	5.6	0.0	0.0	0.1
SW4A-05	6.6	6.7	6.7	6.7	0.0	0.0	0.0
SW4A-10	7.0	7.0	7.1	7.1	0.0	0.0	0.0
SW4A-15	7.4	7.4	7.5	7.5	0.0	0.0	0.0
SW7A-05	6.3	6.3	6.4	6.4	0.0	0.0	0.0
SWFLAG-05	5.0	5.0	5.0	5.3	0.0	0.0	0.3
SWFLAG-10	5.8	5.8	5.8	5.8	0.0	0.0	0.0
SWFLAG-15	8.0	8.0	8.1	8.1	0.0	0.1	0.1
SWMLK-05	6.5	6.5	6.5	6.5	0.0	0.0	0.1
SWMLK-10	6.0	6.0	6.0	6.0	0.0	0.0	0.0
SWMLK-12	6.8	6.8	6.9	6.9	0.0	0.1	0.1
SWRIVRS-05	7.2	7.2	7.2	7.2	0.0	0.0	0.0
TR005	3.2	3.2	3.2	3.1	0.0	0.0	0.0
TR006	3.2	3.2	3.2	3.2	0.0	0.0	0.0
TR010	3.6	3.6	3.5	3.5	0.0	0.0	0.0
TR011	3.6	3.6	3.6	3.6	0.0	0.0	0.0
TR015	4.0	4.0	4.0	4.0	0.0	0.0	0.0
TR016	4.2	4.2	4.2	4.2	0.0	0.0	0.0
TR020	4.6	4.6	4.6	4.6	0.0	0.0	0.0
TR021	4.7	4.7	4.7	4.7	0.0	0.0	0.0
TR025	4.8	4.8	4.7	4.7	0.0	0.0	0.0
TR026	4.8	4.8	4.8	4.8	0.0	0.0	0.0

Table 6A-4. Alternative No. 1, Maintenance Condition for the 25-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 25-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
TR030	4.8	4.8	4.8	4.8	0.0	0.0	0.0
TR031	4.9	4.9	4.8	4.9	0.0	0.0	0.0
TR035	4.9	4.9	4.9	4.9	0.0	0.0	0.0
TR037	4.9	4.9	4.9	4.9	0.0	0.0	0.0
TR038	5.0	5.0	4.9	4.9	0.0	0.0	0.0
TR040	5.0	5.0	5.0	4.9	0.0	0.0	0.0
TWNLKS-05	10.5	10.5	10.5	10.5	0.0	0.0	0.0
TWNLKS-10	9.6	9.6	9.6	9.6	0.0	0.0	0.0
W5A-15	5.3	5.3	5.3	5.3	0.0	0.0	0.0
WBROW-05	6.4	6.4	6.4	6.4	0.0	0.0	0.0
WBROW-10	7.5	7.5	7.5	7.5	0.0	0.0	0.1
WBROW-15	8.7	8.7	8.7	8.7	0.0	0.0	0.0
WBROW-20	9.1	9.2	9.2	9.3	0.0	0.1	0.1
WDAV-05	6.6	6.6	6.6	6.6	0.0	0.0	0.0
WDAV-10	8.2	8.2	8.2	8.2	0.0	0.0	0.0
WDAV-12	8.2	8.2	8.2	8.2	0.0	0.0	0.0
WDAV-15	8.5	8.5	8.5	8.5	0.0	0.0	0.0
WDAV-20	8.6	8.6	8.6	8.6	0.0	0.0	0.0
WDAV-25	8.6	8.6	8.6	8.6	0.0	0.0	0.0
WDAV-30	11.9	11.9	11.9	11.9	0.0	0.0	0.1
WESTLL-05	10.0	10.0	10.0	10.0	0.0	0.0	0.1
WSIST-05	6.6	6.6	6.6	6.7	0.0	0.0	0.0
WSIST-10	6.7	6.7	6.7	6.7	0.0	0.0	0.0
WSUNR-05	7.2	7.2	7.2	7.2	0.0	0.0	0.0
WSUNR-10	7.6	7.7	7.7	7.8	0.0	0.1	0.2
WSUNR-15	8.1	8.1	8.1	8.1	0.0	0.0	0.1
WSUNR-20	8.1	8.1	8.1	8.1	0.0	0.0	0.0

Table 6A-5. Alternative No. 1, Maintenance Condition for the 100-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 100-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
C12UI010	8.6	8.6	8.6	8.6	0.0	0.0	0.0
C12UI015	8.6	8.6	8.6	8.6	0.0	0.0	0.0
C12UI020	8.6	8.6	8.6	8.6	0.0	0.0	0.0
C12UICS18005	8.6	8.6	8.6	8.6	0.0	0.0	0.0
C13IC005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
C13IC010	3.0	3.0	3.0	3.0	0.0	0.0	0.0
C13IC011	3.2	3.2	3.2	3.2	0.0	0.0	0.0
C13IC015	3.2	3.2	3.2	3.3	0.0	0.0	0.0
C13IC020	3.6	3.6	3.6	3.7	0.0	0.0	0.0
C13IC025	5.6	5.6	5.6	5.6	0.0	0.0	0.0
C13ICSPUR002	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13ICSPUR005	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13MR001	5.9	5.9	5.9	5.9	0.0	0.0	0.0
C13MR005	5.8	5.8	5.8	5.8	0.0	0.0	0.0
C13MR010	5.9	5.9	5.9	5.9	0.0	0.0	0.0
C13MR015	6.1	6.1	6.1	6.1	0.0	0.0	0.0
C13MR016	6.2	6.2	6.2	6.2	0.0	0.0	0.0
C13MR020	6.5	6.5	6.5	6.5	0.0	0.0	0.0
C13MR021	6.6	6.6	6.6	6.6	0.0	0.0	0.0
C13MR024	6.6	6.6	6.6	6.6	0.0	0.0	0.0
C13MR025	6.7	6.7	6.7	6.7	0.0	0.0	0.0
C13MR030	6.9	6.9	6.9	6.9	0.0	0.0	0.0
C13MR031	6.9	6.9	6.9	6.9	0.0	0.0	0.0
C13MRC005	6.3	6.3	6.3	6.3	0.0	0.0	0.0
C13MRC006	6.4	6.4	6.4	6.4	0.0	0.0	0.0
C13MRC007	6.4	6.4	6.4	6.4	0.0	0.0	0.0
C13MRC008	6.6	6.6	6.6	6.6	0.0	0.0	0.0
C13MRC009	6.7	6.7	6.7	6.7	0.0	0.0	0.0
C13MRC010	6.8	6.8	6.8	6.8	0.0	0.0	0.0
C13MRC012	6.8	6.8	6.8	6.8	0.0	0.0	0.0
C13MRC014	6.9	6.9	6.9	6.9	0.0	0.0	0.0
C13MRC015	7.0	7.0	7.0	7.0	0.0	0.0	0.0
C13MRC017	7.0	7.0	7.0	7.0	0.0	0.0	0.0
C13MRC018	7.0	7.0	7.0	7.0	0.0	0.0	0.0
C13MRC-02	9.2	9.2	9.2	9.2	0.0	0.0	0.0
C13MRC020	7.0	7.0	7.0	7.0	0.0	0.0	0.0
C13MRC022	7.1	7.1	7.1	7.1	0.0	0.0	0.0
C13MRC023	7.2	7.2	7.2	7.2	0.0	0.0	0.0
C13MRC024	7.3	7.3	7.3	7.3	0.0	0.0	0.0
C13MRC025	7.4	7.4	7.4	7.4	0.0	0.0	0.0
C13MRC-03	7.6	7.6	7.6	7.6	0.0	0.0	0.0
C13MRC035	7.6	7.6	7.6	7.6	0.0	0.0	0.0
C13MRC042	9.2	9.2	9.2	9.2	0.0	0.0	0.0
C13MRC043	9.2	9.2	9.2	9.2	0.0	0.0	0.0
C13MRC045	9.2	9.3	9.3	9.3	0.0	0.0	0.0
C13MRSPUR005	5.9	5.9	5.9	5.9	0.0	0.0	0.0
C14CCC005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
C14CCC008	3.1	3.1	3.1	3.1	0.0	0.0	0.0
C14CCC010	3.5	3.5	3.5	3.5	0.0	0.0	0.0
C14CCC020	4.1	4.1	4.1	4.1	0.0	0.0	0.0

Table 6A-5. Alternative No. 1, Maintenance Condition for the 100-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 100-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
C14CCC022	4.2	4.2	4.2	4.2	0.0	0.0	0.0
C14CCC025	4.5	4.5	4.5	4.4	0.0	0.0	0.0
C14CCC027	4.5	4.5	4.5	4.5	0.0	0.0	0.0
C14CCC038	7.9	7.9	7.9	7.9	0.0	0.0	0.0
C14CCC039	8.1	8.1	8.1	8.1	0.0	0.0	0.0
C14CCC040	8.2	8.2	8.2	8.2	0.0	0.0	0.0
C14CCC045	8.8	8.8	8.8	8.8	0.0	0.0	0.0
CCCSPUR005	4.9	4.9	4.9	4.9	0.0	0.0	0.0
CCCSPUR010	5.1	5.2	5.2	5.3	0.0	0.1	0.2
CCCSPUR015	5.1	5.2	5.2	5.3	0.0	0.1	0.2
CCCSPUR020	8.7	8.7	8.7	8.8	0.0	0.0	0.0
CCCSPUR021	8.6	8.6	8.6	8.6	0.0	0.0	0.0
CRCC-05	5.9	5.9	5.9	5.9	0.0	0.0	0.0
CRDVA-05	4.0	4.0	3.9	3.9	0.0	-0.1	-0.1
DUM_IC006	2.5	2.5	2.5	2.5	0.0	0.0	0.0
EBROW-05	5.5	5.6	5.6	5.7	0.0	0.1	0.1
ECOMM-05	6.4	6.4	6.4	6.4	0.0	0.0	0.0
ECOMM-10	7.1	7.2	7.2	7.2	0.0	0.0	0.1
ECOMM-20	7.1	7.1	7.1	7.1	0.0	0.0	0.0
ELOSO-05	5.5	5.6	5.6	5.7	0.0	0.1	0.1
EOAKPRK-05	5.5	5.5	5.5	5.5	0.0	0.0	0.0
ESUNR-01	7.6	7.6	7.6	7.6	0.0	0.0	0.0
ESUNR-05	7.6	7.6	7.6	7.6	0.0	0.0	0.0
ESUNR-07	7.6	7.6	7.6	7.6	0.0	0.0	0.0
ESUNR-10	7.3	7.3	7.4	7.4	0.0	0.0	0.0
FLEA-05	11.4	11.4	11.4	11.4	0.0	0.0	0.0
FLEA-10	12.5	12.5	12.5	12.5	0.0	0.0	0.0
G16005	4.0	4.0	4.0	4.0	0.0	0.0	0.0
G16007	4.0	4.0	4.0	4.0	0.0	0.0	0.0
G54_HW	2.5	2.5	2.5	2.5	0.0	0.0	0.0
G54_TW	6.7	6.7	6.7	6.7	0.0	0.0	0.0
G57_TW	4.1	4.1	4.1	4.1	0.0	0.0	0.0
GALT-05	10.0	10.0	10.1	10.1	0.0	0.1	0.1
HCOPWCD2005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
HF010	8.7	8.7	8.7	8.7	0.0	0.0	0.0
HF015	8.7	8.7	8.7	8.8	0.0	0.0	0.1
HF020	8.8	8.8	8.9	8.9	0.0	0.1	0.1
HFCS17005	8.7	8.7	8.7	8.7	0.0	0.0	0.0
HFCS55025	9.1	9.1	9.1	9.1	0.0	0.0	0.0
I595-05	8.1	8.1	8.1	8.1	0.0	0.0	0.0
I595-10	7.4	7.4	7.4	7.4	0.0	0.0	0.0
I595-15	7.8	7.8	7.8	7.8	0.0	0.0	0.0
IC022	2.8	2.8	2.8	2.8	0.0	0.0	0.0
IC025	3.1	3.1	3.1	3.1	0.0	0.0	0.0
IC030	3.2	3.2	3.2	3.2	0.0	0.0	0.0
IC032	3.4	3.4	3.4	3.4	0.0	0.0	0.1
IC035	3.6	3.6	3.6	3.6	0.0	0.0	0.1
IC040	3.6	3.6	3.7	3.7	0.0	0.0	0.0
IC042	3.4	3.4	3.5	3.5	0.0	0.0	0.1
IC043	3.3	3.3	3.3	3.3	0.0	0.0	0.0

Table 6A-5. Alternative No. 1, Maintenance Condition for the 100-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 100-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
IC044	3.3	3.3	3.3	3.3	0.0	0.0	0.0
IC045	3.4	3.4	3.4	3.4	0.0	0.0	0.0
IC050	3.4	3.4	3.4	3.4	0.0	0.0	0.0
LAKEEMERALD-05	7.6	7.6	7.6	7.6	0.0	0.0	0.0
LKMELVA-05	7.9	7.9	7.9	7.9	0.0	0.0	0.0
LL005	9.2	9.3	9.3	9.3	0.0	0.0	0.0
LL015	9.3	9.3	9.3	9.3	0.0	0.0	0.0
LL020	9.3	9.3	9.4	9.4	0.0	0.0	0.0
LL025	9.3	9.4	9.4	9.4	0.0	0.0	0.0
LL026	9.9	9.9	10.0	10.0	0.1	0.1	0.2
LL030	9.9	9.9	10.0	10.0	0.0	0.1	0.2
LL035	9.9	9.9	10.0	10.0	0.0	0.1	0.2
LLAKE040	9.9	9.9	10.0	10.0	0.0	0.1	0.2
MELROSEPK-05	9.4	9.5	9.5	9.6	0.0	0.1	0.1
MELROSEPK-06	9.5	9.5	9.5	9.6	0.0	0.1	0.1
MELROSEPK-10	9.5	9.5	9.5	9.6	0.0	0.1	0.1
MIDLST-05	6.2	6.2	6.2	6.2	0.0	0.0	0.0
MLKPOND-05	8.5	8.5	8.5	8.5	0.0	0.0	0.0
NANDR-05	7.3	7.3	7.3	7.3	0.0	0.0	0.0
NANDR-10	6.5	6.5	6.5	6.5	0.0	0.0	0.0
NANDR-15	5.6	5.6	5.6	5.7	0.0	0.1	0.1
NDIXIE-02	7.8	7.8	7.8	7.8	0.0	0.0	0.0
NDIXIE-05	7.2	7.2	7.2	7.2	0.0	0.0	0.0
NE11ST-04	7.6	7.6	7.6	7.6	0.0	0.0	0.0
NE11ST-05	7.6	7.6	7.6	7.6	0.0	0.0	0.0
NE13ST-05	7.7	7.7	7.7	7.8	0.0	0.0	0.1
NE13ST-10	7.6	7.7	7.6	7.6	0.0	0.0	0.0
NE13ST-15	6.8	6.8	6.8	6.8	0.0	0.0	0.0
NE15A-05	6.1	6.1	6.1	6.1	0.0	0.0	0.0
NE15A-10	6.2	6.2	6.2	6.2	0.0	0.0	0.0
NE3A-05	6.7	6.7	6.7	6.7	0.0	0.0	0.0
NE3A-07	6.6	6.6	6.6	6.6	0.0	0.0	0.0
NE3A-10	5.8	5.8	5.8	5.9	0.0	0.0	0.0
NE3CT-05	8.4	8.4	8.4	8.5	0.0	0.0	0.1
NE4A-05	6.6	6.6	6.6	6.6	0.0	0.0	0.0
NE4A-10	6.9	6.9	6.9	7.0	0.0	0.0	0.0
NE4A-15	7.3	7.3	7.4	7.4	0.0	0.0	0.0
NE65-05	7.0	7.0	7.1	7.2	0.0	0.1	0.2
NFED-05	7.0	7.0	7.1	7.2	0.0	0.1	0.2
NFED-10	7.2	7.2	7.2	7.2	0.0	0.0	0.1
NFED-12	7.2	7.2	7.3	7.3	0.0	0.0	0.1
NFED-15	6.9	6.9	6.9	6.9	0.0	0.0	0.0
NFED-20	7.1	7.1	7.1	7.1	0.0	0.0	0.0
NFED-22	7.4	7.4	7.4	7.4	0.0	0.0	0.0
NFED-25	8.2	8.2	8.2	8.2	0.0	0.0	0.0
NFED-30	9.6	9.6	9.6	9.6	0.0	0.0	0.0
NFED-35	6.9	6.9	6.9	6.9	0.0	0.0	0.0
NFED-37	6.7	6.7	6.7	6.7	0.0	0.0	0.0
NFED-40	7.1	7.1	7.1	7.1	0.0	0.0	0.0
NFED-45	9.3	9.3	9.4	9.4	0.0	0.0	0.0

Table 6A-5. Alternative No. 1, Maintenance Condition for the 100-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 100-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
NFED-50	8.4	8.4	8.4	8.4	0.0	0.0	0.0
NFED-52	5.9	6.0	6.0	6.0	0.0	0.0	0.1
NFED-53	5.7	5.7	5.7	5.7	0.0	0.0	0.0
NFED-55	6.8	6.8	6.8	6.8	0.0	0.0	0.0
NFED-60	7.4	7.4	7.4	7.4	0.0	0.0	0.0
NFED-65	7.0	7.0	7.0	7.1	0.0	0.1	0.1
NFED-67	6.9	7.0	7.0	7.0	0.0	0.1	0.1
NFED-70	6.9	6.9	7.0	7.0	0.0	0.0	0.1
NFNR001	2.6	2.6	2.6	2.6	0.0	0.0	0.0
NFNR005	2.8	2.8	2.8	2.8	0.0	0.0	0.0
NFNR008	3.9	3.9	3.9	3.9	0.0	0.0	0.0
NFNR010	4.5	4.5	4.5	4.5	0.0	0.0	0.0
NFNR011	4.6	4.6	4.6	4.6	0.0	0.0	0.0
NFNR015	4.9	4.9	4.9	4.9	0.0	0.0	0.0
NFNR016	5.0	5.0	5.0	5.1	0.0	0.0	0.0
NFNR020	5.2	5.2	5.3	5.3	0.0	0.0	0.0
NFNR021	5.3	5.3	5.3	5.3	0.0	0.0	0.0
NFNR025	5.4	5.4	5.4	5.5	0.0	0.0	0.0
NFNR030	6.2	6.2	6.2	6.2	0.0	0.0	0.0
NFNR035	6.7	6.7	6.7	6.7	0.0	0.0	0.0
NFNR040	6.9	6.9	6.9	6.9	0.0	0.0	0.0
NFNR042	7.1	7.1	7.1	7.1	0.0	0.0	0.0
NFNR043	7.3	7.3	7.3	7.3	0.0	0.0	0.0
NFNR045	7.5	7.5	7.5	7.6	0.0	0.0	0.0
NFNR046	7.6	7.6	7.6	7.6	0.0	0.0	0.0
NFNR050	8.3	8.3	8.3	8.3	0.0	0.0	0.0
NFNR051	8.3	8.3	8.4	8.4	0.0	0.0	0.0
NFNR054	8.5	8.5	8.5	8.5	0.0	0.0	0.0
NFNR055	8.6	8.6	8.6	8.6	0.0	0.0	0.0
NFNRSPUR004	3.2	3.1	3.2	3.3	0.0	0.0	0.1
NFNRSPUR005	3.4	3.5	3.5	3.7	0.1	0.1	0.3
NFNRSPUR010	4.8	4.9	5.1	5.3	0.1	0.3	0.6
NFSPUR005	6.2	6.2	6.2	6.2	0.0	0.0	0.0
NNRC005	6.1	6.1	6.1	6.1	0.0	0.0	0.0
NNRC010	6.5	6.5	6.5	6.5	0.0	0.0	0.0
NNRC015	6.6	6.5	6.5	6.5	0.0	0.0	0.0
NNRC020	6.6	6.6	6.6	6.6	0.0	0.0	0.0
NPOWRL-03	8.0	8.0	8.0	8.0	0.0	0.0	0.0
NPOWRL-05	7.5	7.5	7.5	7.5	0.0	0.0	0.0
NPOWRL-10	9.9	9.9	9.9	9.9	0.0	0.0	0.0
NW10TR-05	11.1	11.1	11.1	11.1	0.0	0.0	0.0
NW15A-05	8.2	8.2	8.2	8.2	0.0	0.0	0.0
NW15A-10	6.9	6.9	6.9	6.9	0.0	0.0	0.0
NW15A-15	6.9	6.9	6.9	6.9	0.0	0.0	0.0
NW18A-05	7.2	7.2	7.2	7.2	0.0	0.0	0.0
NW22ST-05	7.9	7.9	7.9	7.9	0.0	0.0	0.0
NW22ST-10	8.5	8.5	8.6	8.6	0.0	0.0	0.0
NW24A-05	8.3	8.3	8.3	8.3	0.0	0.0	0.0
NW28-05	10.9	10.9	10.9	11.0	0.0	0.0	0.1
NW29-05	11.5	11.5	11.6	11.6	0.0	0.0	0.0

Table 6A-5. Alternative No. 1, Maintenance Condition for the 100-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 100-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
NW31ST-05	8.5	8.5	8.5	8.5	0.0	0.0	0.0
NW35-05	11.1	11.1	11.2	11.3	0.1	0.1	0.2
NW35-10	10.1	10.2	10.2	10.2	0.0	0.0	0.0
NW35-15	10.1	10.2	10.2	10.2	0.0	0.0	0.0
NW4A-05	7.3	7.3	7.3	7.3	0.0	0.0	0.0
NW4A-10	7.3	7.3	7.3	7.3	0.0	0.0	0.0
NW5A-05	7.3	7.3	7.3	7.3	0.0	0.0	0.0
NW5A-07	7.0	7.0	7.0	7.0	0.0	0.0	0.1
NW5A-10	6.9	6.9	6.9	6.9	0.0	0.0	0.1
NW7A-05	7.2	7.3	7.3	7.3	0.0	0.0	0.0
NW7A-10	7.2	7.3	7.3	7.3	0.0	0.0	0.0
NW8ST-05	7.1	7.1	7.1	7.1	0.0	0.0	0.1
NW8ST-10	7.1	7.1	7.1	7.1	0.0	0.0	0.0
NW9A-05	7.1	7.1	7.1	7.1	0.0	0.0	0.1
NW9A-10	7.2	7.2	7.2	7.2	0.0	0.0	0.0
NWFLAG-05	5.6	5.6	5.6	5.7	0.0	0.1	0.1
OC005	7.4	7.4	7.4	7.4	0.0	0.0	0.0
OC010	6.9	6.9	7.0	7.1	0.1	0.1	0.2
OC015	6.5	6.4	6.4	6.4	0.0	-0.1	-0.1
OC020	6.1	6.1	6.1	6.1	0.0	0.0	0.0
OC021	6.0	6.0	6.0	6.0	0.0	0.0	0.0
OP015	7.1	7.1	7.1	7.1	0.0	0.0	0.0
OPEB001	6.3	6.3	6.3	6.3	0.0	0.0	0.0
OPEB002	6.4	6.4	6.4	6.4	0.0	0.0	0.0
OPEB003	6.4	6.4	6.4	6.4	0.0	0.0	0.0
OPEB004	6.4	6.4	6.5	6.5	0.0	0.0	0.0
OPEB005	6.5	6.5	6.5	6.5	0.0	0.0	0.0
OPEB006	6.6	6.6	6.6	6.6	0.0	0.0	0.0
OPEB007	6.7	6.7	6.7	6.7	0.0	0.0	0.1
OPEB008	6.7	6.7	6.8	6.8	0.0	0.0	0.0
OPEB009	6.8	6.8	6.9	6.9	0.0	0.1	0.1
OPEB010	6.8	6.8	6.9	6.9	0.0	0.1	0.1
OPEB011	6.8	6.8	6.9	6.9	0.0	0.1	0.1
OPEB015	6.8	6.8	6.9	6.9	0.0	0.1	0.1
OPL005	7.4	7.4	7.4	7.4	0.0	0.0	0.0
OPL010	7.4	7.4	7.4	7.4	0.0	0.0	0.0
OPL015	7.4	7.4	7.4	7.4	0.0	0.0	0.0
OPL020	7.4	7.4	7.4	7.4	0.0	0.0	0.0
OPL025	9.9	9.9	10.0	10.0	0.0	0.1	0.1
OPL030	9.9	9.9	10.0	10.0	0.0	0.1	0.2
OPL035	9.9	9.9	10.0	10.0	0.0	0.1	0.2
OUT_IC005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
OUT_IC010	2.5	2.5	2.5	2.5	0.0	0.0	0.0
OUT_IC015	2.5	2.5	2.5	2.5	0.0	0.0	0.0
OUT_IC020	2.5	2.5	2.5	2.5	0.0	0.0	0.0
OUT_IC055	2.5	2.5	2.5	2.5	0.0	0.0	0.0
PAG005	9.5	9.5	9.5	9.5	0.0	0.0	0.0
PORTSPUR005	2.5	2.5	2.5	2.5	0.0	0.0	0.0
PRLAKE010	10.7	10.7	10.7	10.6	0.0	0.0	0.0
PRN001	9.4	9.4	9.4	9.4	0.0	0.0	0.0

Table 6A-5. Alternative No. 1, Maintenance Condition for the 100-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 100-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
PRN005	11.3	11.3	11.3	11.4	0.0	0.0	0.0
PRN010	11.3	11.3	11.3	11.4	0.0	0.0	0.0
PRN015	11.3	11.3	11.3	11.4	0.0	0.0	0.0
PRN018	11.3	11.3	11.4	11.4	0.0	0.0	0.1
PRN020	11.3	11.3	11.4	11.4	0.0	0.0	0.1
PRN025	10.5	10.5	10.5	10.5	0.0	0.0	0.0
PRN030	10.4	10.4	10.4	10.4	0.0	0.0	0.0
PRN035	9.1	9.1	9.1	9.1	0.0	0.0	0.0
PRN038	9.0	9.0	9.0	9.0	0.0	0.0	0.0
PRN039	8.9	8.8	8.8	8.8	0.0	0.0	0.0
PRN040	8.8	8.8	8.8	8.8	0.0	0.0	0.0
PRN045	9.0	9.0	9.0	9.0	0.0	0.0	0.0
PRN1005	11.3	11.3	11.4	11.4	0.0	0.0	0.0
PRN1006	9.5	9.5	9.5	9.5	0.0	0.0	-0.1
PRN1010	9.5	9.5	9.5	9.5	0.0	0.0	-0.1
PRN1011	9.5	9.5	9.5	9.5	0.0	0.0	0.0
PRSWLAKE020	10.0	10.0	10.0	10.0	0.0	0.0	0.0
PRSWLAKE025	10.0	10.0	10.0	10.0	0.0	0.0	0.0
RIVRPS	5.5	5.6	5.6	5.7	0.0	0.1	0.2
ROL-05	6.0	6.0	5.9	5.9	0.0	0.0	0.0
RVRLND-05	7.8	7.8	7.8	7.8	0.0	0.0	0.0
S33_HW	2.6	2.6	2.6	2.6	0.0	0.0	0.0
S33_TW	8.7	8.7	8.7	8.7	0.0	0.0	0.0
S36_TW	7.7	7.7	7.7	7.7	0.0	0.0	0.0
S36-HW	9.1	9.1	9.1	9.1	0.0	0.0	0.0
S37A_TW	4.8	4.8	4.8	4.8	0.0	0.0	0.0
S37A-HW	7.6	7.6	7.6	7.6	0.0	0.0	0.0
S37B_HW	9.4	9.4	9.4	9.4	0.0	0.0	0.0
S37B_TW	8.9	8.9	8.9	8.9	0.0	0.0	0.0
SANDR-05	6.2	6.2	6.2	6.2	0.0	0.0	0.0
SE10A-05	6.7	6.7	6.8	6.8	0.0	0.0	0.1
SE3A-05	5.5	5.6	5.6	5.7	0.0	0.1	0.1
SE3A-10	5.4	5.4	5.4	5.4	0.0	0.0	0.0
SE3A-15	8.2	8.3	8.3	8.4	0.0	0.1	0.2
SE4A-10	9.1	9.1	9.2	9.2	0.0	0.1	0.1
SE5A-05	5.0	5.1	5.1	5.1	0.0	0.0	0.1
SeepOut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SFED-05	6.6	6.6	6.6	6.6	0.0	0.0	0.0
SFED-10	6.7	6.7	6.7	6.7	0.0	0.0	0.0
SFED-15	8.2	8.3	8.3	8.4	0.0	0.1	0.2
SFED-20	8.2	8.3	8.3	8.4	0.0	0.1	0.2
SFED-25	8.2	8.3	8.3	8.4	0.0	0.1	0.2
SFNR005	5.7	5.6	5.6	5.7	0.0	0.0	0.0
SFNR006	5.7	5.7	5.7	5.7	0.0	0.0	0.0
SFNR010	5.8	5.8	5.8	5.8	0.0	0.0	0.0
SFNR015	6.0	5.9	5.9	5.9	0.0	0.0	0.0
SFNR020	6.0	6.0	5.9	5.9	0.0	0.0	0.0
SFNR025	6.1	6.1	6.1	6.1	0.0	0.0	0.0
SFNR030	6.1	6.1	6.1	6.1	0.0	0.0	0.0
SFNRC005	6.1	6.1	6.1	6.1	0.0	0.0	0.0

Table 6A-5. Alternative No. 1, Maintenance Condition for the 100-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 100-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
SFNRSPUR005	5.8	5.8	5.8	5.8	0.0	0.0	0.0
SFNRSPUR010	6.0	6.0	6.0	5.9	0.0	0.0	0.0
SFNRSPUR013	6.1	6.1	6.1	6.1	0.0	0.0	0.0
SFNRSPUR014	6.1	6.1	6.1	6.1	0.0	0.0	0.0
SFNRSPUR015	6.1	6.1	6.1	6.1	0.0	0.0	0.0
SFNRSPUR018	6.1	6.1	6.1	6.1	0.0	0.0	0.0
SMIAMI-05	8.6	8.6	8.6	8.6	0.0	0.0	0.0
SMIAMI-10	8.3	8.3	8.3	8.4	0.0	0.0	0.1
SNYDERPK-05	7.4	7.4	7.4	7.4	0.0	0.0	0.0
SNYDERPK-10	7.4	7.4	7.4	7.4	0.0	0.0	0.0
SR84-05	7.6	7.7	7.7	7.7	0.0	0.1	0.1
SR84-10	9.1	9.1	9.2	9.2	0.0	0.1	0.1
SR84-15	8.5	8.5	8.5	8.5	0.0	0.0	0.0
SR84-20	6.4	6.4	6.4	6.5	0.0	0.0	0.0
SR84LAKE005	6.1	6.1	6.1	6.1	0.0	0.0	0.0
SR84LAKE010	6.1	6.1	6.1	6.1	0.0	0.0	0.0
SW12A-05	7.4	7.4	7.4	7.4	0.0	0.0	0.0
SW12A-10	7.4	7.4	7.4	7.4	0.0	0.0	0.1
SW14A-05	6.2	6.2	6.2	6.2	0.0	0.0	0.0
SW14ST-05	8.0	8.0	8.1	8.1	0.0	0.1	0.1
SW14ST-10	8.6	8.6	8.6	8.7	0.0	0.0	0.1
SW15A-05	7.0	7.0	7.0	7.1	0.0	0.0	0.1
SW15CT-05	8.6	8.6	8.7	8.7	0.0	0.1	0.1
SW16ST-05	6.8	6.8	6.9	6.9	0.0	0.0	0.0
SW20ST-05	6.2	6.2	6.2	6.2	0.0	0.0	0.0
SW20ST-10	6.1	6.2	6.2	6.2	0.0	0.0	0.1
SW24ST-05	6.0	6.0	6.0	5.9	0.0	0.0	0.0
SW27A-05	8.8	8.8	8.8	8.8	0.0	0.0	0.0
SW3A-05	5.7	5.7	5.7	5.8	0.0	0.0	0.1
SW4A-05	6.7	6.8	6.8	6.8	0.0	0.0	0.0
SW4A-10	7.1	7.1	7.1	7.1	0.0	0.0	0.0
SW4A-15	7.6	7.6	7.6	7.6	0.0	0.0	0.0
SW7A-05	6.6	6.6	6.6	6.6	0.0	0.0	0.0
SWFLAG-05	5.5	5.6	5.6	5.7	0.0	0.1	0.2
SWFLAG-10	6.1	6.1	6.1	6.1	0.0	0.0	0.0
SWFLAG-15	8.2	8.3	8.3	8.4	0.0	0.1	0.2
SWMLK-05	6.6	6.6	6.6	6.7	0.0	0.0	0.1
SWMLK-10	6.2	6.2	6.2	6.2	0.0	0.0	0.0
SWMLK-12	7.1	7.1	7.1	7.2	0.0	0.1	0.1
SWRIVRS-05	7.3	7.4	7.4	7.4	0.0	0.0	0.0
TR005	3.4	3.4	3.4	3.3	0.0	0.0	0.0
TR006	3.4	3.4	3.4	3.4	0.0	0.0	0.0
TR010	3.9	3.9	3.9	3.9	0.0	0.0	0.0
TR011	4.0	3.9	4.0	4.0	0.0	0.0	0.0
TR015	4.4	4.4	4.4	4.3	0.0	0.0	0.0
TR016	4.6	4.6	4.6	4.7	0.0	0.0	0.1
TR020	5.1	5.0	5.0	5.1	0.0	0.0	0.0
TR021	5.1	5.1	5.1	5.1	0.0	0.0	0.0
TR025	5.2	5.2	5.2	5.2	0.0	0.0	0.0
TR026	5.2	5.2	5.2	5.2	0.0	0.0	0.0

Table 6A-5. Alternative No. 1, Maintenance Condition for the 100-Year, 72-Hour Storm

Model Node	Peak Stage (ft NGVD) for 100-year, 72-hour Storm				Delta (Alt. 1 - Base, ft)		
	Base	10% Silted	20% Silted	30 % Silted	10% Silted	20% Silted	30 % Silted
TR030	5.2	5.2	5.2	5.2	0.0	0.0	0.0
TR031	5.2	5.2	5.2	5.2	0.0	0.0	0.0
TR035	5.3	5.2	5.3	5.3	0.0	0.0	0.0
TR037	5.3	5.3	5.3	5.3	0.0	0.0	0.0
TR038	5.4	5.4	5.4	5.4	0.0	0.0	0.0
TR040	5.4	5.4	5.4	5.4	0.0	0.0	0.0
TWNLKS-05	10.7	10.7	10.7	10.7	0.0	0.0	0.0
TWNLKS-10	9.9	9.9	9.9	9.9	0.0	0.0	0.0
W5A-15	5.7	5.7	5.7	5.7	0.0	0.0	0.0
WBROW-05	6.7	6.7	6.7	6.7	0.0	0.0	0.0
WBROW-10	7.6	7.6	7.7	7.7	0.0	0.0	0.0
WBROW-15	8.8	8.8	8.8	8.8	0.0	0.0	0.0
WBROW-20	9.4	9.5	9.5	9.6	0.0	0.1	0.1
WDAV-05	6.7	6.7	6.7	6.7	0.0	0.0	0.0
WDAV-10	8.4	8.4	8.4	8.4	0.0	0.0	0.0
WDAV-12	8.4	8.4	8.4	8.4	0.0	0.0	0.0
WDAV-15	8.6	8.6	8.6	8.6	0.0	0.0	0.0
WDAV-20	8.8	8.8	8.8	8.8	0.0	0.0	0.0
WDAV-25	8.7	8.7	8.8	8.8	0.0	0.0	0.0
WDAV-30	12.0	12.0	12.0	12.0	0.0	0.0	0.0
WESTLL-05	10.1	10.2	10.2	10.2	0.0	0.0	0.0
WSIST-05	6.9	6.9	6.9	6.9	0.0	0.0	0.0
WSIST-10	6.9	6.9	6.9	6.9	0.0	0.0	0.0
WSUNR-05	7.3	7.3	7.3	7.3	0.0	0.0	0.0
WSUNR-10	7.9	8.0	8.0	8.1	0.0	0.1	0.2
WSUNR-15	8.3	8.3	8.3	8.3	0.0	0.0	0.0
WSUNR-20	8.6	8.6	8.6	8.6	0.0	0.0	0.0

Appendix 6B
Surface Water Management Model Results

The following tables present the model results for simulations of Alternative No. 2 (Exfiltration), Alternative No. 3 (Recharge Wells) and Alternative No. 4 (Dredging) for the City of Fort Lauderdale regional EPA SWMM.

Table 6B-1. Alternative No. 2, Exfiltration - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 2 Peak Stages (ft NGVD)					Delta (Alt. 2 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
C12UI010	6.6	7.3	7.5	8.2	8.6	6.1	7.1	7.3	8.2	8.6	-0.5	-0.2	-0.2	0.0	0.0
C12UI015	6.8	7.4	7.5	8.2	8.6	6.2	7.2	7.4	8.2	8.6	-0.6	-0.2	-0.1	0.0	0.0
C12UI020	6.9	7.4	7.6	8.2	8.6	6.3	7.3	7.4	8.2	8.6	-0.6	-0.2	-0.1	0.0	0.0
C12UICS18005	5.5	6.7	7.1	8.2	8.6	4.9	6.4	6.8	8.2	8.6	-0.6	-0.3	-0.2	0.0	0.0
C13IC005	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
C13IC010	2.6	2.7	2.8	2.9	3.0	2.6	2.7	2.8	2.9	3.0	0.0	0.0	0.0	0.0	0.0
C13IC011	2.6	2.8	2.8	3.0	3.2	2.6	2.7	2.8	3.0	3.2	0.0	0.0	0.0	0.0	0.0
C13IC015	2.7	2.8	2.9	3.1	3.2	2.6	2.8	2.8	3.1	3.2	0.0	-0.1	0.0	0.0	0.0
C13IC020	2.8	3.0	3.1	3.4	3.6	2.8	3.0	3.1	3.4	3.6	0.0	-0.1	-0.1	0.0	0.0
C13IC025	3.5	4.1	4.4	5.2	5.6	3.3	4.0	4.3	5.2	5.6	-0.2	-0.2	-0.1	0.0	0.0
C13ICSPUR002	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0	0.0	0.0
C13ICSPUR005	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0	0.0	0.0
C13MR001	3.5	4.3	4.6	5.4	5.9	3.4	4.1	4.4	5.4	5.8	-0.2	-0.2	-0.2	0.0	0.0
C13MR005	3.5	4.3	4.5	5.4	5.8	3.4	4.1	4.4	5.3	5.7	-0.2	-0.2	-0.1	0.0	0.0
C13MR010	3.6	4.3	4.6	5.5	5.9	3.4	4.2	4.5	5.4	5.8	-0.2	-0.2	-0.1	0.0	0.0
C13MR015	3.7	4.5	4.8	5.7	6.1	3.5	4.3	4.6	5.7	6.1	-0.2	-0.2	-0.2	-0.1	0.0
C13MR016	3.7	4.6	4.9	5.8	6.2	3.6	4.4	4.7	5.8	6.2	-0.2	-0.2	-0.2	-0.1	0.0
C13MR020	3.9	4.7	5.1	6.1	6.5	3.7	4.6	4.9	6.1	6.5	-0.2	-0.2	-0.2	0.0	0.0
C13MR021	3.9	4.7	5.1	6.1	6.6	3.7	4.6	4.9	6.1	6.5	-0.2	-0.2	-0.2	0.0	0.0
C13MR024	3.9	4.8	5.2	6.2	6.6	3.7	4.6	4.9	6.2	6.6	-0.2	-0.2	-0.2	0.0	0.0
C13MR025	3.9	4.8	5.2	6.3	6.7	3.7	4.6	4.9	6.2	6.7	-0.2	-0.2	-0.2	-0.1	0.0
C13MR030	4.0	4.9	5.3	6.5	6.9	3.8	4.7	5.0	6.4	6.8	-0.2	-0.2	-0.3	-0.1	0.0
C13MR031	4.0	4.9	5.3	6.5	6.9	3.8	4.7	5.1	6.4	6.9	-0.2	-0.2	-0.3	-0.1	0.0
C13MRC005	3.7	4.6	4.9	5.9	6.3	3.6	4.4	4.7	5.8	6.3	-0.2	-0.2	-0.2	0.0	0.0
C13MRC006	3.8	4.6	5.0	6.0	6.4	3.6	4.4	4.8	5.9	6.4	-0.2	-0.2	-0.2	0.0	0.0
C13MRC007	3.8	4.7	5.0	6.0	6.4	3.6	4.5	4.8	6.0	6.4	-0.2	-0.2	-0.2	0.0	0.0
C13MRC008	3.9	4.7	5.2	6.2	6.6	3.7	4.6	4.9	6.1	6.6	-0.2	-0.2	-0.2	0.0	0.0
C13MRC009	3.9	4.8	5.2	6.3	6.7	3.7	4.6	4.9	6.2	6.7	-0.2	-0.2	-0.3	0.0	0.0
C13MRC010	4.0	4.8	5.3	6.4	6.8	3.8	4.6	5.0	6.3	6.8	-0.2	-0.2	-0.3	0.0	0.0
C13MRC012	4.0	4.8	5.3	6.4	6.8	3.8	4.7	5.0	6.4	6.8	-0.2	-0.2	-0.3	-0.1	0.0
C13MRC014	4.0	4.9	5.4	6.6	6.9	3.8	4.7	5.1	6.5	6.9	-0.2	-0.2	-0.3	-0.1	0.0
C13MRC015	4.0	4.9	5.4	6.6	7.0	3.8	4.7	5.1	6.5	6.9	-0.2	-0.2	-0.3	-0.1	0.0
C13MRC017	4.0	4.9	5.4	6.6	7.0	3.8	4.7	5.1	6.6	7.0	-0.2	-0.2	-0.3	-0.1	0.0
C13MRC018	4.0	4.9	5.4	6.6	7.0	3.8	4.7	5.1	6.6	7.0	-0.2	-0.2	-0.3	0.0	0.0

Table 6B-1. Alternative No. 2, Exfiltration - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 2 Peak Stages (ft NGVD)					Delta (Alt. 2 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
C13MRC-02	7.6	8.0	8.1	8.4	9.2	7.4	7.9	8.1	8.4	9.1	-0.2	-0.1	-0.1	0.0	-0.1
C13MRC020	4.0	4.9	5.4	6.6	7.0	3.8	4.7	5.1	6.6	7.0	-0.2	-0.2	-0.3	-0.1	0.0
C13MRC022	4.0	5.0	5.4	6.7	7.1	3.8	4.7	5.2	6.7	7.1	-0.2	-0.3	-0.3	-0.1	0.0
C13MRC023	4.0	5.0	5.5	6.8	7.2	3.8	4.7	5.2	6.7	7.1	-0.2	-0.3	-0.3	0.0	-0.1
C13MRC024	4.0	5.0	5.5	6.8	7.3	3.9	4.7	5.2	6.8	7.2	-0.2	-0.3	-0.3	0.0	0.0
C13MRC025	4.1	5.0	5.6	6.9	7.4	3.9	4.7	5.3	6.9	7.3	-0.2	-0.3	-0.3	-0.1	0.0
C13MRC-03	4.2	5.1	5.6	7.0	7.6	3.9	4.8	5.4	7.0	7.5	-0.3	-0.3	-0.3	0.0	0.0
C13MRC035	4.1	5.1	5.6	7.0	7.6	3.9	4.8	5.4	7.0	7.5	-0.2	-0.3	-0.3	0.0	0.0
C13MRC042	4.5	5.5	6.1	8.4	9.2	4.5	5.1	5.8	8.3	9.1	0.0	-0.3	-0.3	-0.1	-0.1
C13MRC043	4.5	5.5	6.1	8.4	9.2	4.5	5.1	5.8	8.3	9.1	0.0	-0.3	-0.3	-0.1	-0.1
C13MRC045	4.6	5.5	6.1	8.4	9.2	4.6	5.2	5.8	8.4	9.2	0.0	-0.3	-0.3	-0.1	-0.1
C13MRSPUR005	3.5	4.3	4.6	5.4	5.9	3.4	4.1	4.4	5.4	5.8	-0.2	-0.2	-0.2	0.0	0.0
C14CCC005	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
C14CCC008	2.6	2.7	2.7	2.9	3.1	2.6	2.7	2.7	2.9	3.1	0.0	0.0	0.0	0.0	0.0
C14CCC010	2.7	2.8	2.8	3.1	3.5	2.7	2.7	2.8	3.1	3.5	0.0	0.0	0.0	0.0	0.0
C14CCC020	2.8	3.0	3.1	3.6	4.1	2.8	3.0	3.1	3.6	4.1	0.0	0.0	0.0	0.0	0.0
C14CCC022	2.8	3.0	3.2	3.6	4.2	2.8	3.0	3.1	3.6	4.2	0.0	0.0	0.0	0.0	0.0
C14CCC025	2.9	3.1	3.3	3.8	4.5	2.9	3.1	3.2	3.8	4.4	0.0	0.0	0.0	0.0	0.0
C14CCC027	2.9	3.1	3.3	3.9	4.5	2.9	3.1	3.3	3.8	4.5	0.0	0.0	-0.1	0.0	0.0
C14CCC038	3.4	4.1	4.6	6.5	7.9	3.4	3.9	4.4	6.4	7.9	0.0	-0.1	-0.1	-0.1	0.0
C14CCC039	3.4	4.1	4.6	6.6	8.1	3.4	4.0	4.5	6.5	8.0	0.0	-0.1	-0.1	-0.1	0.0
C14CCC040	3.4	4.2	4.7	6.8	8.2	3.4	4.0	4.6	6.6	8.2	0.0	-0.1	-0.1	-0.1	-0.1
C14CCC045	3.5	4.4	4.9	7.3	8.8	3.5	4.2	4.8	7.2	8.8	0.0	-0.1	-0.1	-0.1	0.0
CCCSPUR005	3.0	3.3	3.5	4.2	4.9	3.0	3.2	3.4	4.1	4.9	0.0	0.0	-0.1	0.0	0.0
CCCSPUR010	3.0	3.3	3.5	4.2	5.1	3.0	3.2	3.4	4.2	5.1	0.0	0.0	-0.1	0.0	0.0
CCCSPUR015	3.1	3.3	3.5	4.2	5.1	3.1	3.3	3.5	4.2	5.1	0.0	-0.1	-0.1	0.0	0.0
CCCSPUR020	5.7	6.7	7.1	8.4	8.7	5.5	6.6	7.0	8.3	8.7	-0.2	-0.1	-0.1	-0.1	0.0
CCCSPUR021	5.7	6.7	7.1	8.3	8.6	5.4	6.6	7.0	8.3	8.6	-0.2	-0.1	-0.1	-0.1	0.0
CRCC-05	4.9	5.3	5.4	5.8	5.9	4.7	5.1	5.3	5.8	5.9	-0.3	-0.1	-0.1	0.0	0.0
CRDVA-05	3.6	3.8	3.8	3.9	4.0	3.6	3.7	3.8	3.9	4.0	0.0	0.0	0.0	0.0	0.0
DUM_IC006	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
EBROW-05	4.1	4.6	4.8	5.2	5.5	3.9	4.5	4.7	5.2	5.5	-0.2	-0.1	-0.1	0.0	0.0
ECOMM-05	6.0	6.2	6.2	6.3	6.4	6.0	6.1	6.2	6.3	6.4	0.0	0.0	0.0	0.0	0.0
ECOMM-10	6.2	6.6	6.8	7.0	7.1	6.1	6.6	6.8	7.0	7.1	-0.1	0.0	0.0	0.0	0.0

Table 6B-1. Alternative No. 2, Exfiltration - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 2 Peak Stages (ft NGVD)					Delta (Alt. 2 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
ECOMM-20	6.4	6.7	6.8	7.0	7.1	6.3	6.7	6.7	7.0	7.1	-0.1	0.0	0.0	0.0	0.0
ELOSO-05	3.6	4.5	4.7	5.2	5.5	3.3	4.5	4.7	5.2	5.5	-0.4	-0.1	-0.1	0.0	0.0
EOAKPRK-05	4.9	5.1	5.2	5.4	5.5	4.9	5.1	5.2	5.4	5.5	0.0	-0.1	-0.1	0.0	0.0
ESUNR-01	6.6	7.0	7.1	7.4	7.6	6.5	6.9	7.0	7.4	7.5	-0.1	-0.1	-0.1	0.0	0.0
ESUNR-05	6.6	7.0	7.1	7.4	7.6	6.5	6.9	7.0	7.4	7.6	-0.1	-0.1	-0.1	0.0	0.0
ESUNR-07	7.1	7.3	7.3	7.5	7.6	7.0	7.2	7.3	7.5	7.6	0.0	0.0	0.0	0.0	0.0
ESUNR-10	6.8	7.0	7.1	7.2	7.3	6.7	7.0	7.1	7.2	7.3	-0.1	0.0	0.0	0.0	0.0
FLEA-05	10.1	10.4	10.6	11.2	11.4	9.9	10.4	10.5	11.1	11.4	-0.2	-0.1	-0.1	0.0	0.0
FLEA-10	11.9	12.1	12.2	12.4	12.5	11.8	12.0	12.2	12.4	12.5	-0.1	-0.1	-0.1	0.0	0.0
G16005	2.7	2.8	3.0	3.4	4.0	2.7	2.8	2.9	3.4	4.0	0.0	0.0	0.0	0.0	0.0
G16007	2.7	2.8	3.0	3.4	4.0	2.7	2.8	2.9	3.4	4.0	0.0	0.0	0.0	0.0	0.0
G54_HW	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
G54_TW	3.9	4.6	4.9	6.0	6.7	3.7	4.4	4.7	6.0	6.7	-0.2	-0.2	-0.1	0.0	0.0
G57_TW	2.8	2.9	3.0	3.5	4.1	2.8	2.8	3.0	3.4	4.1	0.0	0.0	0.0	0.0	0.0
GALT-05	8.3	9.4	9.6	9.8	10.0	8.2	9.4	9.6	9.8	10.0	-0.1	0.0	0.0	0.0	0.0
HCOPWCD2005	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
HF010	6.8	7.5	7.6	8.3	8.7	6.4	7.4	7.5	8.2	8.7	-0.4	-0.1	-0.1	0.0	0.0
HF015	6.8	7.5	7.6	8.3	8.7	6.4	7.4	7.5	8.2	8.7	-0.4	-0.1	-0.1	0.0	0.0
HF020	6.8	7.5	7.6	8.3	8.8	6.4	7.4	7.6	8.3	8.8	-0.4	-0.1	-0.1	0.0	0.0
HFCS17005	6.8	7.5	7.6	8.2	8.7	6.4	7.4	7.5	8.2	8.7	-0.4	-0.1	-0.1	0.0	0.0
HFCS55025	7.4	8.2	8.4	8.9	9.1	6.9	8.0	8.2	8.9	9.0	-0.5	-0.2	-0.1	0.0	0.0
I595-05	7.4	7.7	7.8	8.0	8.1	7.3	7.6	7.7	8.0	8.1	-0.1	-0.1	-0.1	0.0	0.0
I595-10	5.3	5.5	5.6	6.9	7.4	5.1	5.4	5.5	6.8	7.3	-0.2	-0.1	-0.1	-0.1	-0.1
I595-15	5.5	6.6	6.8	7.5	7.8	5.1	6.4	6.7	7.5	7.8	-0.4	-0.2	-0.1	-0.1	-0.1
IC022	2.5	2.6	2.6	2.7	2.8	2.5	2.6	2.6	2.7	2.8	0.0	0.0	0.0	0.0	0.0
IC025	2.6	2.7	2.8	3.0	3.1	2.6	2.7	2.8	3.0	3.1	0.0	0.0	0.0	0.0	0.0
IC030	2.7	2.8	2.9	3.0	3.2	2.7	2.7	2.8	3.0	3.2	0.0	-0.1	-0.1	0.0	0.0
IC032	2.7	2.8	2.9	3.1	3.4	2.7	2.8	2.9	3.1	3.4	0.0	-0.1	-0.1	0.0	0.0
IC035	2.7	2.9	3.0	3.2	3.6	2.7	2.8	2.9	3.2	3.6	0.0	-0.1	-0.1	0.0	0.0
IC040	2.7	2.9	3.0	3.3	3.6	2.7	2.8	3.0	3.3	3.6	0.0	-0.1	-0.1	0.0	0.0
IC042	2.7	2.9	3.0	3.2	3.4	2.7	2.8	2.9	3.2	3.4	0.0	-0.1	-0.1	0.0	0.0
IC043	2.7	2.8	2.9	3.1	3.3	2.7	2.8	2.9	3.1	3.3	0.0	-0.1	-0.1	0.0	0.0
IC044	2.7	2.8	2.9	3.1	3.3	2.7	2.8	2.9	3.1	3.3	0.0	-0.1	0.0	0.0	0.0
IC045	2.7	2.9	3.0	3.1	3.4	2.7	2.8	2.9	3.1	3.4	0.0	-0.1	-0.1	0.0	0.0

Table 6B-1. Alternative No. 2, Exfiltration - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 2 Peak Stages (ft NGVD)					Delta (Alt. 2 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
IC050	2.7	2.9	3.0	3.1	3.4	2.7	2.8	2.9	3.1	3.4	0.0	-0.1	0.0	0.0	0.0
LAKEEMERALD-05	4.1	4.7	5.0	6.8	7.6	3.8	4.5	4.8	6.6	7.5	-0.2	-0.2	-0.2	-0.3	0.0
LKMELVA-05	4.4	5.5	5.9	7.7	7.9	4.0	5.1	5.5	7.5	7.9	-0.4	-0.3	-0.3	-0.1	0.0
LL005	6.0	7.3	7.6	8.4	9.2	5.4	6.9	7.4	8.4	9.2	-0.6	-0.3	-0.2	-0.1	-0.1
LL015	6.0	7.3	7.6	8.5	9.3	5.4	6.9	7.4	8.4	9.2	-0.6	-0.3	-0.2	-0.1	-0.1
LL020	6.0	7.3	7.7	8.6	9.3	5.4	6.9	7.5	8.5	9.3	-0.6	-0.3	-0.2	-0.1	-0.1
LL025	6.0	7.3	7.7	8.6	9.3	5.4	6.9	7.5	8.5	9.3	-0.6	-0.3	-0.2	-0.1	-0.1
LL026	6.0	7.3	7.8	9.1	9.9	5.5	7.0	7.5	8.9	9.8	-0.6	-0.3	-0.3	-0.1	-0.1
LL030	6.0	7.3	7.8	9.1	9.9	5.5	7.0	7.5	8.9	9.8	-0.6	-0.3	-0.3	-0.1	-0.1
LL035	4.7	6.2	6.9	9.1	9.9	4.2	5.8	6.5	9.0	9.8	-0.5	-0.4	-0.4	-0.1	-0.1
LLAKE040	6.7	8.2	8.7	9.1	9.9	6.4	7.8	8.5	9.0	9.8	-0.4	-0.4	-0.1	-0.1	-0.1
MELROSEPK-05	7.5	8.3	8.6	9.1	9.4	6.7	8.0	8.3	9.1	9.4	-0.8	-0.3	-0.3	0.0	0.0
MELROSEPK-06	7.6	8.3	8.5	9.1	9.5	6.9	8.0	8.3	9.1	9.4	-0.7	-0.3	-0.2	0.0	0.0
MELROSEPK-10	7.7	8.4	8.6	9.2	9.5	7.6	8.2	8.4	9.2	9.5	-0.1	-0.3	-0.2	0.0	0.0
MIDLST-05	4.1	5.0	5.2	5.8	6.2	3.9	4.9	5.1	5.8	6.1	-0.2	-0.1	-0.1	0.0	0.0
MLKPOND-05	4.0	5.0	5.4	7.7	8.5	3.6	4.6	5.1	7.4	8.3	-0.4	-0.4	-0.4	-0.3	-0.2
NANDR-05	6.6	6.9	7.0	7.2	7.3	6.4	6.8	6.9	7.2	7.3	-0.2	-0.1	-0.1	0.0	0.0
NANDR-10	6.2	6.3	6.4	6.4	6.5	6.1	6.3	6.3	6.4	6.5	-0.1	0.0	0.0	0.0	0.0
NANDR-15	5.0	5.3	5.3	5.5	5.6	4.9	5.2	5.3	5.5	5.6	-0.1	0.0	0.0	0.0	0.0
NDIXIE-02	7.0	7.3	7.4	7.7	7.8	6.9	7.2	7.3	7.6	7.8	-0.1	-0.1	-0.1	0.0	0.0
NDIXIE-05	6.5	6.7	6.8	7.1	7.2	6.4	6.6	6.8	7.1	7.2	-0.1	-0.1	-0.1	0.0	0.0
NE11ST-04	7.0	7.3	7.4	7.5	7.6	6.9	7.2	7.3	7.5	7.6	-0.1	0.0	-0.1	0.0	0.0
NE11ST-05	7.3	7.4	7.4	7.5	7.6	7.2	7.4	7.4	7.5	7.6	0.0	0.0	0.0	0.0	0.0
NE13ST-05	6.2	6.9	7.1	7.6	7.7	6.2	6.9	7.1	7.6	7.7	0.0	-0.1	-0.1	0.0	0.0
NE13ST-10	6.4	7.0	7.1	7.5	7.6	6.3	6.9	7.1	7.5	7.6	0.0	-0.1	-0.1	0.0	0.0
NE13ST-15	6.4	6.6	6.6	6.8	6.8	6.4	6.6	6.6	6.8	6.8	0.0	0.0	0.0	0.0	0.0
NE15A-05	3.9	4.7	5.0	5.8	6.1	3.8	4.5	4.8	5.7	6.1	-0.2	-0.2	-0.2	0.0	0.0
NE15A-10	5.3	5.8	5.9	6.1	6.2	5.3	5.7	5.8	6.1	6.2	0.0	-0.2	-0.1	0.0	0.0
NE3A-05	6.4	6.5	6.6	6.7	6.7	6.3	6.5	6.6	6.7	6.7	0.0	0.0	0.0	0.0	0.0
NE3A-07	6.1	6.3	6.4	6.5	6.6	6.0	6.3	6.4	6.5	6.6	-0.1	0.0	0.0	0.0	0.0
NE3A-10	5.3	5.5	5.6	5.7	5.8	5.3	5.5	5.5	5.7	5.8	-0.1	0.0	0.0	0.0	0.0
NE3CT-05	7.6	7.9	8.0	8.3	8.4	7.6	7.8	7.9	8.2	8.4	0.0	0.0	0.0	0.0	0.0
NE4A-05	6.1	6.3	6.4	6.5	6.6	6.0	6.3	6.4	6.5	6.6	-0.1	0.0	0.0	0.0	0.0
NE4A-10	6.5	6.7	6.7	6.8	6.9	6.4	6.6	6.7	6.8	6.9	-0.1	0.0	0.0	0.0	0.0

Table 6B-1. Alternative No. 2, Exfiltration - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 2 Peak Stages (ft NGVD)					Delta (Alt. 2 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
NE4A-15	6.8	7.0	7.1	7.2	7.3	6.8	7.0	7.1	7.2	7.3	0.0	0.0	0.0	0.0	0.0
NE65-05	5.0	5.7	6.0	6.6	7.0	4.5	5.6	5.9	6.6	7.0	-0.5	-0.1	-0.1	0.0	0.0
NFED-05	5.8	6.3	6.5	6.7	7.0	5.8	6.2	6.4	6.7	7.0	0.0	-0.1	0.0	0.0	0.0
NFED-10	5.6	6.3	6.6	6.9	7.2	5.6	6.2	6.5	6.9	7.2	0.0	-0.1	-0.1	0.0	0.0
NFED-12	5.7	6.3	6.6	7.0	7.2	5.7	6.3	6.5	7.0	7.2	0.0	-0.1	-0.1	0.0	0.0
NFED-15	6.4	6.6	6.6	6.8	6.9	6.4	6.6	6.6	6.8	6.9	0.0	0.0	0.0	0.0	0.0
NFED-20	6.4	6.6	6.7	6.9	7.1	6.4	6.6	6.7	6.9	7.1	0.0	0.0	0.0	0.0	0.0
NFED-22	6.6	6.8	6.9	7.2	7.4	6.6	6.8	6.9	7.2	7.4	0.0	0.0	0.0	0.0	0.0
NFED-25	7.2	7.5	7.7	8.0	8.2	7.2	7.5	7.6	8.0	8.2	0.0	-0.1	-0.1	0.0	0.0
NFED-30	9.1	9.3	9.4	9.5	9.6	9.1	9.3	9.4	9.5	9.6	0.0	0.0	0.0	0.0	0.0
NFED-35	6.3	6.6	6.7	6.8	6.9	6.3	6.5	6.6	6.8	6.9	0.0	-0.1	-0.1	0.0	0.0
NFED-37	5.1	5.6	5.9	6.4	6.7	5.0	5.5	5.8	6.4	6.7	-0.1	-0.1	-0.1	0.0	0.0
NFED-40	6.3	6.6	6.7	7.0	7.1	6.3	6.5	6.7	7.0	7.1	0.0	-0.1	-0.1	0.0	0.0
NFED-45	5.0	9.0	9.1	9.2	9.3	5.0	8.9	9.1	9.2	9.3	0.0	-0.1	0.0	0.0	0.0
NFED-50	8.0	8.2	8.3	8.4	8.4	7.9	8.2	8.3	8.4	8.4	-0.1	0.0	0.0	0.0	0.0
NFED-52	4.5	5.0	5.2	5.7	5.9	4.4	4.9	5.1	5.7	5.9	-0.1	-0.1	-0.1	0.0	0.0
NFED-53	4.0	4.6	4.8	5.4	5.7	3.8	4.4	4.7	5.3	5.7	-0.1	-0.1	-0.1	0.0	0.0
NFED-55	6.1	6.4	6.5	6.6	6.8	6.0	6.3	6.4	6.6	6.8	-0.1	0.0	0.0	0.0	0.0
NFED-60	7.1	7.2	7.2	7.3	7.4	7.0	7.2	7.2	7.3	7.4	0.0	0.0	0.0	0.0	0.0
NFED-65	6.2	6.4	6.5	6.7	7.0	6.1	6.3	6.4	6.7	6.9	0.0	0.0	0.0	0.0	0.0
NFED-67	5.0	5.7	6.0	6.7	6.9	4.9	5.5	5.8	6.7	6.9	-0.1	-0.2	-0.2	0.0	0.0
NFED-70	4.3	5.4	6.0	6.7	6.9	4.1	5.1	5.6	6.7	6.9	-0.2	-0.3	-0.3	0.0	0.0
NFNR001	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0	0.0	0.0
NFNR005	2.6	2.6	2.6	2.7	2.8	2.6	2.6	2.6	2.7	2.8	0.0	0.0	0.0	0.0	0.0
NFNR008	2.9	3.1	3.3	3.6	3.9	2.8	3.1	3.2	3.6	3.9	-0.1	-0.1	-0.1	0.0	0.0
NFNR010	3.1	3.5	3.6	4.1	4.5	3.0	3.3	3.5	4.1	4.5	-0.1	-0.1	-0.1	0.0	0.0
NFNR011	3.1	3.5	3.7	4.2	4.6	3.0	3.4	3.5	4.2	4.6	-0.1	-0.2	-0.2	0.0	0.0
NFNR015	3.2	3.7	3.9	4.5	4.9	3.1	3.5	3.7	4.5	4.9	-0.1	-0.2	-0.2	0.0	0.0
NFNR016	3.3	3.8	4.0	4.6	5.0	3.1	3.6	3.8	4.6	5.0	-0.2	-0.2	-0.2	0.0	0.0
NFNR020	3.3	3.9	4.1	4.8	5.2	3.2	3.7	3.9	4.8	5.2	-0.2	-0.2	-0.2	0.0	0.0
NFNR021	3.4	3.9	4.2	4.9	5.3	3.2	3.7	4.0	4.8	5.3	-0.2	-0.2	-0.2	0.0	0.0
NFNR025	3.4	4.0	4.2	5.0	5.4	3.2	3.8	4.0	4.9	5.4	-0.2	-0.2	-0.2	0.0	0.0
NFNR030	3.9	4.7	5.0	5.8	6.2	3.6	4.5	4.8	5.8	6.1	-0.3	-0.2	-0.2	0.0	0.0
NFNR035	4.3	5.2	5.6	6.4	6.7	4.0	5.0	5.4	6.4	6.7	-0.3	-0.3	-0.2	0.0	0.0

Table 6B-1. Alternative No. 2, Exfiltration - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 2 Peak Stages (ft NGVD)					Delta (Alt. 2 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
NFNR040	4.3	5.3	5.6	6.6	6.9	4.0	5.1	5.4	6.6	6.9	-0.3	-0.3	-0.2	0.0	0.0
NFNR042	4.5	5.5	5.9	6.8	7.1	4.2	5.3	5.6	6.8	7.1	-0.4	-0.3	-0.2	0.0	0.0
NFNR043	4.6	5.6	6.0	6.9	7.3	4.2	5.3	5.7	6.9	7.3	-0.4	-0.3	-0.2	0.0	0.0
NFNR045	4.8	5.8	6.2	7.2	7.5	4.4	5.6	6.0	7.2	7.5	-0.4	-0.3	-0.2	0.0	0.0
NFNR046	4.8	5.8	6.2	7.2	7.6	4.4	5.6	6.0	7.2	7.6	-0.4	-0.3	-0.2	0.0	0.0
NFNR050	5.2	6.3	6.7	7.8	8.3	4.7	6.0	6.5	7.8	8.3	-0.5	-0.3	-0.2	0.0	0.0
NFNR051	5.2	6.3	6.7	7.9	8.3	4.7	6.1	6.5	7.9	8.3	-0.5	-0.3	-0.2	0.0	0.0
NFNR054	5.3	6.4	6.9	8.0	8.5	4.8	6.2	6.6	8.0	8.5	-0.5	-0.3	-0.2	0.0	0.0
NFNR055	5.3	6.4	6.9	8.1	8.6	4.8	6.2	6.6	8.1	8.5	-0.5	-0.3	-0.2	0.0	0.0
NFNRSPUR004	2.6	2.8	2.8	3.0	3.2	2.6	2.7	2.8	3.0	3.2	0.0	0.0	0.0	0.0	0.0
NFNRSPUR005	2.7	2.9	2.9	3.2	3.4	2.7	2.8	2.9	3.2	3.4	0.0	-0.1	-0.1	0.0	0.0
NFNRSPUR010	2.8	2.9	3.0	3.6	4.8	2.8	2.9	2.9	3.6	4.7	0.0	0.0	-0.1	-0.1	-0.1
NFSPUR005	3.9	4.7	5.0	5.8	6.2	3.6	4.5	4.8	5.8	6.1	-0.3	-0.2	-0.2	0.0	0.0
NNRC005	3.6	4.2	4.5	5.6	6.1	3.4	4.1	4.4	5.5	6.1	-0.2	-0.2	-0.2	-0.1	0.0
NNRC010	3.8	4.5	4.7	5.9	6.5	3.6	4.3	4.6	5.8	6.5	-0.2	-0.2	-0.2	0.0	0.0
NNRC015	3.8	4.5	4.8	5.9	6.6	3.6	4.3	4.6	5.9	6.5	-0.2	-0.2	-0.2	-0.1	0.0
NNRC020	3.8	4.6	4.8	6.0	6.6	3.6	4.4	4.7	5.9	6.6	-0.2	-0.2	-0.2	0.0	0.0
NPOWRL-03	7.1	7.5	7.6	7.9	8.0	7.0	7.4	7.5	7.9	8.0	-0.1	-0.1	-0.1	0.0	0.0
NPOWRL-05	7.0	7.2	7.2	7.4	7.5	6.9	7.1	7.2	7.4	7.5	0.0	0.0	0.0	0.0	0.0
NPOWRL-10	8.8	9.2	9.2	9.7	9.9	8.5	9.1	9.2	9.6	9.9	-0.3	-0.1	0.0	-0.1	0.0
NW10TR-05	10.3	10.5	10.6	11.0	11.1	10.2	10.4	10.6	11.0	11.1	-0.1	-0.1	-0.1	0.0	0.0
NW15A-05	7.5	7.7	7.8	8.1	8.2	7.5	7.6	7.7	8.1	8.2	0.0	-0.1	-0.1	0.0	0.0
NW15A-10	6.1	6.4	6.5	6.7	6.9	6.0	6.3	6.4	6.7	6.9	-0.2	0.0	0.0	0.0	0.0
NW15A-15	5.9	6.3	6.4	6.6	6.9	5.7	6.2	6.3	6.6	6.9	-0.2	0.0	0.0	0.0	0.0
NW18A-05	6.6	6.8	6.9	7.1	7.2	6.5	6.7	6.8	7.1	7.2	-0.1	-0.1	0.0	0.0	0.0
NW22ST-05	6.2	6.7	6.8	7.5	7.9	6.0	6.5	6.7	7.5	7.8	-0.2	-0.2	-0.1	0.0	0.0
NW22ST-10	7.4	8.0	8.1	8.4	8.5	7.1	7.9	8.0	8.4	8.5	-0.4	-0.1	-0.1	0.0	0.0
NW24A-05	6.5	6.9	7.0	7.8	8.3	6.4	6.8	6.9	7.8	8.3	-0.1	0.0	0.0	0.0	0.0
NW28-05	9.8	10.2	10.4	10.6	10.9	9.7	10.2	10.4	10.6	10.9	-0.1	0.0	0.0	0.0	0.0
NW29-05	11.2	11.4	11.4	11.5	11.5	11.1	11.3	11.4	11.5	11.5	-0.1	0.0	0.0	0.0	0.0
NW31ST-05	6.0	7.1	7.3	8.1	8.5	5.4	6.8	7.1	8.1	8.5	-0.6	-0.3	-0.2	0.0	0.0
NW35-05	9.1	10.1	10.3	10.7	11.1	8.8	9.9	10.2	10.7	11.1	-0.4	-0.1	-0.1	0.0	0.0
NW35-10	9.0	9.5	9.6	10.0	10.1	9.0	9.4	9.6	9.9	10.1	0.0	-0.1	0.0	0.0	0.0
NW35-15	8.6	9.2	9.4	10.0	10.1	8.4	9.1	9.3	9.9	10.1	-0.2	-0.1	-0.1	0.0	0.0

Table 6B-1. Alternative No. 2, Exfiltration - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 2 Peak Stages (ft NGVD)					Delta (Alt. 2 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
NW4A-05	6.5	6.9	7.0	7.2	7.3	6.4	6.8	6.9	7.2	7.3	-0.1	-0.1	0.0	0.0	0.0
NW4A-10	6.5	6.9	7.0	7.2	7.3	6.4	6.8	6.9	7.2	7.3	-0.1	-0.1	0.0	0.0	0.0
NW5A-05	6.4	6.9	7.0	7.2	7.3	6.0	6.8	6.9	7.2	7.3	-0.4	-0.1	0.0	0.0	0.0
NW5A-07	6.3	6.5	6.6	6.9	7.0	6.2	6.5	6.6	6.9	7.0	-0.1	0.0	0.0	0.0	0.0
NW5A-10	6.2	6.5	6.6	6.7	6.9	6.1	6.4	6.5	6.7	6.9	-0.1	0.0	0.0	0.0	0.0
NW7A-05	6.7	6.9	6.9	7.1	7.2	6.6	6.9	6.9	7.1	7.2	-0.1	0.0	0.0	0.0	0.0
NW7A-10	6.6	6.8	6.9	7.1	7.2	6.5	6.7	6.8	7.1	7.2	-0.1	0.0	-0.1	0.0	0.0
NW8ST-05	6.4	6.7	6.7	6.9	7.1	6.4	6.6	6.7	6.9	7.1	-0.1	0.0	0.0	0.0	0.0
NW8ST-10	6.4	6.7	6.7	6.9	7.1	6.4	6.6	6.7	6.9	7.1	-0.1	0.0	0.0	0.0	0.0
NW9A-05	6.7	6.9	6.9	7.0	7.1	6.7	6.9	6.9	7.0	7.1	0.0	0.0	0.0	0.0	0.0
NW9A-10	6.8	7.0	7.0	7.1	7.2	6.7	7.0	7.0	7.1	7.2	-0.1	0.0	0.0	0.0	0.0
NWFLAG-05	4.3	4.7	4.9	5.3	5.6	4.2	4.6	4.9	5.3	5.5	-0.1	-0.1	-0.1	0.0	0.0
OC005	3.9	4.7	5.2	6.9	7.4	3.7	4.4	4.8	6.8	7.3	-0.2	-0.3	-0.3	-0.1	-0.1
OC010	3.8	4.6	5.0	6.5	6.9	3.6	4.4	4.7	6.4	6.8	-0.2	-0.2	-0.3	-0.1	-0.1
OC015	3.8	4.6	4.9	6.1	6.5	3.6	4.3	4.7	6.1	6.4	-0.2	-0.2	-0.3	-0.1	0.0
OC020	3.6	4.4	4.7	5.8	6.1	3.4	4.1	4.5	5.7	6.1	-0.2	-0.2	-0.2	-0.1	0.0
OC021	3.6	4.3	4.6	5.5	6.0	3.4	4.1	4.4	5.5	6.0	-0.2	-0.2	-0.2	-0.1	0.0
OP015	4.1	5.1	5.6	6.8	7.1	3.9	4.8	5.3	6.7	7.1	-0.2	-0.3	-0.3	0.0	0.0
OPEB001	3.7	4.6	5.0	5.9	6.3	3.6	4.4	4.8	5.8	6.3	-0.2	-0.2	-0.2	0.0	0.0
OPEB002	3.7	4.6	5.0	5.9	6.4	3.6	4.4	4.8	5.9	6.3	-0.2	-0.2	-0.2	0.0	0.0
OPEB003	3.7	4.7	5.1	6.0	6.4	3.6	4.4	4.9	6.0	6.4	-0.2	-0.3	-0.2	0.0	0.0
OPEB004	3.7	4.7	5.1	6.0	6.4	3.6	4.4	4.9	6.0	6.4	-0.2	-0.3	-0.2	0.0	0.0
OPEB005	3.7	4.7	5.1	6.0	6.5	3.6	4.4	4.9	6.0	6.4	-0.2	-0.3	-0.2	0.0	0.0
OPEB006	3.8	4.8	5.3	6.2	6.6	3.6	4.5	5.0	6.2	6.6	-0.2	-0.3	-0.3	0.0	0.0
OPEB007	3.8	4.8	5.3	6.3	6.7	3.6	4.5	5.0	6.3	6.7	-0.2	-0.3	-0.3	0.0	0.0
OPEB008	3.8	4.8	5.3	6.3	6.7	3.6	4.5	5.0	6.3	6.7	-0.2	-0.3	-0.3	0.0	0.0
OPEB009	3.8	4.8	5.4	6.4	6.8	3.7	4.5	5.1	6.4	6.8	-0.2	-0.3	-0.3	0.0	0.0
OPEB010	3.8	4.8	5.4	6.4	6.8	3.7	4.5	5.1	6.4	6.8	-0.2	-0.3	-0.3	0.0	0.0
OPEB011	3.8	4.8	5.4	6.4	6.8	3.7	4.5	5.1	6.4	6.8	-0.2	-0.3	-0.3	0.0	0.0
OPEB015	3.8	4.8	5.4	6.4	6.8	3.7	4.5	5.1	6.4	6.8	-0.2	-0.3	-0.3	0.0	0.0
OPL005	4.1	5.1	5.6	6.9	7.4	3.8	4.8	5.3	6.9	7.3	-0.3	-0.3	-0.3	-0.1	0.0
OPL010	4.1	5.1	5.6	7.0	7.4	3.8	4.8	5.3	6.9	7.4	-0.3	-0.3	-0.3	-0.1	-0.1
OPL015	4.6	5.7	5.8	7.0	7.4	4.1	5.6	5.8	6.9	7.4	-0.5	-0.1	0.0	-0.1	-0.1
OPL020	4.6	5.7	5.8	7.0	7.4	4.1	5.6	5.8	6.9	7.4	-0.5	-0.1	0.0	-0.1	-0.1

Table 6B-1. Alternative No. 2, Exfiltration - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 2 Peak Stages (ft NGVD)					Delta (Alt. 2 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
OPL025	4.9	6.6	7.3	9.0	9.9	4.5	6.2	7.0	8.9	9.8	-0.4	-0.4	-0.3	-0.2	-0.1
OPL030	4.7	6.2	6.9	9.1	9.9	4.2	5.8	6.5	9.0	9.8	-0.5	-0.4	-0.4	-0.1	-0.1
OPL035	4.7	6.2	6.9	9.1	9.9	4.2	5.8	6.5	9.0	9.8	-0.5	-0.4	-0.4	-0.1	-0.1
OUT_IC005	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
OUT_IC010	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
OUT_IC015	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
OUT_IC020	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
OUT_IC055	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
PAG005	8.6	9.0	9.1	9.3	9.5	8.3	8.9	9.0	9.3	9.5	-0.3	-0.1	-0.1	0.0	0.0
PORTSPUR005	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
PRLAKE010	8.3	8.9	9.2	10.0	10.7	8.0	8.7	9.0	9.9	10.7	-0.3	-0.2	-0.2	0.0	0.0
PRN001	4.1	4.9	5.4	7.8	9.4	3.9	4.7	5.3	7.7	9.4	-0.1	-0.2	-0.2	-0.1	0.0
PRN005	8.4	9.4	9.9	10.7	11.3	8.1	9.1	9.7	10.7	11.3	-0.4	-0.3	-0.2	0.0	0.0
PRN010	8.4	9.4	9.9	10.7	11.3	8.1	9.1	9.7	10.7	11.3	-0.4	-0.3	-0.2	0.0	0.0
PRN015	8.4	9.4	9.9	10.7	11.3	8.1	9.1	9.7	10.7	11.3	-0.4	-0.3	-0.3	0.0	0.0
PRN018	8.5	9.4	9.9	10.7	11.3	8.1	9.1	9.7	10.7	11.3	-0.4	-0.3	-0.2	0.0	0.0
PRN020	8.5	9.4	9.9	10.7	11.3	8.1	9.1	9.7	10.7	11.3	-0.4	-0.3	-0.2	0.0	0.0
PRN025	9.2	9.7	9.9	10.3	10.5	8.9	9.6	9.8	10.3	10.5	-0.3	-0.1	-0.1	0.0	0.0
PRN030	9.2	9.7	9.9	10.2	10.4	8.9	9.6	9.8	10.2	10.4	-0.3	-0.1	-0.1	0.0	0.0
PRN035	6.9	7.7	8.0	8.7	9.1	6.6	7.5	7.8	8.6	9.1	-0.3	-0.2	-0.2	-0.1	0.0
PRN038	6.9	7.7	8.0	8.6	9.0	6.5	7.5	7.8	8.6	9.0	-0.3	-0.2	-0.2	-0.1	0.0
PRN039	6.9	7.7	8.0	8.6	8.9	6.5	7.5	7.8	8.5	8.8	-0.3	-0.2	-0.2	0.0	0.0
PRN040	6.8	7.7	8.0	8.5	8.8	6.3	7.5	7.8	8.5	8.8	-0.5	-0.2	-0.2	0.0	0.0
PRN045	7.0	7.7	8.0	8.6	9.0	6.7	7.5	7.9	8.6	9.0	-0.3	-0.2	-0.2	0.0	0.0
PRN1005	8.4	9.4	9.9	10.7	11.3	8.1	9.1	9.7	10.7	11.3	-0.4	-0.3	-0.2	0.0	0.0
PRN1006	8.4	9.0	9.2	9.4	9.5	8.1	8.9	9.1	9.4	9.5	-0.3	-0.1	-0.1	0.0	0.0
PRN1010	8.4	9.0	9.2	9.4	9.5	8.1	8.9	9.1	9.4	9.5	-0.3	-0.1	-0.1	0.0	0.0
PRN1011	8.6	9.0	9.1	9.3	9.5	8.3	8.9	9.0	9.3	9.5	-0.3	-0.1	-0.1	0.0	0.0
PRSWLAKE020	7.9	8.5	8.8	9.4	10.0	7.7	8.3	8.6	9.3	9.9	-0.3	-0.2	-0.2	-0.1	-0.1
PRSWLAKE025	7.8	8.2	8.5	9.4	10.0	7.6	8.1	8.3	9.2	9.9	-0.2	-0.2	-0.2	-0.1	-0.1
RIVRPS	2.5	3.3	4.0	4.8	5.5	2.5	2.9	3.7	4.8	5.5	0.0	-0.4	-0.3	0.0	0.0
ROL-05	4.7	5.0	5.1	5.5	6.0	4.6	4.9	5.0	5.4	5.9	-0.1	-0.1	-0.1	0.0	0.0
RVRLND-05	7.3	7.4	7.5	7.7	7.8	7.2	7.4	7.4	7.7	7.8	0.0	0.0	0.0	0.0	0.0
S33_HW	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0	0.0	0.0

Table 6B-1. Alternative No. 2, Exfiltration - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 2 Peak Stages (ft NGVD)					Delta (Alt. 2 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
S33_TW	5.3	6.5	7.0	8.2	8.7	4.9	6.3	6.7	8.2	8.7	-0.5	-0.3	-0.2	0.0	0.0
S36_TW	4.1	5.2	5.7	7.1	7.7	4.0	4.8	5.4	7.1	7.6	-0.2	-0.3	-0.3	0.0	0.0
S36-HW	4.3	5.4	6.0	8.3	9.1	4.3	5.1	5.7	8.2	9.1	0.0	-0.3	-0.3	-0.1	0.0
S37A_TW	2.9	3.2	3.5	4.1	4.8	2.9	3.2	3.4	4.0	4.8	0.0	-0.1	-0.1	0.0	0.0
S37A-HW	3.4	3.9	4.4	6.2	7.6	3.4	3.8	4.3	6.1	7.6	0.0	-0.1	-0.1	-0.1	0.0
S37B_HW	4.0	4.9	5.4	7.8	9.4	3.9	4.7	5.3	7.7	9.4	-0.1	-0.2	-0.1	-0.1	0.0
S37B_TW	3.6	4.4	5.0	7.4	8.9	3.6	4.3	4.9	7.3	8.9	0.0	-0.1	-0.1	-0.1	0.0
SANDR-05	5.8	6.0	6.0	6.1	6.2	5.7	5.9	6.0	6.1	6.2	0.0	0.0	0.0	0.0	0.0
SE10A-05	5.4	6.0	6.2	6.5	6.7	5.3	5.9	6.1	6.5	6.7	-0.1	-0.1	-0.1	0.0	0.0
SE3A-05	3.8	4.5	4.7	5.2	5.5	3.6	4.4	4.7	5.2	5.5	-0.2	-0.1	-0.1	0.0	0.0
SE3A-10	5.0	5.2	5.3	5.3	5.4	5.0	5.2	5.2	5.3	5.4	0.0	0.0	0.0	0.0	0.0
SE3A-15	7.3	7.6	7.8	8.0	8.2	7.2	7.6	7.7	8.0	8.2	-0.1	0.0	0.0	0.0	0.0
SE4A-10	7.5	8.3	8.6	8.9	9.1	7.4	8.2	8.5	8.9	9.1	-0.1	-0.1	-0.1	0.0	0.0
SE5A-05	4.2	4.5	4.6	4.9	5.0	4.2	4.5	4.6	4.9	5.0	0.0	0.0	0.0	0.0	0.0
SeepOut	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SFED-05	5.7	6.1	6.2	6.5	6.6	5.7	6.0	6.1	6.5	6.6	0.0	0.0	-0.1	0.0	0.0
SFED-10	6.1	6.4	6.5	6.6	6.7	6.1	6.3	6.4	6.6	6.7	-0.1	0.0	0.0	0.0	0.0
SFED-15	7.3	7.6	7.8	8.0	8.2	7.2	7.6	7.7	8.0	8.2	-0.1	0.0	0.0	0.0	0.0
SFED-20	7.3	7.6	7.8	8.0	8.2	7.2	7.6	7.7	8.0	8.2	-0.1	0.0	0.0	0.0	0.0
SFED-25	7.3	7.6	7.8	8.0	8.2	7.2	7.6	7.7	8.0	8.2	-0.1	0.0	0.0	0.0	0.0
SFNR005	3.4	4.0	4.2	5.1	5.7	3.3	3.8	4.1	5.1	5.6	-0.2	-0.2	-0.2	0.0	0.0
SFNR006	3.4	4.0	4.3	5.2	5.7	3.3	3.9	4.1	5.1	5.6	-0.2	-0.2	-0.2	0.0	0.0
SFNR010	3.5	4.1	4.3	5.3	5.8	3.3	3.9	4.2	5.3	5.8	-0.2	-0.2	-0.2	0.0	0.0
SFNR015	3.5	4.1	4.4	5.4	6.0	3.3	4.0	4.2	5.4	5.9	-0.2	-0.2	-0.2	-0.1	0.0
SFNR020	3.5	4.1	4.4	5.4	6.0	3.3	4.0	4.2	5.4	5.9	-0.2	-0.2	-0.2	-0.1	0.0
SFNR025	3.5	4.2	4.5	5.5	6.1	3.4	4.0	4.3	5.5	6.0	-0.2	-0.2	-0.2	-0.1	0.0
SFNR030	3.6	4.2	4.5	5.6	6.1	3.4	4.1	4.3	5.5	6.1	-0.2	-0.2	-0.2	-0.1	0.0
SFNRC005	3.6	4.2	4.5	5.6	6.1	3.4	4.1	4.3	5.5	6.1	-0.2	-0.2	-0.2	-0.1	0.0
SFNRSPUR005	3.5	4.1	4.3	5.3	5.8	3.3	3.9	4.2	5.3	5.8	-0.2	-0.2	-0.2	0.0	0.0
SFNRSPUR010	3.5	4.1	4.4	5.4	6.0	3.3	4.0	4.3	5.4	5.9	-0.2	-0.2	-0.2	-0.1	0.0
SFNRSPUR013	3.5	4.2	4.5	5.5	6.1	3.4	4.0	4.3	5.5	6.0	-0.2	-0.2	-0.2	-0.1	0.0
SFNRSPUR014	3.5	4.2	4.5	5.5	6.1	3.4	4.0	4.3	5.5	6.0	-0.2	-0.2	-0.2	-0.1	0.0
SFNRSPUR015	3.5	4.2	4.5	5.5	6.1	3.4	4.1	4.3	5.5	6.1	-0.2	-0.2	-0.2	0.0	0.0
SFNRSPUR018	3.5	4.2	4.5	5.6	6.1	3.4	4.1	4.3	5.5	6.1	-0.2	-0.2	-0.2	0.0	0.0

Table 6B-1. Alternative No. 2, Exfiltration - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 2 Peak Stages (ft NGVD)					Delta (Alt. 2 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
SMIAMI-05	7.9	8.3	8.3	8.5	8.6	7.9	8.2	8.3	8.5	8.6	0.0	0.0	0.0	0.0	0.0
SMIAMI-10	6.7	7.9	8.0	8.2	8.3	6.4	7.8	8.0	8.2	8.3	-0.4	-0.1	0.0	0.0	0.0
SNYDERPK-05	6.1	6.5	6.6	7.1	7.4	5.9	6.4	6.6	7.0	7.3	-0.2	-0.1	-0.1	-0.1	-0.1
SNYDERPK-10	6.1	6.5	6.6	7.1	7.4	5.9	6.4	6.6	7.0	7.3	-0.2	-0.1	-0.1	-0.1	-0.1
SR84-02	8.0	8.1	8.2	8.5	8.6	8.0	8.1	8.2	8.4	8.6	0.0	0.0	0.0	0.0	0.0
SR84-05	6.3	7.0	7.2	7.5	7.6	6.2	6.9	7.1	7.5	7.6	0.0	-0.1	-0.1	0.0	0.0
SR84-10	8.3	8.6	8.7	8.9	9.1	8.2	8.6	8.7	8.9	9.1	0.0	0.0	0.0	0.0	0.0
SR84-15	7.8	8.0	8.1	8.3	8.5	7.7	8.0	8.1	8.3	8.5	-0.1	0.0	0.0	0.0	0.0
SR84-20	4.6	5.4	5.6	6.2	6.4	4.5	5.2	5.5	6.1	6.4	-0.1	-0.2	-0.1	0.0	0.0
SR84LAKE005	3.6	4.2	4.5	5.6	6.1	3.4	4.1	4.3	5.5	6.1	-0.2	-0.2	-0.2	-0.1	0.0
SR84LAKE010	3.6	4.2	4.5	5.6	6.1	3.4	4.1	4.3	5.5	6.1	-0.2	-0.2	-0.2	-0.1	0.0
SW12A-05	6.1	6.5	6.6	7.1	7.4	5.9	6.4	6.6	7.0	7.3	-0.2	-0.1	-0.1	0.0	-0.1
SW12A-10	6.2	6.5	6.6	7.1	7.4	6.1	6.4	6.5	7.0	7.3	-0.1	-0.1	-0.1	0.0	-0.1
SW14A-05	4.1	5.1	5.2	5.8	6.2	3.9	5.0	5.1	5.8	6.1	-0.2	-0.1	0.0	0.0	0.0
SW14ST-05	5.6	6.2	6.4	7.7	8.0	5.6	6.0	6.2	7.6	8.0	-0.1	-0.1	-0.3	-0.1	0.0
SW14ST-10	6.7	7.1	7.3	8.3	8.6	6.7	7.0	7.1	8.2	8.6	0.0	-0.1	-0.1	-0.1	0.0
SW15A-05	6.4	6.6	6.6	6.9	7.0	6.3	6.5	6.5	6.9	7.0	-0.1	-0.1	-0.1	0.0	0.0
SW15CT-05	6.8	7.2	7.3	8.3	8.6	6.8	7.1	7.3	8.2	8.6	0.0	-0.1	-0.1	-0.1	0.0
SW16ST-05	4.3	4.9	5.2	6.4	6.8	4.2	4.7	5.0	6.3	6.8	-0.1	-0.2	-0.2	-0.1	0.0
SW20ST-05	4.3	5.1	5.4	5.9	6.2	4.2	4.9	5.2	5.9	6.2	-0.1	-0.2	-0.2	0.0	0.0
SW20ST-10	4.3	5.1	5.3	5.9	6.2	4.1	4.9	5.2	5.8	6.1	-0.2	-0.2	-0.1	0.0	0.0
SW24ST-05	4.7	5.0	5.1	5.5	6.0	4.5	4.9	5.0	5.5	5.9	-0.2	-0.1	-0.1	0.0	0.0
SW27A-05	8.0	8.2	8.3	8.6	8.8	7.9	8.1	8.2	8.6	8.7	0.0	-0.1	-0.1	0.0	0.0
SW3A-05	4.3	4.9	5.1	5.5	5.7	4.0	4.8	5.0	5.5	5.7	-0.3	-0.1	-0.1	0.0	0.0
SW4A-05	6.2	6.5	6.5	6.6	6.7	6.1	6.4	6.5	6.6	6.7	-0.1	0.0	0.0	0.0	0.0
SW4A-10	6.4	6.7	6.8	7.0	7.1	6.4	6.7	6.8	7.0	7.1	0.0	0.0	-0.1	0.0	0.0
SW4A-15	6.8	7.1	7.2	7.5	7.6	6.8	7.1	7.1	7.4	7.5	0.0	0.0	0.0	0.0	0.0
SW7A-05	5.7	6.0	6.1	6.3	6.6	5.6	6.0	6.1	6.3	6.5	-0.1	0.0	0.0	0.0	0.0
SWFLAG-05	3.3	4.1	4.5	5.0	5.5	3.2	3.8	4.3	5.0	5.5	0.0	-0.3	-0.2	0.0	0.0
SWFLAG-10	4.6	5.1	5.3	5.8	6.1	4.5	4.9	5.1	5.8	6.1	-0.1	-0.2	-0.1	0.0	0.0
SWFLAG-15	7.3	7.6	7.8	8.0	8.2	7.2	7.6	7.7	8.0	8.2	-0.1	0.0	0.0	0.0	0.0
SWMLK-05	4.8	5.2	5.5	6.5	6.6	4.8	5.1	5.2	6.4	6.6	0.0	-0.1	-0.3	0.0	0.0
SWMLK-10	4.8	5.2	5.5	6.0	6.2	4.8	5.1	5.2	6.0	6.2	0.0	-0.1	-0.3	0.0	0.0
SWMLK-12	5.0	5.4	5.6	6.8	7.1	4.9	5.4	5.6	6.7	7.0	0.0	0.0	-0.1	-0.1	0.0

Table 6B-1. Alternative No. 2, Exfiltration - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 2 Peak Stages (ft NGVD)					Delta (Alt. 2 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
SWRIVRS-05	6.4	6.9	7.0	7.2	7.3	6.2	6.9	7.0	7.2	7.3	-0.3	-0.1	0.0	0.0	0.0
TR005	2.7	2.8	2.9	3.2	3.4	2.7	2.7	2.8	3.2	3.4	0.0	-0.1	-0.1	0.0	0.0
TR006	2.7	2.8	2.9	3.2	3.4	2.7	2.8	2.8	3.2	3.4	0.0	-0.1	-0.1	0.0	0.0
TR010	2.7	3.0	3.1	3.6	3.9	2.7	2.9	3.0	3.5	3.9	0.0	-0.1	-0.1	0.0	0.0
TR011	2.7	3.0	3.1	3.6	4.0	2.7	2.9	3.0	3.6	3.9	0.0	-0.1	-0.1	0.0	0.0
TR015	2.9	3.2	3.4	4.0	4.4	2.8	3.1	3.3	4.0	4.4	-0.1	-0.1	-0.1	0.0	0.0
TR016	2.9	3.4	3.6	4.2	4.6	2.9	3.2	3.4	4.2	4.6	-0.1	-0.1	-0.1	0.0	0.0
TR020	3.2	3.7	3.9	4.6	5.1	3.0	3.5	3.8	4.6	5.0	-0.1	-0.2	-0.2	0.0	0.0
TR021	3.2	3.7	4.0	4.7	5.1	3.1	3.6	3.8	4.6	5.1	-0.1	-0.2	-0.2	0.0	0.0
TR025	3.2	3.8	4.0	4.8	5.2	3.1	3.6	3.9	4.7	5.2	-0.2	-0.2	-0.2	0.0	0.0
TR026	3.3	3.8	4.1	4.8	5.2	3.1	3.6	3.9	4.7	5.2	-0.2	-0.2	-0.2	0.0	0.0
TR030	3.3	3.9	4.1	4.8	5.2	3.1	3.7	3.9	4.8	5.2	-0.2	-0.2	-0.2	0.0	0.0
TR031	3.3	3.9	4.1	4.9	5.2	3.2	3.7	3.9	4.8	5.2	-0.2	-0.2	-0.2	0.0	0.0
TR035	3.3	3.9	4.1	4.9	5.3	3.2	3.7	3.9	4.9	5.2	-0.2	-0.2	-0.2	0.0	0.0
TR037	3.3	3.9	4.1	4.9	5.3	3.2	3.7	3.9	4.9	5.2	-0.2	-0.2	-0.2	0.0	0.0
TR038	3.4	4.0	4.2	5.0	5.4	3.2	3.8	4.0	4.9	5.3	-0.2	-0.2	-0.2	0.0	0.0
TR040	3.4	4.0	4.2	5.0	5.4	3.2	3.8	4.0	4.9	5.3	-0.2	-0.2	-0.2	0.0	0.0
TWNLKS-05	8.7	9.6	10.0	10.5	10.7	8.4	9.3	9.8	10.5	10.7	-0.3	-0.3	-0.2	0.0	0.0
TWNLKS-10	8.5	8.6	8.7	9.6	9.9	8.3	8.6	8.7	9.5	9.9	-0.1	0.0	0.0	-0.1	0.0
W5A-15	4.1	4.6	4.8	5.3	5.7	4.0	4.5	4.6	5.3	5.7	-0.1	-0.1	-0.1	0.0	0.0
WBROW-05	6.1	6.3	6.3	6.4	6.7	6.1	6.3	6.3	6.4	6.7	0.0	0.0	0.0	0.0	0.0
WBROW-10	6.1	6.8	7.0	7.5	7.6	6.0	6.6	6.8	7.5	7.6	-0.1	-0.2	-0.2	0.0	0.0
WBROW-15	8.1	8.3	8.4	8.7	8.8	8.0	8.3	8.3	8.7	8.8	-0.1	-0.1	-0.1	0.0	0.0
WBROW-20	7.5	8.3	8.6	9.1	9.4	6.6	8.0	8.3	9.1	9.4	-0.9	-0.3	-0.3	0.0	0.0
WDAV-05	5.7	6.3	6.4	6.6	6.7	5.2	6.2	6.3	6.6	6.7	-0.5	-0.1	-0.1	0.0	0.0
WDAV-10	7.1	7.5	7.7	8.2	8.4	7.0	7.4	7.6	8.2	8.4	0.0	-0.1	-0.1	0.0	0.0
WDAV-12	7.1	7.5	7.7	8.2	8.4	7.0	7.4	7.6	8.2	8.4	-0.1	-0.1	-0.1	0.0	0.0
WDAV-15	8.1	8.3	8.3	8.5	8.6	8.1	8.2	8.3	8.5	8.6	0.0	0.0	0.0	0.0	0.0
WDAV-20	7.5	8.1	8.2	8.6	8.8	7.5	7.9	8.1	8.6	8.7	-0.1	-0.2	-0.1	0.0	0.0
WDAV-25	7.4	7.7	7.9	8.6	8.7	7.3	7.7	7.8	8.6	8.7	0.0	-0.1	-0.2	0.0	0.0
WDAV-30	11.0	11.5	11.6	11.9	12.0	11.0	11.4	11.5	11.8	12.0	-0.1	-0.1	-0.1	0.0	0.0
WESTLL-05	9.0	9.2	9.4	10.0	10.1	8.9	9.1	9.3	9.9	10.1	-0.1	-0.1	-0.1	0.0	0.0
WSIST-05	6.1	6.3	6.4	6.6	6.9	6.0	6.2	6.3	6.6	6.9	-0.1	-0.1	0.0	0.0	0.0
WSIST-10	6.1	6.4	6.5	6.7	6.9	6.0	6.3	6.4	6.7	6.9	-0.1	0.0	0.0	0.0	0.0

Table 6B-1. Alternative No. 2, Exfiltration - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 2 Peak Stages (ft NGVD)					Delta (Alt. 2 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
WSUNR-05	6.5	6.9	7.0	7.2	7.3	6.3	6.8	6.9	7.2	7.3	-0.1	-0.1	-0.1	0.0	0.0
WSUNR-10	6.6	7.0	7.2	7.6	7.9	6.4	6.9	7.1	7.6	7.9	-0.2	-0.1	-0.1	0.0	0.0
WSUNR-15	7.4	7.7	7.8	8.1	8.3	7.3	7.7	7.8	8.1	8.3	-0.1	-0.1	0.0	0.0	0.0
WSUNR-20	5.7	6.9	7.2	8.1	8.6	5.1	6.6	7.0	8.1	8.5	-0.6	-0.3	-0.2	0.0	0.0

Table 6B-2. Alternative No. 3, Recharge Wells - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 3 Peak Stages (ft NGVD)					Delta (Alt. 3 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
C12UI010	6.6	7.3	7.5	8.2	8.6	6.6	7.3	7.5	8.2	8.6	0.0	0.0	0.0	0.0	0.0
C12UI015	6.8	7.4	7.5	8.2	8.6	6.8	7.4	7.5	8.2	8.6	0.0	0.0	0.0	0.0	0.0
C12UI020	6.9	7.4	7.6	8.2	8.6	6.9	7.4	7.6	8.2	8.6	0.0	0.0	0.0	0.0	0.0
C12UICS18005	5.5	6.7	7.1	8.2	8.6	5.5	6.7	7.1	8.2	8.6	0.0	0.0	0.0	0.0	0.0
C13IC005	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
C13IC010	2.6	2.7	2.8	2.9	3.0	2.6	2.7	2.8	2.9	3.0	0.0	0.0	0.0	0.0	0.0
C13IC011	2.6	2.8	2.8	3.0	3.2	2.6	2.8	2.8	3.0	3.2	0.0	0.0	0.0	0.0	0.0
C13IC015	2.7	2.8	2.9	3.1	3.2	2.7	2.8	2.9	3.1	3.2	0.0	0.0	0.0	0.0	0.0
C13IC020	2.8	3.0	3.1	3.4	3.6	2.8	3.0	3.1	3.4	3.6	0.0	0.0	0.0	0.0	0.0
C13IC025	3.5	4.1	4.4	5.2	5.6	3.4	4.1	4.4	5.2	5.6	0.0	0.0	0.0	0.0	0.0
C13ICSPUR002	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0	0.0	0.0
C13ICSPUR005	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0	0.0	0.0
C13MR001	3.5	4.3	4.6	5.4	5.9	3.5	4.3	4.6	5.4	5.8	0.0	0.0	0.0	0.0	0.0
C13MR005	3.5	4.3	4.5	5.4	5.8	3.5	4.3	4.5	5.4	5.8	0.0	0.0	0.0	0.0	0.0
C13MR010	3.6	4.3	4.6	5.5	5.9	3.6	4.3	4.6	5.4	5.8	0.0	0.0	0.0	0.0	0.0
C13MR015	3.7	4.5	4.8	5.7	6.1	3.7	4.5	4.8	5.7	6.1	0.0	0.0	0.0	0.0	0.0
C13MR016	3.7	4.6	4.9	5.8	6.2	3.7	4.6	4.9	5.8	6.2	0.0	0.0	0.0	0.0	0.0
C13MR020	3.9	4.7	5.1	6.1	6.5	3.9	4.7	5.1	6.1	6.5	0.0	0.0	0.0	0.0	0.0
C13MR021	3.9	4.7	5.1	6.1	6.6	3.9	4.7	5.1	6.1	6.5	0.0	0.0	0.0	0.0	0.0
C13MR024	3.9	4.8	5.2	6.2	6.6	3.9	4.8	5.2	6.2	6.6	0.0	0.0	0.0	0.0	0.0
C13MR025	3.9	4.8	5.2	6.3	6.7	3.9	4.8	5.2	6.3	6.7	0.0	0.0	0.0	0.0	0.0
C13MR030	4.0	4.9	5.3	6.5	6.9	4.0	4.8	5.3	6.4	6.9	0.0	0.0	0.0	0.0	0.0
C13MR031	4.0	4.9	5.3	6.5	6.9	4.0	4.8	5.3	6.5	6.9	0.0	0.0	0.0	0.0	0.0
C13MRC005	3.7	4.6	4.9	5.9	6.3	3.7	4.6	4.9	5.9	6.3	0.0	0.0	0.0	0.0	0.0
C13MRC006	3.8	4.6	5.0	6.0	6.4	3.8	4.6	5.0	6.0	6.4	0.0	0.0	0.0	0.0	0.0
C13MRC007	3.8	4.7	5.0	6.0	6.4	3.8	4.7	5.0	6.0	6.4	0.0	0.0	0.0	0.0	0.0
C13MRC008	3.9	4.7	5.2	6.2	6.6	3.9	4.7	5.2	6.2	6.6	0.0	0.0	0.0	0.0	0.0
C13MRC009	3.9	4.8	5.2	6.3	6.7	3.9	4.8	5.2	6.2	6.7	0.0	0.0	0.0	0.0	0.0
C13MRC010	4.0	4.8	5.3	6.4	6.8	4.0	4.8	5.3	6.4	6.8	0.0	0.0	0.0	0.0	0.0
C13MRC012	4.0	4.8	5.3	6.4	6.8	4.0	4.8	5.3	6.4	6.8	0.0	0.0	0.0	0.0	0.0
C13MRC014	4.0	4.9	5.4	6.6	6.9	4.0	4.9	5.4	6.6	6.9	0.0	0.0	0.0	0.0	0.0
C13MRC015	4.0	4.9	5.4	6.6	7.0	4.0	4.9	5.4	6.6	7.0	0.0	0.0	0.0	0.0	0.0
C13MRC017	4.0	4.9	5.4	6.6	7.0	4.0	4.9	5.4	6.6	7.0	0.0	0.0	0.0	0.0	0.0
C13MRC018	4.0	4.9	5.4	6.6	7.0	4.0	4.9	5.4	6.6	7.0	0.0	0.0	0.0	0.0	0.0

Table 6B-2. Alternative No. 3, Recharge Wells - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 3 Peak Stages (ft NGVD)					Delta (Alt. 3 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
C13MRC-02	7.6	8.0	8.1	8.4	9.2	7.6	8.0	8.1	8.4	9.2	0.0	0.0	0.0	0.0	0.0
C13MRC020	4.0	4.9	5.4	6.6	7.0	4.0	4.9	5.4	6.6	7.0	0.0	0.0	0.0	0.0	0.0
C13MRC022	4.0	5.0	5.4	6.7	7.1	4.0	4.9	5.4	6.7	7.1	0.0	0.0	0.0	0.0	0.0
C13MRC023	4.0	5.0	5.5	6.8	7.2	4.0	5.0	5.5	6.8	7.2	0.0	0.0	0.0	0.0	0.0
C13MRC024	4.0	5.0	5.5	6.8	7.3	4.0	5.0	5.5	6.8	7.3	0.0	0.0	0.0	0.0	0.0
C13MRC025	4.1	5.0	5.6	6.9	7.4	4.0	5.0	5.5	6.9	7.4	0.0	0.0	0.0	0.0	0.0
C13MRC-03	4.2	5.1	5.6	7.0	7.6	4.2	5.1	5.6	7.0	7.6	0.0	0.0	0.0	0.0	0.0
C13MRC035	4.1	5.1	5.6	7.0	7.6	4.1	5.1	5.6	7.0	7.6	0.0	0.0	0.0	0.0	0.0
C13MRC042	4.5	5.5	6.1	8.4	9.2	4.5	5.5	6.1	8.3	9.2	0.0	0.0	0.0	0.0	0.0
C13MRC043	4.5	5.5	6.1	8.4	9.2	4.5	5.5	6.1	8.4	9.2	0.0	0.0	0.0	0.0	0.0
C13MRC045	4.6	5.5	6.1	8.4	9.2	4.6	5.5	6.1	8.4	9.2	0.0	0.0	0.0	0.0	0.0
C13MRSPUR005	3.5	4.3	4.6	5.4	5.9	3.5	4.3	4.6	5.4	5.8	0.0	0.0	0.0	0.0	0.0
C14CCC005	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
C14CCC008	2.6	2.7	2.7	2.9	3.1	2.6	2.7	2.7	2.9	3.1	0.0	0.0	0.0	0.0	0.0
C14CCC010	2.7	2.8	2.8	3.1	3.5	2.7	2.8	2.8	3.1	3.5	0.0	0.0	0.0	0.0	0.0
C14CCC020	2.8	3.0	3.1	3.6	4.1	2.8	3.0	3.1	3.6	4.1	0.0	0.0	0.0	0.0	0.0
C14CCC022	2.8	3.0	3.2	3.6	4.2	2.8	3.0	3.2	3.6	4.2	0.0	0.0	0.0	0.0	0.0
C14CCC025	2.9	3.1	3.3	3.8	4.5	2.9	3.1	3.3	3.8	4.5	0.0	0.0	0.0	0.0	0.0
C14CCC027	2.9	3.1	3.3	3.9	4.5	2.9	3.1	3.3	3.9	4.5	0.0	0.0	0.0	0.0	0.0
C14CCC038	3.4	4.1	4.6	6.5	7.9	3.4	4.1	4.6	6.5	7.9	0.0	0.0	0.0	0.0	0.0
C14CCC039	3.4	4.1	4.6	6.6	8.1	3.4	4.1	4.6	6.6	8.1	0.0	0.0	0.0	0.0	0.0
C14CCC040	3.4	4.2	4.7	6.8	8.2	3.4	4.2	4.7	6.8	8.2	0.0	0.0	0.0	0.0	0.0
C14CCC045	3.5	4.4	4.9	7.3	8.8	3.5	4.4	4.9	7.3	8.8	0.0	0.0	0.0	0.0	0.0
CCCSPUR005	3.0	3.3	3.5	4.2	4.9	3.0	3.3	3.5	4.2	4.9	0.0	0.0	0.0	0.0	0.0
CCCSPUR010	3.0	3.3	3.5	4.2	5.1	3.0	3.3	3.5	4.2	5.1	0.0	0.0	0.0	0.0	0.0
CCCSPUR015	3.1	3.3	3.5	4.2	5.1	3.1	3.3	3.5	4.2	5.1	0.0	0.0	0.0	0.0	0.0
CCCSPUR020	5.7	6.7	7.1	8.4	8.7	5.7	6.7	7.1	8.4	8.7	0.0	0.0	0.0	0.0	0.0
CCCSPUR021	5.7	6.7	7.1	8.3	8.6	5.7	6.7	7.1	8.3	8.6	0.0	0.0	0.0	0.0	0.0
CRCC-05	4.9	5.3	5.4	5.8	5.9	4.9	5.3	5.4	5.8	5.9	0.0	0.0	0.0	0.0	0.0
CRDVA-05	3.6	3.8	3.8	3.9	4.0	3.6	3.8	3.8	3.9	4.0	0.0	0.0	0.0	0.0	0.0
DUM_IC006	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
EBROW-05	4.1	4.6	4.8	5.2	5.5	4.1	4.5	4.7	5.2	5.5	0.0	0.0	0.0	0.0	0.0
ECOMM-05	6.0	6.2	6.2	6.3	6.4	6.0	6.2	6.2	6.3	6.4	0.0	0.0	0.0	0.0	0.0
ECOMM-10	6.2	6.6	6.8	7.0	7.1	6.2	6.6	6.8	7.0	7.1	0.0	0.0	0.0	0.0	0.0

Table 6B-2. Alternative No. 3, Recharge Wells - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 3 Peak Stages (ft NGVD)					Delta (Alt. 3 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
ECOMM-20	6.4	6.7	6.8	7.0	7.1	6.4	6.7	6.8	7.0	7.1	0.0	0.0	0.0	0.0	0.0
ELOSO-05	3.6	4.5	4.7	5.2	5.5	3.6	4.5	4.7	5.2	5.5	0.0	0.0	0.0	0.0	0.0
EOAKPRK-05	4.9	5.1	5.2	5.4	5.5	4.9	5.1	5.2	5.4	5.5	0.0	0.0	0.0	0.0	0.0
ESUNR-01	6.6	7.0	7.1	7.4	7.6	6.5	6.9	7.0	7.4	7.5	-0.1	0.0	0.0	0.0	0.0
ESUNR-05	6.6	7.0	7.1	7.4	7.6	6.6	6.9	7.0	7.4	7.6	0.0	0.0	0.0	0.0	0.0
ESUNR-07	7.1	7.3	7.3	7.5	7.6	7.0	7.2	7.3	7.5	7.6	0.0	0.0	0.0	0.0	0.0
ESUNR-10	6.8	7.0	7.1	7.2	7.3	6.7	7.0	7.1	7.2	7.3	-0.1	0.0	0.0	0.0	0.0
FLEA-05	10.1	10.4	10.6	11.2	11.4	10.1	10.4	10.6	11.2	11.4	0.0	0.0	0.0	0.0	0.0
FLEA-10	11.9	12.1	12.2	12.4	12.5	11.9	12.1	12.2	12.4	12.5	0.0	0.0	0.0	0.0	0.0
G16005	2.7	2.8	3.0	3.4	4.0	2.7	2.8	3.0	3.4	4.0	0.0	0.0	0.0	0.0	0.0
G16007	2.7	2.8	3.0	3.4	4.0	2.7	2.8	3.0	3.4	4.0	0.0	0.0	0.0	0.0	0.0
G54_HW	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
G54_TW	3.9	4.6	4.9	6.0	6.7	3.9	4.6	4.9	6.0	6.7	0.0	0.0	0.0	0.0	0.0
G57_TW	2.8	2.9	3.0	3.5	4.1	2.8	2.9	3.0	3.5	4.1	0.0	0.0	0.0	0.0	0.0
GALT-05	8.3	9.4	9.6	9.8	10.0	8.3	9.4	9.6	9.8	10.0	0.0	0.0	0.0	0.0	0.0
HCOPWCD2005	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
HF010	6.8	7.5	7.6	8.3	8.7	6.8	7.5	7.6	8.3	8.7	0.0	0.0	0.0	0.0	0.0
HF015	6.8	7.5	7.6	8.3	8.7	6.8	7.5	7.6	8.3	8.7	0.0	0.0	0.0	0.0	0.0
HF020	6.8	7.5	7.6	8.3	8.8	6.8	7.5	7.6	8.3	8.8	0.0	0.0	0.0	0.0	0.0
HFCS17005	6.8	7.5	7.6	8.2	8.7	6.8	7.5	7.6	8.2	8.7	0.0	0.0	0.0	0.0	0.0
HFCS55025	7.4	8.2	8.4	8.9	9.1	7.4	8.2	8.4	8.9	9.1	0.0	0.0	0.0	0.0	0.0
I595-05	7.4	7.7	7.8	8.0	8.1	7.4	7.7	7.8	8.0	8.1	0.0	0.0	0.0	0.0	0.0
I595-10	5.3	5.5	5.6	6.9	7.4	5.3	5.5	5.6	6.3	7.0	0.0	0.0	0.0	-0.6	-0.3
I595-15	5.5	6.6	6.8	7.5	7.8	5.5	6.6	6.8	7.5	7.8	0.0	0.0	0.0	0.0	0.0
IC022	2.5	2.6	2.6	2.7	2.8	2.5	2.6	2.6	2.7	2.8	0.0	0.0	0.0	0.0	0.0
IC025	2.6	2.7	2.8	3.0	3.1	2.6	2.7	2.8	3.0	3.1	0.0	0.0	0.0	0.0	0.0
IC030	2.7	2.8	2.9	3.0	3.2	2.7	2.8	2.9	3.0	3.2	0.0	0.0	0.0	0.0	0.0
IC032	2.7	2.8	2.9	3.1	3.4	2.7	2.8	2.9	3.1	3.4	0.0	0.0	0.0	0.0	0.0
IC035	2.7	2.9	3.0	3.2	3.6	2.7	2.9	3.0	3.2	3.6	0.0	0.0	0.0	0.0	0.0
IC040	2.7	2.9	3.0	3.3	3.6	2.7	2.9	3.0	3.3	3.6	0.0	0.0	0.0	0.0	0.0
IC042	2.7	2.9	3.0	3.2	3.4	2.7	2.9	3.0	3.2	3.4	0.0	0.0	0.0	0.0	0.0
IC043	2.7	2.8	2.9	3.1	3.3	2.7	2.8	2.9	3.1	3.3	0.0	0.0	0.0	0.0	0.0
IC044	2.7	2.8	2.9	3.1	3.3	2.7	2.8	2.9	3.1	3.3	0.0	0.0	0.0	0.0	0.0
IC045	2.7	2.9	3.0	3.1	3.4	2.7	2.9	3.0	3.1	3.4	0.0	0.0	0.0	0.0	0.0

Table 6B-2. Alternative No. 3, Recharge Wells - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 3 Peak Stages (ft NGVD)					Delta (Alt. 3 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
IC050	2.7	2.9	3.0	3.1	3.4	2.7	2.9	3.0	3.1	3.4	0.0	0.0	0.0	0.0	0.0
LAKEEMERALD-05	4.1	4.7	5.0	6.8	7.6	4.1	4.7	5.0	6.8	7.6	0.0	0.0	0.0	0.0	0.0
LKMELVA-05	4.4	5.5	5.9	7.7	7.9	4.4	5.5	5.9	7.7	7.9	0.0	0.0	0.0	0.0	0.0
LL005	6.0	7.3	7.6	8.4	9.2	6.0	7.2	7.6	8.4	9.2	0.0	0.0	0.0	0.0	0.0
LL015	6.0	7.3	7.6	8.5	9.3	6.0	7.3	7.6	8.4	9.3	0.0	0.0	0.0	0.0	0.0
LL020	6.0	7.3	7.7	8.6	9.3	6.0	7.3	7.7	8.6	9.3	0.0	0.0	0.0	0.0	0.0
LL025	6.0	7.3	7.7	8.6	9.3	6.0	7.3	7.7	8.6	9.3	0.0	0.0	0.0	0.0	0.0
LL026	6.0	7.3	7.8	9.1	9.9	6.0	7.3	7.8	9.1	9.9	0.0	0.0	0.0	0.0	0.0
LL030	6.0	7.3	7.8	9.1	9.9	6.0	7.3	7.8	9.1	9.9	0.0	0.0	0.0	0.0	0.0
LL035	4.7	6.2	6.9	9.1	9.9	4.6	6.2	6.9	9.1	9.9	0.0	0.0	0.0	0.0	0.0
LLAKE040	6.7	8.2	8.7	9.1	9.9	6.7	8.2	8.7	9.1	9.9	0.0	0.0	0.0	0.0	0.0
MELROSEPK-05	7.5	8.3	8.6	9.1	9.4	7.5	8.3	8.6	9.1	9.4	0.0	0.0	0.0	0.0	0.0
MELROSEPK-06	7.6	8.3	8.5	9.1	9.5	7.6	8.3	8.5	9.1	9.5	0.0	0.0	0.0	0.0	0.0
MELROSEPK-10	7.7	8.4	8.6	9.2	9.5	7.7	8.4	8.6	9.2	9.5	0.0	0.0	0.0	0.0	0.0
MIDLST-05	4.1	5.0	5.2	5.8	6.2	4.1	5.0	5.2	5.8	6.1	0.0	0.0	0.0	0.0	0.0
MLKPOND-05	4.0	5.0	5.4	7.7	8.5	4.0	5.0	5.4	7.7	8.5	0.0	0.0	0.0	0.0	0.0
NANDR-05	6.6	6.9	7.0	7.2	7.3	6.6	6.9	6.9	7.1	7.3	-0.1	0.0	0.0	0.0	0.0
NANDR-10	6.2	6.3	6.4	6.4	6.5	6.2	6.3	6.4	6.4	6.5	0.0	0.0	0.0	0.0	0.0
NANDR-15	5.0	5.3	5.3	5.5	5.6	5.0	5.2	5.3	5.5	5.6	0.0	0.0	0.0	0.0	0.0
NDIXIE-02	7.0	7.3	7.4	7.7	7.8	7.0	7.3	7.4	7.7	7.8	0.0	0.0	0.0	0.0	0.0
NDIXIE-05	6.5	6.7	6.8	7.1	7.2	6.5	6.7	6.8	7.1	7.2	0.0	0.0	0.0	0.0	0.0
NE11ST-04	7.0	7.3	7.4	7.5	7.6	7.0	7.3	7.4	7.5	7.6	0.0	0.0	0.0	0.0	0.0
NE11ST-05	7.3	7.4	7.4	7.5	7.6	7.3	7.4	7.4	7.5	7.6	0.0	0.0	0.0	0.0	0.0
NE13ST-05	6.2	6.9	7.1	7.6	7.7	6.2	6.9	7.1	7.6	7.7	0.0	0.0	0.0	0.0	0.0
NE13ST-10	6.4	7.0	7.1	7.5	7.6	6.3	6.9	7.1	7.5	7.6	0.0	0.0	0.0	0.0	0.0
NE13ST-15	6.4	6.6	6.6	6.8	6.8	6.4	6.6	6.6	6.8	6.8	0.0	0.0	0.0	0.0	0.0
NE15A-05	3.9	4.7	5.0	5.8	6.1	3.9	4.7	5.0	5.7	6.1	0.0	0.0	0.0	0.0	0.0
NE15A-10	5.3	5.8	5.9	6.1	6.2	5.3	5.8	5.9	6.1	6.2	0.0	0.0	0.0	0.0	0.0
NE3A-05	6.4	6.5	6.6	6.7	6.7	6.3	6.5	6.5	6.6	6.7	0.0	0.0	0.0	0.0	0.0
NE3A-07	6.1	6.3	6.4	6.5	6.6	6.1	6.3	6.4	6.5	6.5	0.0	0.0	0.0	0.0	0.0
NE3A-10	5.3	5.5	5.6	5.7	5.8	5.3	5.5	5.5	5.7	5.8	0.0	0.0	0.0	0.0	0.0
NE3CT-05	7.6	7.9	8.0	8.3	8.4	7.5	7.9	8.0	8.2	8.4	0.0	0.0	0.0	0.0	0.0
NE4A-05	6.1	6.3	6.4	6.5	6.6	6.1	6.3	6.4	6.5	6.6	0.0	0.0	0.0	0.0	0.0
NE4A-10	6.5	6.7	6.7	6.8	6.9	6.5	6.6	6.7	6.8	6.9	0.0	0.0	0.0	0.0	0.0

Table 6B-2. Alternative No. 3, Recharge Wells - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 3 Peak Stages (ft NGVD)					Delta (Alt. 3 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
NE4A-15	6.8	7.0	7.1	7.2	7.3	6.8	7.0	7.1	7.2	7.3	0.0	0.0	0.0	0.0	0.0
NE65-05	5.0	5.7	6.0	6.6	7.0	5.0	5.7	6.0	6.6	7.0	0.0	0.0	0.0	0.0	0.0
NFED-05	5.8	6.3	6.5	6.7	7.0	5.8	6.3	6.5	6.6	7.0	0.0	0.0	0.0	0.0	0.0
NFED-10	5.6	6.3	6.6	6.9	7.2	5.6	6.3	6.6	6.9	7.2	0.0	0.0	0.0	0.0	0.0
NFED-12	5.7	6.3	6.6	7.0	7.2	5.7	6.3	6.6	7.0	7.2	0.0	0.0	0.0	0.0	0.0
NFED-15	6.4	6.6	6.6	6.8	6.9	6.4	6.6	6.6	6.8	6.9	0.0	0.0	0.0	0.0	0.0
NFED-20	6.4	6.6	6.7	6.9	7.1	6.4	6.6	6.7	6.9	7.1	0.0	0.0	0.0	0.0	0.0
NFED-22	6.6	6.8	6.9	7.2	7.4	6.6	6.8	6.9	7.2	7.4	0.0	0.0	0.0	0.0	0.0
NFED-25	7.2	7.5	7.7	8.0	8.2	7.2	7.5	7.7	8.0	8.2	0.0	0.0	0.0	0.0	0.0
NFED-30	9.1	9.3	9.4	9.5	9.6	9.1	9.3	9.4	9.5	9.6	0.0	0.0	0.0	0.0	0.0
NFED-35	6.3	6.6	6.7	6.8	6.9	6.3	6.6	6.7	6.8	6.9	0.0	0.0	0.0	0.0	0.0
NFED-37	5.1	5.6	5.9	6.4	6.7	5.1	5.6	5.9	6.4	6.7	0.0	0.0	0.0	0.0	0.0
NFED-40	6.3	6.6	6.7	7.0	7.1	6.3	6.6	6.7	7.0	7.1	0.0	0.0	0.0	0.0	0.0
NFED-45	8.3	9.0	9.1	9.2	9.3	8.3	9.0	9.1	9.2	9.3	0.0	0.0	0.0	0.0	0.0
NFED-50	8.0	8.2	8.3	8.4	8.4	8.0	8.2	8.3	8.4	8.4	0.0	0.0	0.0	0.0	0.0
NFED-52	4.5	5.0	5.2	5.7	5.9	4.5	5.0	5.2	5.7	5.9	0.0	0.0	0.0	0.0	0.0
NFED-53	4.0	4.6	4.8	5.4	5.7	4.0	4.5	4.8	5.3	5.7	0.0	0.0	0.0	0.0	0.0
NFED-55	6.1	6.4	6.5	6.6	6.8	6.1	6.4	6.5	6.6	6.8	0.0	0.0	0.0	0.0	0.0
NFED-60	7.1	7.2	7.2	7.3	7.4	7.1	7.2	7.2	7.3	7.4	0.0	0.0	0.0	0.0	0.0
NFED-65	6.2	6.4	6.5	6.7	7.0	6.1	6.4	6.4	6.7	6.9	0.0	0.0	0.0	0.0	0.0
NFED-67	5.0	5.7	6.0	6.7	6.9	4.9	5.6	5.9	6.7	6.9	-0.1	-0.1	-0.1	0.0	0.0
NFED-70	4.3	5.4	6.0	6.7	6.9	4.2	5.2	5.8	6.7	6.9	-0.1	-0.2	-0.2	0.0	0.0
NFNR001	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0	0.0	0.0
NFNR005	2.6	2.6	2.6	2.7	2.8	2.6	2.6	2.6	2.7	2.8	0.0	0.0	0.0	0.0	0.0
NFNR008	2.9	3.1	3.3	3.6	3.9	2.9	3.1	3.3	3.6	3.9	0.0	0.0	0.0	0.0	0.0
NFNR010	3.1	3.5	3.6	4.1	4.5	3.1	3.5	3.6	4.1	4.5	0.0	0.0	0.0	0.0	0.0
NFNR011	3.1	3.5	3.7	4.2	4.6	3.1	3.5	3.7	4.2	4.6	0.0	0.0	0.0	0.0	0.0
NFNR015	3.2	3.7	3.9	4.5	4.9	3.2	3.7	3.9	4.5	4.9	0.0	0.0	0.0	0.0	0.0
NFNR016	3.3	3.8	4.0	4.6	5.0	3.3	3.8	4.0	4.6	5.0	0.0	0.0	0.0	0.0	0.0
NFNR020	3.3	3.9	4.1	4.8	5.2	3.3	3.9	4.1	4.8	5.2	0.0	0.0	0.0	0.0	0.0
NFNR021	3.4	3.9	4.2	4.9	5.3	3.4	3.9	4.1	4.9	5.3	0.0	0.0	0.0	0.0	0.0
NFNR025	3.4	4.0	4.2	5.0	5.4	3.4	4.0	4.2	5.0	5.4	0.0	0.0	0.0	0.0	0.0
NFNR030	3.9	4.7	5.0	5.8	6.2	3.9	4.7	4.9	5.8	6.1	0.0	0.0	0.0	0.0	0.0
NFNR035	4.3	5.2	5.6	6.4	6.7	4.3	5.2	5.6	6.4	6.7	0.0	0.0	0.0	0.0	0.0

Table 6B-2. Alternative No. 3, Recharge Wells - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 3 Peak Stages (ft NGVD)					Delta (Alt. 3 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
NFNR040	4.3	5.3	5.6	6.6	6.9	4.3	5.3	5.6	6.6	6.9	0.0	0.0	0.0	0.0	0.0
NFNR042	4.5	5.5	5.9	6.8	7.1	4.5	5.5	5.8	6.8	7.1	0.0	0.0	0.0	0.0	0.0
NFNR043	4.6	5.6	6.0	6.9	7.3	4.6	5.6	6.0	6.9	7.3	0.0	0.0	0.0	0.0	0.0
NFNR045	4.8	5.8	6.2	7.2	7.5	4.8	5.8	6.2	7.2	7.5	0.0	0.0	0.0	0.0	0.0
NFNR046	4.8	5.8	6.2	7.2	7.6	4.8	5.8	6.2	7.2	7.6	0.0	0.0	0.0	0.0	0.0
NFNR050	5.2	6.3	6.7	7.8	8.3	5.2	6.3	6.7	7.8	8.3	0.0	0.0	0.0	0.0	0.0
NFNR051	5.2	6.3	6.7	7.9	8.3	5.2	6.3	6.7	7.9	8.3	0.0	0.0	0.0	0.0	0.0
NFNR054	5.3	6.4	6.9	8.0	8.5	5.3	6.4	6.9	8.0	8.5	0.0	0.0	0.0	0.0	0.0
NFNR055	5.3	6.4	6.9	8.1	8.6	5.3	6.4	6.9	8.1	8.6	0.0	0.0	0.0	0.0	0.0
NFNRSPUR004	2.6	2.8	2.8	3.0	3.2	2.6	2.8	2.8	3.0	3.2	0.0	0.0	0.0	0.0	0.0
NFNRSPUR005	2.7	2.9	2.9	3.2	3.4	2.7	2.9	2.9	3.2	3.4	0.0	0.0	0.0	0.0	0.0
NFNRSPUR010	2.8	2.9	3.0	3.6	4.8	2.8	2.9	3.0	3.5	4.6	0.0	0.0	0.0	-0.1	-0.2
NFSPUR005	3.9	4.7	5.0	5.8	6.2	3.9	4.7	4.9	5.8	6.1	0.0	0.0	0.0	0.0	0.0
NNRC005	3.6	4.2	4.5	5.6	6.1	3.6	4.2	4.5	5.5	6.1	0.0	0.0	0.0	-0.1	0.0
NNRC010	3.8	4.5	4.7	5.9	6.5	3.7	4.5	4.7	5.8	6.5	0.0	0.0	0.0	0.0	0.0
NNRC015	3.8	4.5	4.8	5.9	6.6	3.8	4.5	4.8	5.9	6.5	0.0	0.0	0.0	0.0	0.0
NNRC020	3.8	4.6	4.8	6.0	6.6	3.8	4.5	4.8	5.9	6.6	0.0	0.0	0.0	0.0	0.0
NPOWRL-03	7.1	7.5	7.6	7.9	8.0	7.1	7.5	7.6	7.8	8.0	0.0	0.0	0.0	0.0	0.0
NPOWRL-05	7.0	7.2	7.2	7.4	7.5	7.0	7.2	7.2	7.4	7.5	0.0	0.0	0.0	0.0	0.0
NPOWRL-10	8.8	9.2	9.2	9.7	9.9	8.8	9.2	9.2	9.7	9.9	0.0	0.0	0.0	0.0	0.0
NW10TR-05	10.3	10.5	10.6	11.0	11.1	10.3	10.5	10.6	11.0	11.1	0.0	0.0	0.0	0.0	0.0
NW15A-05	7.5	7.7	7.8	8.1	8.2	7.5	7.7	7.8	8.1	8.2	0.0	0.0	0.0	0.0	0.0
NW15A-10	6.1	6.4	6.5	6.7	6.9	6.1	6.4	6.5	6.7	6.9	0.0	0.0	0.0	0.0	0.0
NW15A-15	5.9	6.3	6.4	6.6	6.9	5.9	6.3	6.4	6.6	6.9	0.0	0.0	0.0	0.0	0.0
NW18A-05	6.6	6.8	6.9	7.1	7.2	6.6	6.8	6.9	7.1	7.2	0.0	0.0	0.0	0.0	0.0
NW22ST-05	6.2	6.7	6.8	7.5	7.9	6.2	6.7	6.8	7.5	7.9	0.0	0.0	0.0	0.0	0.0
NW22ST-10	7.4	8.0	8.1	8.4	8.5	7.4	8.0	8.1	8.4	8.5	0.0	0.0	0.0	0.0	0.0
NW24A-05	6.5	6.9	7.0	7.8	8.3	6.5	6.9	7.0	7.8	8.3	0.0	0.0	0.0	0.0	0.0
NW28-05	9.8	10.2	10.4	10.6	10.9	9.8	10.2	10.4	10.6	10.9	0.0	0.0	0.0	0.0	0.0
NW29-05	11.2	11.4	11.4	11.5	11.5	11.2	11.4	11.4	11.5	11.5	0.0	0.0	0.0	0.0	0.0
NW31ST-05	6.0	7.1	7.3	8.1	8.5	6.0	7.1	7.3	8.1	8.5	0.0	0.0	0.0	0.0	0.0
NW35-05	9.1	10.1	10.3	10.7	11.1	9.1	10.1	10.3	10.7	11.1	0.0	0.0	0.0	0.0	0.0
NW35-10	9.0	9.5	9.6	10.0	10.1	9.0	9.5	9.6	10.0	10.1	0.0	0.0	0.0	0.0	0.0
NW35-15	8.6	9.2	9.4	10.0	10.1	8.6	9.2	9.4	10.0	10.1	0.0	0.0	0.0	0.0	0.0

Table 6B-2. Alternative No. 3, Recharge Wells - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 3 Peak Stages (ft NGVD)					Delta (Alt. 3 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
NW4A-05	6.5	6.9	7.0	7.2	7.3	6.4	6.8	6.9	7.1	7.3	0.0	-0.1	0.0	0.0	0.0
NW4A-10	6.5	6.9	7.0	7.2	7.3	6.4	6.8	6.9	7.1	7.3	0.0	-0.1	0.0	0.0	0.0
NW5A-05	6.4	6.9	7.0	7.2	7.3	6.3	6.8	6.9	7.1	7.3	-0.1	-0.1	0.0	0.0	0.0
NW5A-07	6.3	6.5	6.6	6.9	7.0	6.3	6.5	6.6	6.8	6.9	0.0	0.0	0.0	0.0	0.0
NW5A-10	6.2	6.5	6.6	6.7	6.9	6.2	6.5	6.5	6.7	6.8	0.0	0.0	0.0	0.0	0.0
NW7A-05	6.7	6.9	6.9	7.1	7.2	6.7	6.9	6.9	7.1	7.2	0.0	0.0	0.0	0.0	0.0
NW7A-10	6.6	6.8	6.9	7.1	7.2	6.6	6.8	6.9	7.1	7.2	0.0	0.0	-0.1	0.0	0.0
NW8ST-05	6.4	6.7	6.7	6.9	7.1	6.4	6.6	6.7	6.9	7.0	0.0	0.0	0.0	0.0	0.0
NW8ST-10	6.4	6.7	6.7	6.9	7.1	6.4	6.6	6.7	6.9	7.0	0.0	0.0	0.0	0.0	0.0
NW9A-05	6.7	6.9	6.9	7.0	7.1	6.7	6.9	6.9	7.0	7.0	0.0	0.0	0.0	0.0	0.0
NW9A-10	6.8	7.0	7.0	7.1	7.2	6.8	7.0	7.0	7.1	7.2	0.0	0.0	0.0	0.0	0.0
NWFLAG-05	4.3	4.7	4.9	5.3	5.6	4.3	4.7	4.9	5.3	5.5	0.0	0.0	0.0	0.0	0.0
OC005	3.9	4.7	5.2	6.9	7.4	3.8	4.7	4.9	6.3	7.0	0.0	0.0	-0.3	-0.6	-0.3
OC010	3.8	4.6	5.0	6.5	6.9	3.8	4.6	4.9	6.0	6.6	0.0	0.0	-0.1	-0.4	-0.2
OC015	3.8	4.6	4.9	6.1	6.5	3.8	4.6	4.8	5.8	6.3	0.0	0.0	-0.1	-0.3	-0.1
OC020	3.6	4.4	4.7	5.8	6.1	3.6	4.3	4.6	5.6	6.0	0.0	0.0	-0.1	-0.2	-0.1
OC021	3.6	4.3	4.6	5.5	6.0	3.6	4.2	4.5	5.4	5.9	0.0	0.0	-0.1	-0.1	-0.1
OP015	4.1	5.1	5.6	6.8	7.1	4.1	5.0	5.6	6.8	7.1	0.0	0.0	0.0	0.0	0.0
OPEB001	3.7	4.6	5.0	5.9	6.3	3.7	4.6	5.0	5.9	6.3	0.0	0.0	0.0	0.0	0.0
OPEB002	3.7	4.6	5.0	5.9	6.4	3.7	4.6	5.0	5.9	6.4	0.0	0.0	0.0	0.0	0.0
OPEB003	3.7	4.7	5.1	6.0	6.4	3.7	4.7	5.1	6.0	6.4	0.0	0.0	0.0	0.0	0.0
OPEB004	3.7	4.7	5.1	6.0	6.4	3.7	4.7	5.1	6.0	6.4	0.0	0.0	0.0	0.0	0.0
OPEB005	3.7	4.7	5.1	6.0	6.5	3.7	4.7	5.1	6.0	6.5	0.0	0.0	0.0	0.0	0.0
OPEB006	3.8	4.8	5.3	6.2	6.6	3.8	4.8	5.3	6.2	6.6	0.0	0.0	0.0	0.0	0.0
OPEB007	3.8	4.8	5.3	6.3	6.7	3.8	4.8	5.3	6.3	6.7	0.0	0.0	0.0	0.0	0.0
OPEB008	3.8	4.8	5.3	6.3	6.7	3.8	4.8	5.3	6.3	6.7	0.0	0.0	0.0	0.0	0.0
OPEB009	3.8	4.8	5.4	6.4	6.8	3.8	4.8	5.4	6.4	6.8	0.0	0.0	0.0	0.0	0.0
OPEB010	3.8	4.8	5.4	6.4	6.8	3.8	4.8	5.4	6.4	6.8	0.0	0.0	0.0	0.0	0.0
OPEB011	3.8	4.8	5.4	6.4	6.8	3.8	4.8	5.4	6.4	6.8	0.0	0.0	0.0	0.0	0.0
OPEB015	3.8	4.8	5.4	6.4	6.8	3.8	4.8	5.4	6.4	6.8	0.0	0.0	0.0	0.0	0.0
OPL005	4.1	5.1	5.6	6.9	7.4	4.1	5.1	5.6	6.9	7.4	0.0	0.0	0.0	0.0	0.0
OPL010	4.1	5.1	5.6	7.0	7.4	4.1	5.1	5.6	6.9	7.4	0.0	0.0	0.0	0.0	0.0
OPL015	4.6	5.7	5.8	7.0	7.4	4.6	5.7	5.8	7.0	7.4	0.0	0.0	0.0	0.0	0.0
OPL020	4.6	5.7	5.8	7.0	7.4	4.6	5.7	5.8	7.0	7.4	0.0	0.0	0.0	0.0	0.0

Table 6B-2. Alternative No. 3, Recharge Wells - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 3 Peak Stages (ft NGVD)					Delta (Alt. 3 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
OPL025	4.9	6.6	7.3	9.0	9.9	4.9	6.6	7.3	9.0	9.9	0.0	0.0	0.0	0.0	0.0
OPL030	4.7	6.2	6.9	9.1	9.9	4.6	6.2	6.9	9.1	9.9	0.0	0.0	0.0	0.0	0.0
OPL035	4.7	6.2	6.9	9.1	9.9	4.6	6.2	6.9	9.1	9.9	0.0	0.0	0.0	0.0	0.0
OUT_IC005	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
OUT_IC010	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
OUT_IC015	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
OUT_IC020	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
OUT_IC055	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
PAG005	8.6	9.0	9.1	9.3	9.5	8.6	9.0	9.1	9.3	9.5	0.0	0.0	0.0	0.0	0.0
PORTSPUR005	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
PRLAKE010	8.3	8.9	9.2	10.0	10.7	8.3	8.9	9.2	10.0	10.7	0.0	0.0	0.0	0.0	0.0
PRN001	4.1	4.9	5.4	7.8	9.4	4.1	4.9	5.4	7.8	9.4	0.0	0.0	0.0	0.0	0.0
PRN005	8.4	9.4	9.9	10.7	11.3	8.4	9.4	9.9	10.7	11.3	0.0	0.0	0.0	0.0	0.0
PRN010	8.4	9.4	9.9	10.7	11.3	8.4	9.4	9.9	10.7	11.3	0.0	0.0	0.0	0.0	0.0
PRN015	8.4	9.4	9.9	10.7	11.3	8.4	9.4	9.9	10.7	11.3	0.0	0.0	0.0	0.0	0.0
PRN018	8.5	9.4	9.9	10.7	11.3	8.5	9.4	9.9	10.7	11.3	0.0	0.0	0.0	0.0	0.0
PRN020	8.5	9.4	9.9	10.7	11.3	8.5	9.4	9.9	10.7	11.3	0.0	0.0	0.0	0.0	0.0
PRN025	9.2	9.7	9.9	10.3	10.5	9.2	9.7	9.9	10.3	10.5	0.0	0.0	0.0	0.0	0.0
PRN030	9.2	9.7	9.9	10.2	10.4	9.2	9.7	9.9	10.2	10.4	0.0	0.0	0.0	0.0	0.0
PRN035	6.9	7.7	8.0	8.7	9.1	6.9	7.7	8.0	8.7	9.1	0.0	0.0	0.0	0.0	0.0
PRN038	6.9	7.7	8.0	8.6	9.0	6.9	7.7	8.0	8.6	9.0	0.0	0.0	0.0	0.0	0.0
PRN039	6.9	7.7	8.0	8.6	8.9	6.9	7.7	8.0	8.6	8.9	0.0	0.0	0.0	0.0	0.0
PRN040	6.8	7.7	8.0	8.5	8.8	6.8	7.7	8.0	8.5	8.8	0.0	0.0	0.0	0.0	0.0
PRN045	7.0	7.7	8.0	8.6	9.0	7.0	7.7	8.0	8.6	9.0	0.0	0.0	0.0	0.0	0.0
PRN1005	8.4	9.4	9.9	10.7	11.3	8.4	9.4	9.9	10.7	11.3	0.0	0.0	0.0	0.0	0.0
PRN1006	8.4	9.0	9.2	9.4	9.5	8.4	9.0	9.2	9.4	9.5	0.0	0.0	0.0	0.0	0.0
PRN1010	8.4	9.0	9.2	9.4	9.5	8.4	9.0	9.2	9.4	9.5	0.0	0.0	0.0	0.0	0.0
PRN1011	8.6	9.0	9.1	9.3	9.5	8.6	9.0	9.1	9.3	9.5	0.0	0.0	0.0	0.0	0.0
PRSWLAKE020	7.9	8.5	8.8	9.4	10.0	7.9	8.5	8.8	9.4	10.0	0.0	0.0	0.0	0.0	0.0
PRSWLAKE025	7.8	8.2	8.5	9.4	10.0	7.8	8.2	8.5	9.4	10.0	0.0	0.0	0.0	0.0	0.0
RIVRPS	2.5	3.3	4.0	4.8	5.5	2.5	3.3	4.0	4.7	5.5	0.0	0.0	0.0	0.0	0.0
ROL-05	4.7	5.0	5.1	5.5	6.0	4.7	5.0	5.1	5.4	5.9	0.0	0.0	0.0	-0.1	0.0
RVRLND-05	7.3	7.4	7.5	7.7	7.8	7.3	7.4	7.5	7.7	7.8	0.0	0.0	0.0	0.0	0.0
S33_HW	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0	0.0	0.0

Table 6B-2. Alternative No. 3, Recharge Wells - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 3 Peak Stages (ft NGVD)					Delta (Alt. 3 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
S33_TW	5.3	6.5	7.0	8.2	8.7	5.3	6.5	7.0	8.2	8.7	0.0	0.0	0.0	0.0	0.0
S36_TW	4.1	5.2	5.7	7.1	7.7	4.1	5.2	5.7	7.1	7.7	0.0	0.0	0.0	0.0	0.0
S36-HW	4.3	5.4	6.0	8.3	9.1	4.3	5.4	6.0	8.3	9.1	0.0	0.0	0.0	0.0	0.0
S37A_TW	2.9	3.2	3.5	4.1	4.8	2.9	3.2	3.5	4.1	4.8	0.0	0.0	0.0	0.0	0.0
S37A-HW	3.4	3.9	4.4	6.2	7.6	3.4	3.9	4.4	6.2	7.6	0.0	0.0	0.0	0.0	0.0
S37B_HW	4.0	4.9	5.4	7.8	9.4	4.0	4.9	5.4	7.8	9.4	0.0	0.0	0.0	0.0	0.0
S37B_TW	3.6	4.4	5.0	7.4	8.9	3.6	4.4	5.0	7.4	8.9	0.0	0.0	0.0	0.0	0.0
SANDR-05	5.8	6.0	6.0	6.1	6.2	5.7	6.0	6.0	6.1	6.2	0.0	0.0	0.0	0.0	0.0
SE10A-05	5.4	6.0	6.2	6.5	6.7	5.3	5.9	6.1	6.5	6.7	0.0	0.0	0.0	0.0	0.0
SE3A-05	3.8	4.5	4.7	5.2	5.5	3.8	4.5	4.7	5.2	5.5	0.0	0.0	0.0	0.0	0.0
SE3A-10	5.0	5.2	5.3	5.3	5.4	5.0	5.2	5.3	5.3	5.4	0.0	0.0	0.0	0.0	0.0
SE3A-15	7.3	7.6	7.8	8.0	8.2	7.3	7.6	7.7	8.0	8.2	0.0	0.0	0.0	0.0	0.0
SE4A-10	7.5	8.3	8.6	8.9	9.1	7.4	8.3	8.6	8.9	9.1	-0.1	0.0	0.0	0.0	0.0
SE5A-05	4.2	4.5	4.6	4.9	5.0	4.2	4.5	4.6	4.9	5.0	0.0	0.0	0.0	0.0	0.0
SeepOut	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SFED-05	5.7	6.1	6.2	6.5	6.6	5.7	6.0	6.1	6.5	6.6	0.0	0.0	0.0	0.0	0.0
SFED-10	6.1	6.4	6.5	6.6	6.7	6.1	6.4	6.5	6.6	6.7	0.0	0.0	0.0	0.0	0.0
SFED-15	7.3	7.6	7.8	8.0	8.2	7.2	7.6	7.7	8.0	8.2	0.0	0.0	0.0	0.0	0.0
SFED-20	7.3	7.6	7.8	8.0	8.2	7.2	7.6	7.7	8.0	8.2	0.0	0.0	0.0	0.0	0.0
SFED-25	7.3	7.6	7.8	8.0	8.2	7.3	7.6	7.7	8.0	8.2	0.0	0.0	0.0	0.0	0.0
SFNR005	3.4	4.0	4.2	5.1	5.7	3.4	4.0	4.2	5.1	5.6	0.0	0.0	0.0	-0.1	-0.1
SFNR006	3.4	4.0	4.3	5.2	5.7	3.4	4.0	4.2	5.1	5.6	0.0	0.0	0.0	-0.1	0.0
SFNR010	3.5	4.1	4.3	5.3	5.8	3.4	4.1	4.3	5.2	5.8	0.0	0.0	0.0	-0.1	0.0
SFNR015	3.5	4.1	4.4	5.4	6.0	3.5	4.1	4.4	5.3	5.9	0.0	0.0	0.0	-0.1	0.0
SFNR020	3.5	4.1	4.4	5.4	6.0	3.5	4.1	4.4	5.4	5.9	0.0	0.0	0.0	-0.1	0.0
SFNR025	3.5	4.2	4.5	5.5	6.1	3.5	4.2	4.5	5.5	6.0	0.0	0.0	0.0	-0.1	0.0
SFNR030	3.6	4.2	4.5	5.6	6.1	3.5	4.2	4.5	5.5	6.1	0.0	0.0	0.0	-0.1	0.0
SFNRC005	3.6	4.2	4.5	5.6	6.1	3.5	4.2	4.5	5.5	6.1	0.0	0.0	0.0	-0.1	0.0
SFNRSPUR005	3.5	4.1	4.3	5.3	5.8	3.4	4.1	4.3	5.2	5.8	0.0	0.0	0.0	-0.1	0.0
SFNRSPUR010	3.5	4.1	4.4	5.4	6.0	3.5	4.1	4.4	5.4	5.9	0.0	0.0	0.0	-0.1	0.0
SFNRSPUR013	3.5	4.2	4.5	5.5	6.1	3.5	4.2	4.5	5.5	6.0	0.0	0.0	0.0	-0.1	0.0
SFNRSPUR014	3.5	4.2	4.5	5.5	6.1	3.5	4.2	4.5	5.5	6.0	0.0	0.0	0.0	0.0	0.0
SFNRSPUR015	3.5	4.2	4.5	5.5	6.1	3.5	4.2	4.5	5.5	6.1	0.0	0.0	0.0	0.0	0.0
SFNRSPUR018	3.5	4.2	4.5	5.6	6.1	3.5	4.2	4.5	5.5	6.1	0.0	0.0	0.0	0.0	0.0

Table 6B-2. Alternative No. 3, Recharge Wells - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 3 Peak Stages (ft NGVD)					Delta (Alt. 3 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
SMIAMI-05	7.9	8.3	8.3	8.5	8.6	7.9	8.3	8.3	8.5	8.6	0.0	0.0	0.0	0.0	0.0
SMIAMI-10	6.7	7.9	8.0	8.2	8.3	6.7	7.9	8.0	8.2	8.3	0.0	0.0	0.0	0.0	0.0
SNYDERPK-05	6.1	6.5	6.6	7.1	7.4	5.3	6.2	6.4	6.9	7.1	-0.8	-0.3	-0.2	-0.2	-0.3
SNYDERPK-10	6.1	6.5	6.6	7.1	7.4	5.7	6.2	6.4	6.9	7.1	-0.4	-0.3	-0.2	-0.2	-0.3
SR84-02	8.0	8.1	8.2	8.5	8.6	8.0	8.1	8.2	8.5	8.6	-0.1	0.0	0.0	0.0	0.0
SR84-05	6.3	7.0	7.2	7.5	7.6	6.2	6.9	7.1	7.4	7.6	0.0	0.0	0.0	0.0	0.0
SR84-10	8.3	8.6	8.7	8.9	9.1	8.3	8.6	8.7	8.9	9.1	0.0	0.0	0.0	0.0	0.0
SR84-15	7.8	8.0	8.1	8.3	8.5	7.7	8.0	8.1	8.3	8.4	0.0	0.0	0.0	0.0	0.0
SR84-20	4.6	5.4	5.6	6.2	6.4	4.5	5.3	5.6	6.1	6.4	-0.1	-0.1	-0.1	0.0	-0.1
SR84LAKE005	3.6	4.2	4.5	5.6	6.1	3.5	4.2	4.5	5.5	6.1	0.0	0.0	0.0	-0.1	0.0
SR84LAKE010	3.6	4.2	4.5	5.6	6.1	3.5	4.2	4.5	5.5	6.1	0.0	0.0	0.0	0.0	0.0
SW12A-05	6.1	6.5	6.6	7.1	7.4	5.5	6.2	6.4	6.9	7.1	-0.6	-0.3	-0.2	-0.2	-0.3
SW12A-10	6.2	6.5	6.6	7.1	7.4	6.0	6.3	6.4	6.9	7.1	-0.2	-0.3	-0.2	-0.2	-0.3
SW14A-05	4.1	5.1	5.2	5.8	6.2	4.1	5.1	5.2	5.8	6.1	0.0	0.0	0.0	0.0	0.0
SW14ST-05	5.6	6.2	6.4	7.7	8.0	5.6	6.1	6.4	7.6	8.0	0.0	0.0	0.0	0.0	0.0
SW14ST-10	6.7	7.1	7.3	8.3	8.6	6.7	7.1	7.3	8.3	8.6	0.0	0.0	0.0	0.0	0.0
SW15A-05	6.4	6.6	6.6	6.9	7.0	6.4	6.6	6.6	6.9	7.0	0.0	0.0	0.0	0.0	0.0
SW15CT-05	6.8	7.2	7.3	8.3	8.6	6.8	7.2	7.3	8.3	8.6	0.0	0.0	0.0	0.0	0.0
SW16ST-05	4.3	4.9	5.2	6.4	6.8	4.3	4.9	5.2	6.4	6.8	0.0	0.0	0.0	0.0	0.0
SW20ST-05	4.3	5.1	5.4	5.9	6.2	4.2	5.1	5.3	5.9	6.1	-0.1	-0.1	-0.1	0.0	-0.1
SW20ST-10	4.3	5.1	5.3	5.9	6.2	4.2	5.1	5.3	5.8	6.1	-0.1	-0.1	-0.1	0.0	-0.1
SW24ST-05	4.7	5.0	5.1	5.5	6.0	4.7	5.0	5.1	5.4	5.9	0.0	0.0	0.0	-0.1	0.0
SW27A-05	8.0	8.2	8.3	8.6	8.8	8.0	8.2	8.3	8.6	8.8	0.0	0.0	0.0	0.0	0.0
SW3A-05	4.3	4.9	5.1	5.5	5.7	4.2	4.9	5.1	5.5	5.7	0.0	0.0	0.0	0.0	0.0
SW4A-05	6.2	6.5	6.5	6.6	6.7	6.2	6.4	6.5	6.6	6.7	0.0	0.0	0.0	0.0	0.0
SW4A-10	6.4	6.7	6.8	7.0	7.1	6.4	6.7	6.8	7.0	7.1	-0.1	0.0	0.0	0.0	0.0
SW4A-15	6.8	7.1	7.2	7.5	7.6	6.7	7.0	7.1	7.4	7.5	-0.1	-0.1	0.0	0.0	0.0
SW7A-05	5.7	6.0	6.1	6.3	6.6	5.7	6.0	6.1	6.3	6.5	0.0	0.0	0.0	0.0	0.0
SWFLAG-05	3.3	4.1	4.5	5.0	5.5	3.3	4.1	4.5	5.0	5.5	0.0	0.0	0.0	0.0	0.0
SWFLAG-10	4.6	5.1	5.3	5.8	6.1	4.6	5.1	5.2	5.8	6.1	0.0	0.0	0.0	0.0	0.0
SWFLAG-15	7.3	7.6	7.8	8.0	8.2	7.3	7.6	7.7	8.0	8.2	0.0	0.0	0.0	0.0	0.0
SWMLK-05	4.8	5.2	5.5	6.5	6.6	4.8	5.2	5.5	6.5	6.6	0.0	0.0	0.0	0.0	0.0
SWMLK-10	4.8	5.2	5.5	6.0	6.2	4.8	5.1	5.5	6.0	6.2	0.0	0.0	0.0	0.0	0.0
SWMLK-12	5.0	5.4	5.6	6.8	7.1	5.0	5.4	5.6	6.8	7.1	0.0	0.0	0.0	0.0	0.0

Table 6B-2. Alternative No. 3, Recharge Wells - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 3 Peak Stages (ft NGVD)					Delta (Alt. 3 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
SWRIVRS-05	6.4	6.9	7.0	7.2	7.3	6.4	6.9	7.0	7.2	7.3	0.0	0.0	0.0	0.0	0.0
TR005	2.7	2.8	2.9	3.2	3.4	2.7	2.8	2.9	3.2	3.4	0.0	0.0	0.0	0.0	0.0
TR006	2.7	2.8	2.9	3.2	3.4	2.7	2.8	2.9	3.2	3.4	0.0	0.0	0.0	0.0	0.0
TR010	2.7	3.0	3.1	3.6	3.9	2.7	3.0	3.1	3.6	3.9	0.0	0.0	0.0	0.0	0.0
TR011	2.7	3.0	3.1	3.6	4.0	2.7	3.0	3.1	3.6	3.9	0.0	0.0	0.0	0.0	0.0
TR015	2.9	3.2	3.4	4.0	4.4	2.9	3.2	3.4	4.0	4.4	0.0	0.0	0.0	0.0	0.0
TR016	2.9	3.4	3.6	4.2	4.6	2.9	3.4	3.5	4.2	4.6	0.0	0.0	0.0	0.0	0.0
TR020	3.2	3.7	3.9	4.6	5.1	3.2	3.7	3.9	4.6	5.0	0.0	0.0	0.0	0.0	0.0
TR021	3.2	3.7	4.0	4.7	5.1	3.2	3.7	4.0	4.7	5.1	0.0	0.0	0.0	0.0	0.0
TR025	3.2	3.8	4.0	4.8	5.2	3.2	3.8	4.0	4.8	5.2	0.0	0.0	0.0	0.0	0.0
TR026	3.3	3.8	4.1	4.8	5.2	3.2	3.8	4.0	4.8	5.2	0.0	0.0	0.0	0.0	0.0
TR030	3.3	3.9	4.1	4.8	5.2	3.3	3.8	4.1	4.8	5.2	0.0	0.0	0.0	0.0	0.0
TR031	3.3	3.9	4.1	4.9	5.2	3.3	3.9	4.1	4.8	5.2	0.0	0.0	0.0	0.0	0.0
TR035	3.3	3.9	4.1	4.9	5.3	3.3	3.9	4.1	4.9	5.2	0.0	0.0	0.0	0.0	0.0
TR037	3.3	3.9	4.1	4.9	5.3	3.3	3.9	4.1	4.9	5.3	0.0	0.0	0.0	0.0	0.0
TR038	3.4	4.0	4.2	5.0	5.4	3.4	4.0	4.2	4.9	5.3	0.0	0.0	0.0	0.0	0.0
TR040	3.4	4.0	4.2	5.0	5.4	3.4	4.0	4.2	5.0	5.4	0.0	0.0	0.0	0.0	0.0
TWNLKS-05	8.7	9.6	10.0	10.5	10.7	8.7	9.6	10.0	10.5	10.7	0.0	0.0	0.0	0.0	0.0
TWNLKS-10	8.5	8.6	8.7	9.6	9.9	8.5	8.6	8.7	9.6	9.9	0.0	0.0	0.0	0.0	0.0
W5A-15	4.1	4.6	4.8	5.3	5.7	4.1	4.6	4.8	5.3	5.7	0.0	0.0	0.0	0.0	0.0
WBROW-05	6.1	6.3	6.3	6.4	6.7	6.1	6.3	6.3	6.4	6.7	0.0	0.0	0.0	0.0	0.0
WBROW-10	6.1	6.8	7.0	7.5	7.6	6.1	6.8	7.0	7.5	7.6	0.0	0.0	0.0	0.0	0.0
WBROW-15	8.1	8.3	8.4	8.7	8.8	8.1	8.3	8.4	8.7	8.8	0.0	0.0	0.0	0.0	0.0
WBROW-20	7.5	8.3	8.6	9.1	9.4	7.5	8.3	8.6	9.1	9.4	0.0	0.0	0.0	0.0	0.0
WDAV-05	5.7	6.3	6.4	6.6	6.7	5.7	6.3	6.4	6.6	6.7	0.0	0.0	0.0	0.0	0.0
WDAV-10	7.1	7.5	7.7	8.2	8.4	7.1	7.5	7.7	8.2	8.4	0.0	0.0	0.0	0.0	0.0
WDAV-12	7.1	7.5	7.7	8.2	8.4	7.1	7.5	7.7	8.2	8.4	0.0	0.0	0.0	0.0	0.0
WDAV-15	8.1	8.3	8.3	8.5	8.6	8.1	8.3	8.3	8.5	8.6	0.0	0.0	0.0	0.0	0.0
WDAV-20	7.5	8.1	8.2	8.6	8.8	7.5	8.1	8.2	8.6	8.8	0.0	0.0	0.0	0.0	0.0
WDAV-25	7.4	7.7	7.9	8.6	8.7	7.4	7.7	7.9	8.6	8.7	0.0	0.0	0.0	0.0	0.0
WDAV-30	11.0	11.5	11.6	11.9	12.0	11.0	11.5	11.6	11.9	12.0	0.0	0.0	0.0	0.0	0.0
WESTLL-05	9.0	9.2	9.4	10.0	10.1	9.0	9.2	9.4	10.0	10.1	0.0	0.0	0.0	0.0	0.0
WSIST-05	6.1	6.3	6.4	6.6	6.9	6.1	6.3	6.4	6.6	6.9	0.0	0.0	0.0	0.0	0.0
WSIST-10	6.1	6.4	6.5	6.7	6.9	6.1	6.4	6.5	6.7	6.9	0.0	0.0	0.0	0.0	0.0

Table 6B-2. Alternative No. 3, Recharge Wells - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 3 Peak Stages (ft NGVD)					Delta (Alt. 3 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
WSUNR-05	6.5	6.9	7.0	7.2	7.3	6.4	6.8	6.9	7.1	7.3	-0.1	-0.1	0.0	0.0	0.0
WSUNR-10	6.6	7.0	7.2	7.6	7.9	6.5	7.0	7.1	7.6	7.9	-0.1	0.0	0.0	-0.1	-0.1
WSUNR-15	7.4	7.7	7.8	8.1	8.3	7.4	7.7	7.8	8.1	8.3	0.0	0.0	0.0	0.0	0.0
WSUNR-20	5.7	6.9	7.2	8.1	8.6	5.7	6.9	7.2	8.1	8.6	0.0	0.0	0.0	0.0	0.0

Table 6B-3. Alternative No. 4, Dredging - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 4 Peak Stages (ft NGVD)					Delta (Alt. 4 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
C12UI010	6.6	7.3	7.5	8.2	8.6	6.6	7.2	7.4	7.9	8.3	0.0	0.0	0.0	-0.3	-0.3
C12UI015	6.8	7.4	7.5	8.2	8.6	6.8	7.4	7.5	7.9	8.3	0.0	0.0	0.0	-0.3	-0.3
C12UI020	6.9	7.4	7.6	8.2	8.6	6.9	7.4	7.6	8.0	8.3	0.0	0.0	0.0	-0.3	-0.3
C12UICS18005	5.5	6.7	7.1	8.2	8.6	5.0	6.2	6.6	7.8	8.3	-0.5	-0.5	-0.5	-0.4	-0.4
C13IC005	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
C13IC010	2.6	2.7	2.8	2.9	3.0	2.6	2.7	2.8	2.9	3.0	0.0	0.0	0.0	0.0	0.0
C13IC011	2.6	2.8	2.8	3.0	3.2	2.6	2.8	2.8	3.0	3.2	0.0	0.0	0.0	0.0	0.0
C13IC015	2.7	2.8	2.9	3.1	3.2	2.7	2.8	2.9	3.1	3.2	0.0	0.0	0.0	0.0	0.0
C13IC020	2.8	3.0	3.1	3.4	3.6	2.8	3.0	3.1	3.4	3.6	0.0	0.0	0.0	0.0	0.0
C13IC025	3.5	4.1	4.4	5.2	5.6	3.5	4.1	4.4	5.2	5.6	0.0	0.0	0.0	0.0	0.0
C13ICSPUR002	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0	0.0	0.0
C13ICSPUR005	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0	0.0	0.0
C13MR001	3.5	4.3	4.6	5.4	5.9	3.5	4.3	4.6	5.4	5.9	0.0	0.0	0.0	0.0	0.0
C13MR005	3.5	4.3	4.5	5.4	5.8	3.5	4.3	4.5	5.4	5.8	0.0	0.0	0.0	0.0	0.0
C13MR010	3.6	4.3	4.6	5.5	5.9	3.6	4.3	4.6	5.5	5.9	0.0	0.0	0.0	0.0	0.0
C13MR015	3.7	4.5	4.8	5.7	6.1	3.7	4.5	4.8	5.7	6.1	0.0	0.0	0.0	0.0	0.0
C13MR016	3.7	4.6	4.9	5.8	6.2	3.7	4.6	4.9	5.8	6.2	0.0	0.0	0.0	0.0	0.0
C13MR020	3.9	4.7	5.1	6.1	6.5	3.9	4.7	5.1	6.1	6.5	0.0	0.0	0.0	0.0	0.0
C13MR021	3.9	4.7	5.1	6.1	6.6	3.9	4.7	5.1	6.1	6.6	0.0	0.0	0.0	0.0	0.0
C13MR024	3.9	4.8	5.2	6.2	6.6	3.9	4.8	5.2	6.2	6.6	0.0	0.0	0.0	0.0	0.0
C13MR025	3.9	4.8	5.2	6.3	6.7	3.9	4.8	5.2	6.3	6.7	0.0	0.0	0.0	0.0	0.0
C13MR030	4.0	4.9	5.3	6.5	6.9	4.0	4.9	5.3	6.5	6.9	0.0	0.0	0.0	0.0	0.0
C13MR031	4.0	4.9	5.3	6.5	6.9	4.0	4.9	5.3	6.5	6.9	0.0	0.0	0.0	0.0	0.0
C13MRC005	3.7	4.6	4.9	5.9	6.3	3.7	4.6	4.9	5.9	6.3	0.0	0.0	0.0	0.0	0.0
C13MRC006	3.8	4.6	5.0	6.0	6.4	3.8	4.6	5.0	6.0	6.4	0.0	0.0	0.0	0.0	0.0
C13MRC007	3.8	4.7	5.0	6.0	6.4	3.8	4.7	5.0	6.0	6.4	0.0	0.0	0.0	0.0	0.0
C13MRC008	3.9	4.7	5.2	6.2	6.6	3.9	4.7	5.2	6.2	6.6	0.0	0.0	0.0	0.0	0.0
C13MRC009	3.9	4.8	5.2	6.3	6.7	3.9	4.8	5.2	6.3	6.7	0.0	0.0	0.0	0.0	0.0
C13MRC010	4.0	4.8	5.3	6.4	6.8	4.0	4.8	5.3	6.4	6.8	0.0	0.0	0.0	0.0	0.0
C13MRC012	4.0	4.8	5.3	6.4	6.8	4.0	4.8	5.3	6.4	6.8	0.0	0.0	0.0	0.0	0.0
C13MRC014	4.0	4.9	5.4	6.6	6.9	4.0	4.9	5.4	6.6	6.9	0.0	0.0	0.0	0.0	0.0
C13MRC015	4.0	4.9	5.4	6.6	7.0	4.0	4.9	5.4	6.6	7.0	0.0	0.0	0.0	0.0	0.0
C13MRC017	4.0	4.9	5.4	6.6	7.0	4.0	4.9	5.4	6.6	7.0	0.0	0.0	0.0	0.0	0.0
C13MRC018	4.0	4.9	5.4	6.6	7.0	4.0	4.9	5.4	6.6	7.0	0.0	0.0	0.0	0.0	0.0

Table 6B-3. Alternative No. 4, Dredging - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 4 Peak Stages (ft NGVD)					Delta (Alt. 4 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
C13MRC-02	7.6	8.0	8.1	8.4	9.2	7.6	8.0	8.1	8.4	9.2	0.0	0.0	0.0	0.0	0.0
C13MRC020	4.0	4.9	5.4	6.6	7.0	4.0	4.9	5.4	6.6	7.0	0.0	0.0	0.0	0.0	0.0
C13MRC022	4.0	5.0	5.4	6.7	7.1	4.0	5.0	5.4	6.7	7.1	0.0	0.0	0.0	0.0	0.0
C13MRC023	4.0	5.0	5.5	6.8	7.2	4.0	5.0	5.5	6.8	7.2	0.0	0.0	0.0	0.0	0.0
C13MRC024	4.0	5.0	5.5	6.8	7.3	4.0	5.0	5.5	6.8	7.3	0.0	0.0	0.0	0.0	0.0
C13MRC025	4.1	5.0	5.6	6.9	7.4	4.1	5.0	5.6	6.9	7.4	0.0	0.0	0.0	0.0	0.0
C13MRC-03	4.2	5.1	5.6	7.0	7.6	4.2	5.1	5.6	7.0	7.6	0.0	0.0	0.0	0.0	0.0
C13MRC035	4.1	5.1	5.6	7.0	7.6	4.1	5.1	5.6	7.0	7.6	0.0	0.0	0.0	0.0	0.0
C13MRC042	4.5	5.5	6.1	8.4	9.2	4.5	5.5	6.1	8.4	9.2	0.0	0.0	0.0	0.0	0.0
C13MRC043	4.5	5.5	6.1	8.4	9.2	4.5	5.5	6.1	8.4	9.2	0.0	0.0	0.0	0.0	0.0
C13MRC045	4.6	5.5	6.1	8.4	9.2	4.6	5.5	6.1	8.4	9.2	0.0	0.0	0.0	0.0	0.0
C13MRSPUR005	3.5	4.3	4.6	5.4	5.9	3.5	4.3	4.6	5.4	5.9	0.0	0.0	0.0	0.0	0.0
C14CCC005	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
C14CCC008	2.6	2.7	2.7	2.9	3.1	2.6	2.7	2.7	2.9	3.1	0.0	0.0	0.0	0.0	0.0
C14CCC010	2.7	2.8	2.8	3.1	3.5	2.7	2.8	2.8	3.1	3.5	0.0	0.0	0.0	0.0	0.0
C14CCC020	2.8	3.0	3.1	3.6	4.1	2.8	3.0	3.1	3.6	4.1	0.0	0.0	0.0	0.0	0.0
C14CCC022	2.8	3.0	3.2	3.6	4.2	2.8	3.0	3.2	3.6	4.2	0.0	0.0	0.0	0.0	0.0
C14CCC025	2.9	3.1	3.3	3.8	4.5	2.9	3.1	3.3	3.8	4.5	0.0	0.0	0.0	0.0	0.0
C14CCC027	2.9	3.1	3.3	3.9	4.5	2.9	3.1	3.3	3.9	4.5	0.0	0.0	0.0	0.0	0.0
C14CCC038	3.4	4.1	4.6	6.5	7.9	3.4	4.1	4.6	6.5	7.9	0.0	0.0	0.0	0.0	0.0
C14CCC039	3.4	4.1	4.6	6.6	8.1	3.4	4.1	4.6	6.6	8.1	0.0	0.0	0.0	0.0	0.0
C14CCC040	3.4	4.2	4.7	6.8	8.2	3.4	4.2	4.7	6.8	8.2	0.0	0.0	0.0	0.0	0.0
C14CCC045	3.5	4.4	4.9	7.3	8.8	3.5	4.4	4.9	7.3	8.8	0.0	0.0	0.0	0.0	0.0
CCCSPUR005	3.0	3.3	3.5	4.2	4.9	3.0	3.3	3.5	4.2	4.9	0.0	0.0	0.0	0.0	0.0
CCCSPUR010	3.0	3.3	3.5	4.2	5.1	3.0	3.3	3.5	4.2	5.1	0.0	0.0	0.0	0.0	0.0
CCCSPUR015	3.1	3.3	3.5	4.2	5.1	3.1	3.3	3.5	4.2	5.1	0.0	0.0	0.0	0.0	0.0
CCCSPUR020	5.7	6.7	7.1	8.4	8.7	5.7	6.7	7.1	8.4	8.7	0.0	0.0	0.0	0.0	0.0
CCCSPUR021	5.7	6.7	7.1	8.3	8.6	5.7	6.7	7.1	8.3	8.6	0.0	0.0	0.0	0.0	0.0
CRCC-05	4.9	5.3	5.4	5.8	5.9	4.9	5.3	5.4	5.8	5.9	0.0	0.0	0.0	0.0	0.0
CRDVA-05	3.6	3.8	3.8	3.9	4.0	3.6	3.8	3.8	3.9	4.0	0.0	0.0	0.0	0.0	0.0
DUM_IC006	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
EBROW-05	4.1	4.6	4.8	5.2	5.5	4.1	4.6	4.8	5.2	5.5	0.0	0.0	0.0	0.0	0.0
ECOMM-05	6.0	6.2	6.2	6.3	6.4	6.0	6.2	6.2	6.3	6.4	0.0	0.0	0.0	0.0	0.0
ECOMM-10	6.2	6.6	6.8	7.0	7.1	6.2	6.6	6.8	7.0	7.1	0.0	0.0	0.0	0.0	0.0

Table 6B-3. Alternative No. 4, Dredging - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 4 Peak Stages (ft NGVD)					Delta (Alt. 4 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
ECOMM-20	6.4	6.7	6.8	7.0	7.1	6.4	6.7	6.8	7.0	7.1	0.0	0.0	0.0	0.0	0.0
ELOSO-05	3.6	4.5	4.7	5.2	5.5	3.6	4.5	4.7	5.2	5.5	0.0	0.0	0.0	0.0	0.0
EOAKPRK-05	4.9	5.1	5.2	5.4	5.5	4.9	5.1	5.2	5.4	5.5	0.0	0.0	0.0	0.0	0.0
ESUNR-01	6.6	7.0	7.1	7.4	7.6	6.6	7.0	7.1	7.4	7.6	0.0	0.0	0.0	0.0	0.0
ESUNR-05	6.6	7.0	7.1	7.4	7.6	6.6	7.0	7.1	7.4	7.6	0.0	0.0	0.0	0.0	0.0
ESUNR-07	7.1	7.3	7.3	7.5	7.6	7.1	7.3	7.3	7.5	7.6	0.0	0.0	0.0	0.0	0.0
ESUNR-10	6.8	7.0	7.1	7.2	7.3	6.8	7.0	7.1	7.2	7.3	0.0	0.0	0.0	0.0	0.0
FLEA-05	10.1	10.4	10.6	11.2	11.4	10.1	10.4	10.6	11.2	11.4	0.0	0.0	0.0	0.0	0.0
FLEA-10	11.9	12.1	12.2	12.4	12.5	11.9	12.1	12.2	12.4	12.5	0.0	0.0	0.0	0.0	0.0
G16005	2.7	2.8	3.0	3.4	4.0	2.7	2.8	3.0	3.4	4.0	0.0	0.0	0.0	0.0	0.0
G16007	2.7	2.8	3.0	3.4	4.0	2.7	2.8	3.0	3.4	4.0	0.0	0.0	0.0	0.0	0.0
G54_HW	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
G54_TW	3.9	4.6	4.9	6.0	6.7	3.8	4.6	4.9	5.9	6.6	0.0	0.0	0.0	-0.1	-0.1
G57_TW	2.8	2.9	3.0	3.5	4.1	2.8	2.9	3.0	3.5	4.1	0.0	0.0	0.0	0.0	0.0
GALT-05	8.3	9.4	9.6	9.8	10.0	8.3	9.4	9.6	9.8	10.0	0.0	0.0	0.0	0.0	0.0
HCOPWCD2005	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
HF010	6.8	7.5	7.6	8.3	8.7	6.7	7.4	7.6	8.2	8.5	-0.1	0.0	0.0	-0.1	-0.2
HF015	6.8	7.5	7.6	8.3	8.7	6.7	7.4	7.6	8.2	8.5	0.0	0.0	0.0	-0.1	-0.2
HF020	6.8	7.5	7.6	8.3	8.8	6.7	7.5	7.6	8.2	8.7	0.0	0.0	0.0	-0.1	-0.1
HFCS17005	6.8	7.5	7.6	8.2	8.7	6.7	7.4	7.6	8.1	8.4	0.0	-0.1	0.0	-0.2	-0.3
HFCS55025	7.4	8.2	8.4	8.9	9.1	7.3	8.2	8.3	8.9	9.0	0.0	0.0	0.0	0.0	0.0
I595-05	7.4	7.7	7.8	8.0	8.1	7.4	7.7	7.8	8.0	8.1	0.0	0.0	0.0	0.0	0.0
I595-10	5.3	5.5	5.6	6.9	7.4	5.3	5.5	5.6	6.9	7.4	0.0	0.0	0.0	0.0	0.0
I595-15	5.5	6.6	6.8	7.5	7.8	5.5	6.6	6.8	7.5	7.8	0.0	0.0	0.0	0.0	0.0
IC022	2.5	2.6	2.6	2.7	2.8	2.5	2.6	2.6	2.7	2.8	0.0	0.0	0.0	0.0	0.0
IC025	2.6	2.7	2.8	3.0	3.1	2.6	2.7	2.8	3.0	3.1	0.0	0.0	0.0	0.0	0.0
IC030	2.7	2.8	2.9	3.0	3.2	2.7	2.8	2.9	3.0	3.2	0.0	0.0	0.0	0.0	0.0
IC032	2.7	2.8	2.9	3.1	3.4	2.7	2.8	2.9	3.1	3.4	0.0	0.0	0.0	0.0	0.0
IC035	2.7	2.9	3.0	3.2	3.6	2.7	2.9	3.0	3.2	3.6	0.0	0.0	0.0	0.0	0.0
IC040	2.7	2.9	3.0	3.3	3.6	2.7	2.9	3.0	3.3	3.6	0.0	0.0	0.0	0.0	0.0
IC042	2.7	2.9	3.0	3.2	3.4	2.7	2.9	3.0	3.2	3.4	0.0	0.0	0.0	0.0	0.0
IC043	2.7	2.8	2.9	3.1	3.3	2.7	2.8	2.9	3.1	3.3	0.0	0.0	0.0	0.0	0.0
IC044	2.7	2.8	2.9	3.1	3.3	2.7	2.8	2.9	3.1	3.3	0.0	0.0	0.0	0.0	0.0
IC045	2.7	2.9	3.0	3.1	3.4	2.7	2.9	3.0	3.1	3.4	0.0	0.0	0.0	0.0	0.0

Table 6B-3. Alternative No. 4, Dredging - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 4 Peak Stages (ft NGVD)					Delta (Alt. 4 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
IC050	2.7	2.9	3.0	3.1	3.4	2.7	2.9	3.0	3.1	3.4	0.0	0.0	0.0	0.0	0.0
LAKEEMERALD-05	4.1	4.7	5.0	6.8	7.6	4.1	4.7	5.0	6.8	7.6	0.0	0.0	0.0	0.0	0.0
LKMELVA-05	4.4	5.5	5.9	7.7	7.9	4.4	5.5	5.9	7.7	7.9	0.0	0.0	0.0	0.0	0.0
LL005	6.0	7.3	7.6	8.4	9.2	6.0	7.3	7.6	8.4	9.2	0.0	0.0	0.0	0.0	0.0
LL015	6.0	7.3	7.6	8.5	9.3	6.0	7.3	7.6	8.4	9.3	0.0	0.0	0.0	0.0	0.0
LL020	6.0	7.3	7.7	8.6	9.3	6.0	7.3	7.7	8.6	9.3	0.0	0.0	0.0	0.0	0.0
LL025	6.0	7.3	7.7	8.6	9.3	6.0	7.3	7.7	8.6	9.3	0.0	0.0	0.0	0.0	0.0
LL026	6.0	7.3	7.8	9.1	9.9	6.0	7.3	7.8	9.1	9.9	0.0	0.0	0.0	0.0	0.0
LL030	6.0	7.3	7.8	9.1	9.9	6.0	7.3	7.8	9.1	9.9	0.0	0.0	0.0	0.0	0.0
LL035	4.7	6.2	6.9	9.1	9.9	4.7	6.2	6.9	9.1	9.9	0.0	0.0	0.0	0.0	0.0
LLAKE040	6.7	8.2	8.7	9.1	9.9	6.7	8.2	8.7	9.1	9.9	0.0	0.0	0.0	0.0	0.0
MELROSEPK-05	7.5	8.3	8.6	9.1	9.4	7.5	8.3	8.6	9.1	9.4	0.0	0.0	0.0	0.0	0.0
MELROSEPK-06	7.6	8.3	8.5	9.1	9.5	7.6	8.3	8.5	9.1	9.4	0.0	0.0	0.0	0.0	0.0
MELROSEPK-10	7.7	8.4	8.6	9.2	9.5	7.7	8.4	8.6	9.2	9.5	0.0	0.0	0.0	0.0	0.0
MIDLST-05	4.1	5.0	5.2	5.8	6.2	4.0	4.9	5.1	5.6	6.0	-0.1	-0.1	0.0	-0.2	-0.2
MLKPOND-05	4.0	5.0	5.4	7.7	8.5	4.0	5.0	5.4	7.7	8.5	0.0	0.0	0.0	0.0	0.0
NANDR-05	6.6	6.9	7.0	7.2	7.3	6.6	6.9	7.0	7.2	7.3	0.0	0.0	0.0	0.0	0.0
NANDR-10	6.2	6.3	6.4	6.4	6.5	6.2	6.3	6.4	6.4	6.5	0.0	0.0	0.0	0.0	0.0
NANDR-15	5.0	5.3	5.3	5.5	5.6	5.0	5.3	5.3	5.5	5.6	0.0	0.0	0.0	0.0	0.0
NDIXIE-02	7.0	7.3	7.4	7.7	7.8	7.0	7.3	7.4	7.7	7.8	0.0	0.0	0.0	0.0	0.0
NDIXIE-05	6.5	6.7	6.8	7.1	7.2	6.5	6.7	6.8	7.1	7.2	0.0	0.0	0.0	0.0	0.0
NE11ST-04	7.0	7.3	7.4	7.5	7.6	7.0	7.3	7.4	7.5	7.6	0.0	0.0	0.0	0.0	0.0
NE11ST-05	7.3	7.4	7.4	7.5	7.6	7.3	7.4	7.4	7.5	7.6	0.0	0.0	0.0	0.0	0.0
NE13ST-05	6.2	6.9	7.1	7.6	7.7	6.2	6.9	7.1	7.6	7.7	0.0	0.0	0.0	0.0	0.0
NE13ST-10	6.4	7.0	7.1	7.5	7.6	6.4	7.0	7.1	7.5	7.6	0.0	0.0	0.0	0.0	0.0
NE13ST-15	6.4	6.6	6.6	6.8	6.8	6.4	6.6	6.6	6.8	6.8	0.0	0.0	0.0	0.0	0.0
NE15A-05	3.9	4.7	5.0	5.8	6.1	3.9	4.7	5.0	5.8	6.1	0.0	0.0	0.0	0.0	0.0
NE15A-10	5.3	5.8	5.9	6.1	6.2	5.3	5.8	5.9	6.1	6.2	0.0	0.0	0.0	0.0	0.0
NE3A-05	6.4	6.5	6.6	6.7	6.7	6.4	6.5	6.6	6.7	6.7	0.0	0.0	0.0	0.0	0.0
NE3A-07	6.1	6.3	6.4	6.5	6.6	6.1	6.3	6.4	6.5	6.6	0.0	0.0	0.0	0.0	0.0
NE3A-10	5.3	5.5	5.6	5.7	5.8	5.3	5.5	5.6	5.7	5.8	0.0	0.0	0.0	0.0	0.0
NE3CT-05	7.6	7.9	8.0	8.3	8.4	7.6	7.9	8.0	8.3	8.4	0.0	0.0	0.0	0.0	0.0
NE4A-05	6.1	6.3	6.4	6.5	6.6	6.1	6.3	6.4	6.5	6.6	0.0	0.0	0.0	0.0	0.0
NE4A-10	6.5	6.7	6.7	6.8	6.9	6.5	6.7	6.7	6.8	6.9	0.0	0.0	0.0	0.0	0.0

Table 6B-3. Alternative No. 4, Dredging - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 4 Peak Stages (ft NGVD)					Delta (Alt. 4 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
NE4A-15	6.8	7.0	7.1	7.2	7.3	6.8	7.0	7.1	7.2	7.3	0.0	0.0	0.0	0.0	0.0
NE65-05	5.0	5.7	6.0	6.6	7.0	5.0	5.7	6.0	6.6	7.0	0.0	0.0	0.0	0.0	0.0
NFED-05	5.8	6.3	6.5	6.7	7.0	5.8	6.3	6.5	6.7	7.0	0.0	0.0	0.0	0.0	0.0
NFED-10	5.6	6.3	6.6	6.9	7.2	5.6	6.3	6.6	6.9	7.2	0.0	0.0	0.0	0.0	0.0
NFED-12	5.7	6.3	6.6	7.0	7.2	5.7	6.3	6.6	7.0	7.2	0.0	0.0	0.0	0.0	0.0
NFED-15	6.4	6.6	6.6	6.8	6.9	6.4	6.6	6.6	6.8	6.9	0.0	0.0	0.0	0.0	0.0
NFED-20	6.4	6.6	6.7	6.9	7.1	6.4	6.6	6.7	6.9	7.1	0.0	0.0	0.0	0.0	0.0
NFED-22	6.6	6.8	6.9	7.2	7.4	6.6	6.8	6.9	7.2	7.4	0.0	0.0	0.0	0.0	0.0
NFED-25	7.2	7.5	7.7	8.0	8.2	7.2	7.5	7.7	8.0	8.2	0.0	0.0	0.0	0.0	0.0
NFED-30	9.1	9.3	9.4	9.5	9.6	9.1	9.3	9.4	9.5	9.6	0.0	0.0	0.0	0.0	0.0
NFED-35	6.3	6.6	6.7	6.8	6.9	6.3	6.6	6.7	6.8	6.9	0.0	0.0	0.0	0.0	0.0
NFED-37	5.1	5.6	5.9	6.4	6.7	5.1	5.6	5.9	6.4	6.7	0.0	0.0	0.0	0.0	0.0
NFED-40	6.3	6.6	6.7	7.0	7.1	6.3	6.6	6.7	7.0	7.1	0.0	0.0	0.0	0.0	0.0
NFED-45	8.3	9.0	9.1	9.2	9.3	8.3	9.0	9.1	9.2	9.3	0.0	0.0	0.0	0.0	0.0
NFED-50	8.0	8.2	8.3	8.4	8.4	8.0	8.2	8.3	8.4	8.4	0.0	0.0	0.0	0.0	0.0
NFED-52	4.5	5.0	5.2	5.7	5.9	4.5	5.0	5.2	5.7	5.9	0.0	0.0	0.0	0.0	0.0
NFED-53	4.0	4.6	4.8	5.4	5.7	4.0	4.6	4.8	5.4	5.7	0.0	0.0	0.0	0.0	0.0
NFED-55	6.1	6.4	6.5	6.6	6.8	6.1	6.4	6.5	6.6	6.8	0.0	0.0	0.0	0.0	0.0
NFED-60	7.1	7.2	7.2	7.3	7.4	7.1	7.2	7.2	7.3	7.4	0.0	0.0	0.0	0.0	0.0
NFED-65	6.2	6.4	6.5	6.7	7.0	6.2	6.4	6.5	6.7	7.0	0.0	0.0	0.0	0.0	0.0
NFED-67	5.0	5.7	6.0	6.7	6.9	5.0	5.7	6.0	6.7	6.9	0.0	0.0	0.0	0.0	0.0
NFED-70	4.3	5.4	6.0	6.7	6.9	4.3	5.4	6.0	6.7	6.9	0.0	0.0	0.0	0.0	0.0
NFNR001	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0	0.0	0.0
NFNR005	2.6	2.6	2.6	2.7	2.8	2.6	2.6	2.7	2.8	2.8	0.0	0.0	0.0	0.0	0.0
NFNR008	2.9	3.1	3.3	3.6	3.9	2.9	3.3	3.4	3.9	4.2	0.1	0.1	0.2	0.3	0.3
NFNR010	3.1	3.5	3.6	4.1	4.5	3.1	3.5	3.7	4.2	4.6	0.0	0.0	0.0	0.1	0.1
NFNR011	3.1	3.5	3.7	4.2	4.6	3.1	3.6	3.7	4.3	4.7	0.0	0.0	0.0	0.1	0.1
NFNR015	3.2	3.7	3.9	4.5	4.9	3.2	3.7	3.9	4.5	4.9	0.0	0.0	0.0	0.0	0.0
NFNR016	3.3	3.8	4.0	4.6	5.0	3.3	3.8	4.0	4.7	5.1	0.0	0.0	0.0	0.0	0.0
NFNR020	3.3	3.9	4.1	4.8	5.2	3.3	3.9	4.1	4.8	5.2	0.0	0.0	0.0	0.0	0.0
NFNR021	3.4	3.9	4.2	4.9	5.3	3.3	3.9	4.2	4.9	5.3	0.0	0.0	0.0	0.0	0.0
NFNR025	3.4	4.0	4.2	5.0	5.4	3.4	4.0	4.2	5.0	5.4	0.0	0.0	0.0	0.0	0.0
NFNR030	3.9	4.7	5.0	5.8	6.2	3.7	4.5	4.7	5.6	6.0	-0.2	-0.2	-0.2	-0.2	-0.2
NFNR035	4.3	5.2	5.6	6.4	6.7	4.0	4.8	5.1	6.1	6.5	-0.3	-0.4	-0.4	-0.3	-0.2

Table 6B-3. Alternative No. 4, Dredging - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 4 Peak Stages (ft NGVD)					Delta (Alt. 4 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
NFNR040	4.3	5.3	5.6	6.6	6.9	4.1	4.9	5.2	6.3	6.7	-0.3	-0.4	-0.4	-0.3	-0.2
NFNR042	4.5	5.5	5.9	6.8	7.1	4.2	5.1	5.4	6.5	6.9	-0.3	-0.4	-0.5	-0.3	-0.2
NFNR043	4.6	5.6	6.0	6.9	7.3	4.3	5.2	5.5	6.6	7.1	-0.3	-0.4	-0.4	-0.3	-0.2
NFNR045	4.8	5.8	6.2	7.2	7.5	4.4	5.4	5.7	6.9	7.3	-0.4	-0.5	-0.5	-0.3	-0.2
NFNR046	4.8	5.8	6.2	7.2	7.6	4.4	5.4	5.7	6.9	7.4	-0.4	-0.5	-0.5	-0.3	-0.2
NFNR050	5.2	6.3	6.7	7.8	8.3	4.7	5.7	6.1	7.4	7.9	-0.5	-0.6	-0.7	-0.4	-0.4
NFNR051	5.2	6.3	6.7	7.9	8.3	4.7	5.7	6.1	7.5	8.0	-0.5	-0.6	-0.7	-0.4	-0.4
NFNR054	5.3	6.4	6.9	8.0	8.5	4.7	5.8	6.2	7.6	8.1	-0.5	-0.6	-0.7	-0.4	-0.4
NFNR055	5.3	6.4	6.9	8.1	8.6	4.8	5.8	6.2	7.6	8.2	-0.5	-0.6	-0.7	-0.4	-0.4
NFNRSPUR004	2.6	2.8	2.8	3.0	3.2	2.6	2.7	2.7	2.9	3.0	0.0	-0.1	-0.1	-0.1	-0.2
NFNRSPUR005	2.7	2.9	2.9	3.2	3.4	2.7	2.8	2.8	3.0	3.2	0.0	-0.1	-0.1	-0.1	-0.2
NFNRSPUR010	2.8	2.9	3.0	3.6	4.8	2.8	2.8	2.9	3.1	3.9	0.0	-0.1	-0.1	-0.5	-0.9
NFSPUR005	3.9	4.7	5.0	5.8	6.2	3.7	4.5	4.7	5.6	6.0	-0.2	-0.2	-0.2	-0.2	-0.2
NNRC005	3.6	4.2	4.5	5.6	6.1	3.5	4.1	4.4	5.4	6.0	-0.1	-0.1	-0.1	-0.2	-0.1
NNRC010	3.8	4.5	4.7	5.9	6.5	3.7	4.4	4.7	5.8	6.4	0.0	0.0	0.0	-0.1	-0.1
NNRC015	3.8	4.5	4.8	5.9	6.6	3.7	4.5	4.7	5.8	6.4	0.0	0.0	0.0	-0.1	-0.1
NNRC020	3.8	4.6	4.8	6.0	6.6	3.8	4.5	4.8	5.9	6.5	0.0	0.0	0.0	-0.1	-0.1
NPOWRL-03	7.1	7.5	7.6	7.9	8.0	7.1	7.5	7.6	7.9	8.0	0.0	0.0	0.0	0.0	0.0
NPOWRL-05	7.0	7.2	7.2	7.4	7.5	7.0	7.2	7.2	7.4	7.5	0.0	0.0	0.0	0.0	0.0
NPOWRL-10	8.8	9.2	9.2	9.7	9.9	8.8	9.2	9.2	9.7	9.9	0.0	0.0	0.0	0.0	0.0
NW10TR-05	10.3	10.5	10.6	11.0	11.1	10.3	10.5	10.6	11.0	11.1	0.0	0.0	0.0	0.0	0.0
NW15A-05	7.5	7.7	7.8	8.1	8.2	7.5	7.7	7.8	8.1	8.2	0.0	0.0	0.0	0.0	0.0
NW15A-10	6.1	6.4	6.5	6.7	6.9	6.1	6.4	6.5	6.7	6.8	0.0	0.0	0.0	0.0	-0.1
NW15A-15	5.9	6.3	6.4	6.6	6.9	5.9	6.3	6.4	6.6	6.8	0.0	0.0	0.0	0.0	-0.2
NW18A-05	6.6	6.8	6.9	7.1	7.2	6.6	6.8	6.9	7.1	7.2	0.0	0.0	0.0	0.0	0.0
NW22ST-05	6.2	6.7	6.8	7.5	7.9	6.2	6.7	6.8	7.5	7.9	0.0	0.0	0.0	0.0	0.0
NW22ST-10	7.4	8.0	8.1	8.4	8.5	7.4	8.0	8.1	8.4	8.5	0.0	0.0	0.0	0.0	0.0
NW24A-05	6.5	6.9	7.0	7.8	8.3	6.5	6.8	6.9	7.4	7.9	0.0	0.0	0.0	-0.4	-0.4
NW28-05	9.8	10.2	10.4	10.6	10.9	9.8	10.2	10.4	10.6	10.9	0.0	0.0	0.0	0.0	0.0
NW29-05	11.2	11.4	11.4	11.5	11.5	11.2	11.4	11.4	11.5	11.5	0.0	0.0	0.0	0.0	0.0
NW31ST-05	6.0	7.1	7.3	8.1	8.5	5.7	6.9	7.2	7.8	8.2	-0.3	-0.2	-0.1	-0.4	-0.3
NW35-05	9.1	10.1	10.3	10.7	11.1	9.1	10.1	10.3	10.7	11.1	0.0	0.0	0.0	0.0	0.0
NW35-10	9.0	9.5	9.6	10.0	10.1	9.0	9.5	9.6	10.0	10.1	0.0	0.0	0.0	0.0	0.0
NW35-15	8.6	9.2	9.4	10.0	10.1	8.6	9.2	9.4	10.0	10.1	0.0	0.0	0.0	0.0	0.0

Table 6B-3. Alternative No. 4, Dredging - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 4 Peak Stages (ft NGVD)					Delta (Alt. 4 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
NW4A-05	6.5	6.9	7.0	7.2	7.3	6.5	6.9	7.0	7.2	7.3	0.0	0.0	0.0	0.0	0.0
NW4A-10	6.5	6.9	7.0	7.2	7.3	6.5	6.9	7.0	7.2	7.3	0.0	0.0	0.0	0.0	0.0
NW5A-05	6.4	6.9	7.0	7.2	7.3	6.4	6.9	7.0	7.2	7.3	0.0	0.0	0.0	0.0	0.0
NW5A-07	6.3	6.5	6.6	6.9	7.0	6.3	6.5	6.6	6.9	7.0	0.0	0.0	0.0	0.0	0.0
NW5A-10	6.2	6.5	6.6	6.7	6.9	6.2	6.5	6.6	6.7	6.9	0.0	0.0	0.0	0.0	0.0
NW7A-05	6.7	6.9	6.9	7.1	7.2	6.7	6.9	6.9	7.1	7.2	0.0	0.0	0.0	0.0	0.0
NW7A-10	6.6	6.8	6.9	7.1	7.2	6.6	6.8	6.9	7.1	7.2	0.0	0.0	0.0	0.0	0.0
NW8ST-05	6.4	6.7	6.7	6.9	7.1	6.4	6.7	6.7	6.9	7.1	0.0	0.0	0.0	0.0	0.0
NW8ST-10	6.4	6.7	6.7	6.9	7.1	6.4	6.7	6.7	6.9	7.0	0.0	0.0	0.0	0.0	0.0
NW9A-05	6.7	6.9	6.9	7.0	7.1	6.7	6.9	6.9	7.0	7.1	0.0	0.0	0.0	0.0	0.0
NW9A-10	6.8	7.0	7.0	7.1	7.2	6.8	7.0	7.0	7.1	7.2	0.0	0.0	0.0	0.0	0.0
NWFLAG-05	4.3	4.7	4.9	5.3	5.6	4.3	4.7	4.9	5.3	5.5	0.0	0.0	0.0	0.0	0.0
OC005	3.9	4.7	5.2	6.9	7.4	3.8	4.7	5.1	6.9	7.4	0.0	0.0	0.0	0.0	0.0
OC010	3.8	4.6	5.0	6.5	6.9	3.8	4.6	4.9	6.4	6.9	0.0	0.0	-0.1	0.0	0.0
OC015	3.8	4.6	4.9	6.1	6.5	3.8	4.5	4.9	6.1	6.4	0.0	0.0	-0.1	0.0	0.0
OC020	3.6	4.4	4.7	5.8	6.1	3.6	4.3	4.6	5.7	6.0	0.0	-0.1	-0.1	-0.1	-0.1
OC021	3.6	4.3	4.6	5.5	6.0	3.5	4.2	4.5	5.4	5.8	0.0	-0.1	-0.1	-0.1	-0.2
OP015	4.1	5.1	5.6	6.8	7.1	4.1	5.1	5.6	6.8	7.1	0.0	0.0	0.0	0.0	0.0
OPEB001	3.7	4.6	5.0	5.9	6.3	3.7	4.6	5.0	5.9	6.3	0.0	0.0	0.0	0.0	0.0
OPEB002	3.7	4.6	5.0	5.9	6.4	3.7	4.6	5.0	5.9	6.4	0.0	0.0	0.0	0.0	0.0
OPEB003	3.7	4.7	5.1	6.0	6.4	3.7	4.7	5.1	6.0	6.4	0.0	0.0	0.0	0.0	0.0
OPEB004	3.7	4.7	5.1	6.0	6.4	3.7	4.7	5.1	6.0	6.4	0.0	0.0	0.0	0.0	0.0
OPEB005	3.7	4.7	5.1	6.0	6.5	3.7	4.7	5.1	6.0	6.5	0.0	0.0	0.0	0.0	0.0
OPEB006	3.8	4.8	5.3	6.2	6.6	3.8	4.8	5.3	6.2	6.6	0.0	0.0	0.0	0.0	0.0
OPEB007	3.8	4.8	5.3	6.3	6.7	3.8	4.8	5.3	6.3	6.7	0.0	0.0	0.0	0.0	0.0
OPEB008	3.8	4.8	5.3	6.3	6.7	3.8	4.8	5.3	6.3	6.7	0.0	0.0	0.0	0.0	0.0
OPEB009	3.8	4.8	5.4	6.4	6.8	3.8	4.8	5.4	6.4	6.8	0.0	0.0	0.0	0.0	0.0
OPEB010	3.8	4.8	5.4	6.4	6.8	3.8	4.8	5.4	6.4	6.8	0.0	0.0	0.0	0.0	0.0
OPEB011	3.8	4.8	5.4	6.4	6.8	3.8	4.8	5.4	6.4	6.8	0.0	0.0	0.0	0.0	0.0
OPEB015	3.8	4.8	5.4	6.4	6.8	3.8	4.8	5.4	6.4	6.8	0.0	0.0	0.0	0.0	0.0
OPL005	4.1	5.1	5.6	6.9	7.4	4.1	5.1	5.6	6.9	7.4	0.0	0.0	0.0	0.0	0.0
OPL010	4.1	5.1	5.6	7.0	7.4	4.1	5.1	5.6	7.0	7.4	0.0	0.0	0.0	0.0	0.0
OPL015	4.6	5.7	5.8	7.0	7.4	4.6	5.7	5.8	7.0	7.4	0.0	0.0	0.0	0.0	0.0
OPL020	4.6	5.7	5.8	7.0	7.4	4.6	5.7	5.8	7.0	7.4	0.0	0.0	0.0	0.0	0.0

Table 6B-3. Alternative No. 4, Dredging - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 4 Peak Stages (ft NGVD)					Delta (Alt. 4 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
OPL025	4.9	6.6	7.3	9.0	9.9	4.9	6.6	7.3	9.0	9.9	0.0	0.0	0.0	0.0	0.0
OPL030	4.7	6.2	6.9	9.1	9.9	4.7	6.2	6.9	9.1	9.9	0.0	0.0	0.0	0.0	0.0
OPL035	4.7	6.2	6.9	9.1	9.9	4.7	6.2	6.9	9.1	9.9	0.0	0.0	0.0	0.0	0.0
OUT_IC005	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
OUT_IC010	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
OUT_IC015	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
OUT_IC020	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
OUT_IC055	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
PAG005	8.6	9.0	9.1	9.3	9.5	8.6	9.0	9.1	9.3	9.5	0.0	0.0	0.0	0.0	0.0
PORTSPUR005	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0
PRLAKE010	8.3	8.9	9.2	10.0	10.7	8.3	8.9	9.2	10.0	10.7	0.0	0.0	0.0	0.0	0.0
PRN001	4.1	4.9	5.4	7.8	9.4	4.1	4.9	5.4	7.8	9.4	0.0	0.0	0.0	0.0	0.0
PRN005	8.4	9.4	9.9	10.7	11.3	8.4	9.4	9.9	10.7	11.3	0.0	0.0	0.0	0.0	0.0
PRN010	8.4	9.4	9.9	10.7	11.3	8.4	9.4	9.9	10.7	11.3	0.0	0.0	0.0	0.0	0.0
PRN015	8.4	9.4	9.9	10.7	11.3	8.4	9.4	9.9	10.7	11.3	0.0	0.0	0.0	0.0	0.0
PRN018	8.5	9.4	9.9	10.7	11.3	8.5	9.4	9.9	10.7	11.3	0.0	0.0	0.0	0.0	0.0
PRN020	8.5	9.4	9.9	10.7	11.3	8.5	9.4	9.9	10.7	11.3	0.0	0.0	0.0	0.0	0.0
PRN025	9.2	9.7	9.9	10.3	10.5	9.2	9.7	9.9	10.3	10.5	0.0	0.0	0.0	0.0	0.0
PRN030	9.2	9.7	9.9	10.2	10.4	9.2	9.7	9.9	10.2	10.4	0.0	0.0	0.0	0.0	0.0
PRN035	6.9	7.7	8.0	8.7	9.1	6.9	7.7	8.0	8.7	9.1	0.0	0.0	0.0	0.0	0.0
PRN038	6.9	7.7	8.0	8.6	9.0	6.9	7.7	8.0	8.6	9.0	0.0	0.0	0.0	0.0	0.0
PRN039	6.9	7.7	8.0	8.6	8.9	6.9	7.7	8.0	8.6	8.9	0.0	0.0	0.0	0.0	0.0
PRN040	6.8	7.7	8.0	8.5	8.8	6.8	7.7	8.0	8.5	8.8	0.0	0.0	0.0	0.0	0.0
PRN045	7.0	7.7	8.0	8.6	9.0	7.0	7.7	8.0	8.6	9.0	0.0	0.0	0.0	0.0	0.0
PRN1005	8.4	9.4	9.9	10.7	11.3	8.4	9.4	9.9	10.7	11.3	0.0	0.0	0.0	0.0	0.0
PRN1006	8.4	9.0	9.2	9.4	9.5	8.4	9.0	9.2	9.4	9.5	0.0	0.0	0.0	0.0	0.0
PRN1010	8.4	9.0	9.2	9.4	9.5	8.4	9.0	9.2	9.4	9.5	0.0	0.0	0.0	0.0	0.0
PRN1011	8.6	9.0	9.1	9.3	9.5	8.6	9.0	9.1	9.3	9.5	0.0	0.0	0.0	0.0	0.0
PRSWLAKE020	7.9	8.5	8.8	9.4	10.0	7.9	8.5	8.8	9.4	10.0	0.0	0.0	0.0	0.0	0.0
PRSWLAKE025	7.8	8.2	8.5	9.4	10.0	7.8	8.2	8.5	9.4	10.0	0.0	0.0	0.0	0.0	0.0
RIVRPS	2.5	3.3	4.0	4.8	5.5	2.5	3.3	4.0	4.8	5.5	0.0	0.0	0.0	0.0	0.0
ROL-05	4.7	5.0	5.1	5.5	6.0	4.7	5.0	5.1	5.4	5.8	0.0	0.0	0.0	-0.1	-0.2
RVRLND-05	7.3	7.4	7.5	7.7	7.8	7.3	7.4	7.5	7.7	7.8	0.0	0.0	0.0	0.0	0.0
S33_HW	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0	0.0	0.0

Table 6B-3. Alternative No. 4, Dredging - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 4 Peak Stages (ft NGVD)					Delta (Alt. 4 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
S33_TW	5.3	6.5	7.0	8.2	8.7	4.8	5.9	6.3	7.7	8.3	-0.6	-0.7	-0.7	-0.5	-0.4
S36_TW	4.1	5.2	5.7	7.1	7.7	4.1	5.2	5.7	7.1	7.7	0.0	0.0	0.0	0.0	0.0
S36-HW	4.3	5.4	6.0	8.3	9.1	4.3	5.4	6.0	8.3	9.1	0.0	0.0	0.0	0.0	0.0
S37A_TW	2.9	3.2	3.5	4.1	4.8	2.9	3.2	3.5	4.1	4.8	0.0	0.0	0.0	0.0	0.0
S37A-HW	3.4	3.9	4.4	6.2	7.6	3.4	3.9	4.4	6.2	7.6	0.0	0.0	0.0	0.0	0.0
S37B_HW	4.0	4.9	5.4	7.8	9.4	4.0	4.9	5.4	7.8	9.4	0.0	0.0	0.0	0.0	0.0
S37B_TW	3.6	4.4	5.0	7.4	8.9	3.6	4.4	5.0	7.4	8.9	0.0	0.0	0.0	0.0	0.0
SANDR-05	5.8	6.0	6.0	6.1	6.2	5.8	6.0	6.0	6.1	6.2	0.0	0.0	0.0	0.0	0.0
SE10A-05	5.4	6.0	6.2	6.5	6.7	5.4	6.0	6.2	6.5	6.7	0.0	0.0	0.0	0.0	0.0
SE3A-05	3.8	4.5	4.7	5.2	5.5	3.8	4.5	4.7	5.2	5.5	0.0	0.0	0.0	0.0	0.0
SE3A-10	5.0	5.2	5.3	5.3	5.4	5.0	5.2	5.3	5.3	5.4	0.0	0.0	0.0	0.0	0.0
SE3A-15	7.3	7.6	7.8	8.0	8.2	7.3	7.6	7.8	8.0	8.2	0.0	0.0	0.0	0.0	0.0
SE4A-10	7.5	8.3	8.6	8.9	9.1	7.5	8.3	8.6	8.9	9.1	0.0	0.0	0.0	0.0	0.0
SE5A-05	4.2	4.5	4.6	4.9	5.0	4.2	4.5	4.6	4.9	5.0	0.0	0.0	0.0	0.0	0.0
SeepOut	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SFED-05	5.7	6.1	6.2	6.5	6.6	5.7	6.1	6.2	6.5	6.6	0.0	0.0	0.0	0.0	0.0
SFED-10	6.1	6.4	6.5	6.6	6.7	6.1	6.4	6.5	6.6	6.7	0.0	0.0	0.0	0.0	0.0
SFED-15	7.3	7.6	7.8	8.0	8.2	7.3	7.6	7.8	8.0	8.2	0.0	0.0	0.0	0.0	0.0
SFED-20	7.3	7.6	7.8	8.0	8.2	7.3	7.6	7.8	8.0	8.2	0.0	0.0	0.0	0.0	0.0
SFED-25	7.3	7.6	7.8	8.0	8.2	7.3	7.6	7.8	8.0	8.2	0.0	0.0	0.0	0.0	0.0
SFNR005	3.4	4.0	4.2	5.1	5.7	3.4	4.0	4.2	5.1	5.6	0.0	0.0	0.0	-0.1	-0.1
SFNR006	3.4	4.0	4.3	5.2	5.7	3.4	4.0	4.2	5.1	5.6	0.0	0.0	-0.1	-0.1	-0.1
SFNR010	3.5	4.1	4.3	5.3	5.8	3.4	4.0	4.2	5.2	5.7	-0.1	-0.1	-0.1	-0.1	-0.2
SFNR015	3.5	4.1	4.4	5.4	6.0	3.4	4.0	4.3	5.2	5.8	-0.1	-0.1	-0.1	-0.2	-0.2
SFNR020	3.5	4.1	4.4	5.4	6.0	3.4	4.0	4.3	5.2	5.8	-0.1	-0.1	-0.1	-0.2	-0.2
SFNR025	3.5	4.2	4.5	5.5	6.1	3.5	4.1	4.4	5.4	5.9	-0.1	-0.1	-0.1	-0.2	-0.2
SFNR030	3.6	4.2	4.5	5.6	6.1	3.5	4.1	4.4	5.4	6.0	-0.1	-0.1	-0.1	-0.2	-0.2
SFNRC005	3.6	4.2	4.5	5.6	6.1	3.5	4.1	4.4	5.4	6.0	-0.1	-0.1	-0.1	-0.2	-0.2
SFNRSPUR005	3.5	4.1	4.3	5.3	5.8	3.4	4.0	4.2	5.2	5.7	-0.1	-0.1	-0.1	-0.1	-0.2
SFNRSPUR010	3.5	4.1	4.4	5.4	6.0	3.4	4.0	4.3	5.3	5.8	-0.1	-0.1	-0.1	-0.2	-0.2
SFNRSPUR013	3.5	4.2	4.5	5.5	6.1	3.5	4.1	4.4	5.4	5.9	-0.1	-0.1	-0.1	-0.2	-0.2
SFNRSPUR014	3.5	4.2	4.5	5.5	6.1	3.5	4.1	4.4	5.4	5.9	-0.1	-0.1	-0.1	-0.2	-0.2
SFNRSPUR015	3.5	4.2	4.5	5.5	6.1	3.5	4.1	4.4	5.4	5.9	-0.1	-0.1	-0.1	-0.2	-0.2
SFNRSPUR018	3.5	4.2	4.5	5.6	6.1	3.5	4.1	4.4	5.4	5.9	0.0	-0.1	-0.1	-0.1	-0.2

Table 6B-3. Alternative No. 4, Dredging - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 4 Peak Stages (ft NGVD)					Delta (Alt. 4 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
SMIAMI-05	7.9	8.3	8.3	8.5	8.6	7.9	8.3	8.3	8.5	8.6	0.0	0.0	0.0	0.0	0.0
SMIAMI-10	6.7	7.9	8.0	8.2	8.3	6.7	7.9	8.0	8.2	8.3	0.0	0.0	0.0	0.0	0.0
SNYDERPK-05	6.1	6.5	6.6	7.1	7.4	6.1	6.5	6.6	7.1	7.4	0.0	0.0	0.0	0.0	0.0
SNYDERPK-10	6.1	6.5	6.6	7.1	7.4	6.1	6.5	6.6	7.1	7.4	0.0	0.0	0.0	0.0	0.0
SR84-02	8.0	8.1	8.2	8.5	8.6	8.0	8.1	8.2	8.5	8.6	0.0	0.0	0.0	0.0	0.0
SR84-05	6.3	7.0	7.2	7.5	7.6	6.3	7.0	7.2	7.5	7.6	0.0	0.0	0.0	0.0	0.0
SR84-10	8.3	8.6	8.7	8.9	9.1	8.3	8.6	8.7	8.9	9.1	0.0	0.0	0.0	0.0	0.0
SR84-15	7.8	8.0	8.1	8.3	8.5	7.8	8.0	8.1	8.3	8.5	0.0	0.0	0.0	0.0	0.0
SR84-20	4.6	5.4	5.6	6.2	6.4	4.6	5.4	5.6	6.2	6.4	0.0	0.0	0.0	0.0	0.0
SR84LAKE005	3.6	4.2	4.5	5.6	6.1	3.5	4.1	4.4	5.4	6.0	-0.1	-0.1	-0.1	-0.2	-0.2
SR84LAKE010	3.6	4.2	4.5	5.6	6.1	3.5	4.1	4.4	5.4	6.0	-0.1	-0.1	-0.1	-0.2	-0.2
SW12A-05	6.1	6.5	6.6	7.1	7.4	6.1	6.5	6.6	7.1	7.4	0.0	0.0	0.0	0.0	0.0
SW12A-10	6.2	6.5	6.6	7.1	7.4	6.2	6.5	6.6	7.1	7.4	0.0	0.0	0.0	0.0	0.0
SW14A-05	4.1	5.1	5.2	5.8	6.2	4.0	5.0	5.1	5.6	6.0	-0.1	0.0	0.0	-0.2	-0.2
SW14ST-05	5.6	6.2	6.4	7.7	8.0	5.6	6.1	6.4	7.6	8.0	0.0	0.0	0.0	0.0	0.0
SW14ST-10	6.7	7.1	7.3	8.3	8.6	6.7	7.1	7.3	8.3	8.6	0.0	0.0	0.0	0.0	0.0
SW15A-05	6.4	6.6	6.6	6.9	7.0	6.4	6.6	6.6	6.9	7.0	0.0	0.0	0.0	0.0	0.0
SW15CT-05	6.8	7.2	7.3	8.3	8.6	6.8	7.2	7.3	8.3	8.6	0.0	0.0	0.0	0.0	0.0
SW16ST-05	4.3	4.9	5.2	6.4	6.8	4.3	4.9	5.2	6.3	6.8	0.0	0.0	0.0	0.0	0.0
SW20ST-05	4.3	5.1	5.4	5.9	6.2	4.3	5.1	5.3	5.9	6.2	0.0	0.0	0.0	0.0	0.0
SW20ST-10	4.3	5.1	5.3	5.9	6.2	4.3	5.1	5.3	5.9	6.1	0.0	0.0	0.0	0.0	0.0
SW24ST-05	4.7	5.0	5.1	5.5	6.0	4.7	5.0	5.1	5.4	5.8	0.0	0.0	0.0	-0.1	-0.2
SW27A-05	8.0	8.2	8.3	8.6	8.8	8.0	8.2	8.3	8.6	8.8	0.0	0.0	0.0	0.0	0.0
SW3A-05	4.3	4.9	5.1	5.5	5.7	4.3	4.9	5.1	5.5	5.7	0.0	0.0	0.0	0.0	0.0
SW4A-05	6.2	6.5	6.5	6.6	6.7	6.2	6.5	6.5	6.6	6.7	0.0	0.0	0.0	0.0	0.0
SW4A-10	6.4	6.7	6.8	7.0	7.1	6.4	6.7	6.8	7.0	7.1	0.0	0.0	0.0	0.0	0.0
SW4A-15	6.8	7.1	7.2	7.5	7.6	6.8	7.1	7.2	7.5	7.6	0.0	0.0	0.0	0.0	0.0
SW7A-05	5.7	6.0	6.1	6.3	6.6	5.7	6.0	6.1	6.3	6.4	0.0	0.0	0.0	-0.1	-0.1
SWFLAG-05	3.3	4.1	4.5	5.0	5.5	3.3	4.1	4.5	5.0	5.5	0.0	0.0	0.0	0.0	0.0
SWFLAG-10	4.6	5.1	5.3	5.8	6.1	4.6	5.0	5.2	5.7	6.1	0.0	-0.1	-0.1	-0.1	-0.1
SWFLAG-15	7.3	7.6	7.8	8.0	8.2	7.3	7.6	7.8	8.0	8.2	0.0	0.0	0.0	0.0	0.0
SWMLK-05	4.8	5.2	5.5	6.5	6.6	4.8	5.1	5.5	6.5	6.6	0.0	0.0	0.0	0.0	0.0
SWMLK-10	4.8	5.2	5.5	6.0	6.2	4.8	5.1	5.5	6.0	6.2	0.0	0.0	0.0	0.0	0.0
SWMLK-12	5.0	5.4	5.6	6.8	7.1	5.0	5.4	5.6	6.8	7.1	0.0	0.0	0.0	0.0	0.0

Table 6B-3. Alternative No. 4, Dredging - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 4 Peak Stages (ft NGVD)					Delta (Alt. 4 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
SWRIVRS-05	6.4	6.9	7.0	7.2	7.3	6.4	6.9	7.0	7.2	7.3	0.0	0.0	0.0	0.0	0.0
TR005	2.7	2.8	2.9	3.2	3.4	2.7	2.8	2.8	3.1	3.3	0.0	0.0	0.0	-0.1	-0.1
TR006	2.7	2.8	2.9	3.2	3.4	2.7	2.8	2.9	3.1	3.3	0.0	0.0	0.0	-0.1	-0.1
TR010	2.7	3.0	3.1	3.6	3.9	2.7	2.9	3.0	3.4	3.7	0.0	-0.1	-0.1	-0.2	-0.2
TR011	2.7	3.0	3.1	3.6	4.0	2.7	3.0	3.1	3.5	3.8	0.0	0.0	-0.1	-0.2	-0.2
TR015	2.9	3.2	3.4	4.0	4.4	2.8	3.1	3.3	3.8	4.1	-0.1	-0.1	-0.1	-0.2	-0.2
TR016	2.9	3.4	3.6	4.2	4.6	2.9	3.3	3.5	4.1	4.5	0.0	-0.1	-0.1	-0.1	-0.1
TR020	3.2	3.7	3.9	4.6	5.1	3.1	3.6	3.8	4.5	4.9	-0.1	-0.1	-0.1	-0.1	-0.2
TR021	3.2	3.7	4.0	4.7	5.1	3.1	3.7	3.9	4.5	5.0	-0.1	-0.1	-0.1	-0.1	-0.1
TR025	3.2	3.8	4.0	4.8	5.2	3.2	3.7	3.9	4.6	5.1	-0.1	-0.1	-0.1	-0.1	-0.1
TR026	3.3	3.8	4.1	4.8	5.2	3.2	3.7	4.0	4.7	5.1	-0.1	-0.1	-0.1	-0.1	-0.1
TR030	3.3	3.9	4.1	4.8	5.2	3.2	3.8	4.0	4.7	5.1	-0.1	-0.1	-0.1	-0.1	-0.1
TR031	3.3	3.9	4.1	4.9	5.2	3.3	3.8	4.1	4.8	5.2	0.0	-0.1	-0.1	-0.1	-0.1
TR035	3.3	3.9	4.1	4.9	5.3	3.3	3.9	4.1	4.8	5.2	0.0	-0.1	0.0	-0.1	-0.1
TR037	3.3	3.9	4.1	4.9	5.3	3.3	3.9	4.1	4.8	5.2	0.0	0.0	0.0	-0.1	0.0
TR038	3.4	4.0	4.2	5.0	5.4	3.4	4.0	4.2	4.9	5.3	0.0	0.0	0.0	0.0	-0.1
TR040	3.4	4.0	4.2	5.0	5.4	3.4	4.0	4.2	4.9	5.3	0.0	0.0	0.0	0.0	0.0
TWNLKS-05	8.7	9.6	10.0	10.5	10.7	8.7	9.6	10.0	10.5	10.7	0.0	0.0	0.0	0.0	0.0
TWNLKS-10	8.5	8.6	8.7	9.6	9.9	8.5	8.6	8.7	9.6	9.9	0.0	0.0	0.0	0.0	0.0
W5A-15	4.1	4.6	4.8	5.3	5.7	4.1	4.6	4.8	5.3	5.7	0.0	0.0	0.0	0.0	0.0
WBROW-05	6.1	6.3	6.3	6.4	6.7	6.1	6.3	6.3	6.4	6.5	0.0	0.0	0.0	0.0	-0.2
WBROW-10	6.1	6.8	7.0	7.5	7.6	6.1	6.7	6.9	7.4	7.6	0.0	0.0	0.0	0.0	0.0
WBROW-15	8.1	8.3	8.4	8.7	8.8	8.1	8.3	8.4	8.7	8.8	0.0	0.0	0.0	0.0	0.0
WBROW-20	7.5	8.3	8.6	9.1	9.4	7.5	8.3	8.6	9.1	9.4	0.0	0.0	0.0	0.0	0.0
WDAV-05	5.7	6.3	6.4	6.6	6.7	5.7	6.3	6.4	6.6	6.7	0.0	0.0	0.0	0.0	0.0
WDAV-10	7.1	7.5	7.7	8.2	8.4	7.1	7.5	7.7	8.2	8.4	0.0	0.0	0.0	0.0	0.0
WDAV-12	7.1	7.5	7.7	8.2	8.4	7.1	7.5	7.7	8.2	8.4	0.0	0.0	0.0	0.0	0.0
WDAV-15	8.1	8.3	8.3	8.5	8.6	8.1	8.3	8.3	8.5	8.6	0.0	0.0	0.0	0.0	0.0
WDAV-20	7.5	8.1	8.2	8.6	8.8	7.5	8.1	8.2	8.6	8.8	0.0	0.0	0.0	0.0	0.0
WDAV-25	7.4	7.7	7.9	8.6	8.7	7.4	7.7	7.9	8.6	8.7	0.0	0.0	0.0	0.0	0.0
WDAV-30	11.0	11.5	11.6	11.9	12.0	11.0	11.5	11.6	11.9	12.0	0.0	0.0	0.0	0.0	0.0
WESTLL-05	9.0	9.2	9.4	10.0	10.1	9.0	9.2	9.4	10.0	10.1	0.0	0.0	0.0	0.0	0.0
WSIST-05	6.1	6.3	6.4	6.6	6.9	6.1	6.3	6.4	6.6	6.8	0.0	0.0	0.0	0.0	-0.2
WSIST-10	6.1	6.4	6.5	6.7	6.9	6.1	6.4	6.5	6.7	6.8	0.0	0.0	0.0	0.0	-0.1

Table 6B-3. Alternative No. 4, Dredging - Peak Stages and Deltas

Model Node	Base Peak Stages (ft NGVD)					Alt. 4 Peak Stages (ft NGVD)					Delta (Alt. 4 - Base, ft)				
	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr	2-yr, 24-hr	5-yr, 24-hr	10-yr, 24-hr	25-yr, 72-hr	100-yr, 72-hr
WSUNR-05	6.5	6.9	7.0	7.2	7.3	6.5	6.9	7.0	7.2	7.3	0.0	0.0	0.0	0.0	0.0
WSUNR-10	6.6	7.0	7.2	7.6	7.9	6.6	7.0	7.2	7.6	7.9	0.0	0.0	0.0	0.0	0.0
WSUNR-15	7.4	7.7	7.8	8.1	8.3	7.4	7.7	7.8	8.1	8.2	0.0	0.0	0.0	0.0	-0.1
WSUNR-20	5.7	6.9	7.2	8.1	8.6	5.4	6.7	7.0	7.7	8.2	-0.4	-0.2	-0.2	-0.4	-0.4

Appendix 7A
Surface Water Management Model Hydrologic Data

The following tables present the existing land use hydrology for the City of Fort Lauderdale EPA SWMM Projects at Edgewood East, Edgewood West, Progresso and Victoria Park.

Table 7A-1. East Edgewood Model Hydrologic Data

Existing Conditions											
Hydrologic Units	Width	Area	% DCIA	Slope	Manning's Roughness		Initial Abstractions		Max Inf Rate	Min Inf Rate	Soil Storage
					Impervious	Pervious	Impervious	Pervious			
(HUs)	(ft)	(Ac)	(%)	(%)			(in)	(in)	(in/hr)	(in/hr)	(in)
HUEDGWDC00	1,190	7.3	78.2	0.65	0.015	0.178	0.1	0.189	2.88	0.10	1.43
HUEDGWDC01	488	3.1	75.4	0.55	0.015	0.207	0.1	0.197	2.92	0.09	1.30
HUEDGWDC02	1,022	6.2	51.6	0.88	0.015	0.199	0.1	0.217	4.82	0.21	3.04
HUEDGWDC03	819	10.3	27.4	0.40	0.015	0.231	0.1	0.226	4.84	0.19	2.94
HUEDGWDC04	1,294	19.8	51.7	0.40	0.015	0.316	0.1	0.227	4.46	0.17	2.48
HUEDGWDC05	1,032	8.4	23.0	0.67	0.015	0.213	0.1	0.227	6.38	0.38	3.85
HUEDGWDC06	912	16.2	49.9	0.30	0.015	0.177	0.1	0.203	4.14	0.17	2.62
HUEDGWDC07	1,195	8.9	23.0	0.51	0.015	0.213	0.1	0.227	6.00	0.33	3.67
HUEDGWDC08	836	17.2	38.0	0.37	0.015	0.197	0.1	0.216	5.05	0.23	3.10
HUEDGWDC09	740	4.5	28.4	0.65	0.015	0.212	0.1	0.225	5.49	0.27	3.41
HUEDGWDC10	927	14.5	23.0	0.52	0.015	0.213	0.1	0.227	5.14	0.22	3.24
HUEDGWDC11	1,640	14.1	45.0	0.91	0.015	0.320	0.1	0.230	3.85	0.12	1.68
HUEDGWDC12	1,716	26.3	78.1	0.58	0.015	0.157	0.1	0.188	2.43	0.07	0.93
HUEDGWDC13	1,283	6.7	54.3	5.39	0.018	0.330	0.1	0.232	3.72	0.10	1.47
HUEDGWDC14	1,517	11.5	81.0	1.42	0.015	0.139	0.1	0.179	2.11	0.05	0.74
HUEDGWDE00	783	5.0	79.2	1.32	0.015	0.165	0.1	0.186	2.29	0.06	0.80
HUEDGWDE01	1,009	9.3	77.8	0.79	0.015	0.182	0.1	0.191	2.58	0.07	1.05
HUEDGWDE02	948	10.7	76.6	0.52	0.015	0.196	0.1	0.194	3.14	0.13	1.30
HUEDGWDE03	1,120	10.7	78.5	0.94	0.015	0.174	0.1	0.188	2.54	0.08	0.95
HUEDGWDE04	1,599	22.0	40.2	0.48	0.015	0.207	0.1	0.222	4.54	0.18	2.68
HUEDGWDE05	815	13.5	81.0	0.45	0.015	0.139	0.1	0.179	2.11	0.05	0.74
HUEDGWDE06	1,539	24.6	73.0	0.34	0.015	0.229	0.1	0.203	4.56	0.27	2.18
HUEDGWDE07	1,290	14.5	81.0	0.62	0.015	0.139	0.1	0.179	2.62	0.11	1.08
HUEDGWDE08	1,025	8.7	52.8	0.51	0.015	0.173	0.1	0.201	4.00	0.17	2.51
HUEDGWDE09	933	10.8	11.0	0.92	0.015	0.378	0.1	0.242	5.85	0.26	2.81
HUEDGWDE10	1,059	14.3	35.9	1.44	0.015	0.353	0.1	0.236	3.64	0.09	1.29
HUEDGWDE11	1,431	12.0	73.0	0.67	0.015	0.229	0.1	0.203	5.83	0.42	3.02
HUEDGWDE12	905	12.3	77.9	0.48	0.015	0.182	0.1	0.190	2.41	0.06	0.84
HUEDGWDE13	980	10.3	81.0	0.53	0.015	0.139	0.1	0.179	2.11	0.05	0.74
HUEDGWDE14	1,487	12.9	68.3	0.72	0.015	0.217	0.1	0.200	4.61	0.22	2.50

Table 7A-1. East Edgewood Model Hydrologic Data

Existing Conditions											
Hydrologic Units	Width	Area	% DCIA	Slope	Manning's Roughness		Initial Abstractions		Max Inf Rate	Min Inf Rate	Soil Storage
					Impervious	Pervious	Impervious	Pervious			
(HUs)	(ft)	(Ac)	(%)	(%)			(in)	(in)	(in/hr)	(in/hr)	(in)
HUEDGWDE15	3,574	32.9	6.2	1.66	0.015	0.379	0.1	0.243	5.29	0.21	2.42
HUEDGWDE16	920	7.4	73.4	1.36	0.015	0.226	0.1	0.202	4.02	0.17	1.89
HUEDGWDE17	1,367	22.9	80.5	0.47	0.015	0.147	0.1	0.181	2.16	0.05	0.76
HUEDGWDE18	3,884	18.7	45.1	4.68	0.024	0.384	0.1	0.244	7.04	0.44	3.51
HUEDGWDE19	2,262	7.2	33.1	7.66	0.024	0.384	0.1	0.244	11.15	0.92	6.23
HUEDGWDE20	1,892	16.9	12.2	1.55	0.015	0.377	0.1	0.242	8.72	0.58	4.73
HUEDGWDE21	1,248	17.0	27.1	0.63	0.015	0.364	0.1	0.238	6.27	0.38	3.02
HUEDGWDE22	1,597	39.4	66.2	0.49	0.015	0.272	0.1	0.214	3.42	0.11	1.34
HUEDGWDE23	1,285	7.2	64.0	1.34	0.015	0.282	0.1	0.217	4.94	0.25	2.35
HUEDGWDWP	1,098	9.2	1.0	1.43	0.015	0.384	0.1	0.244	3.84	0.10	1.35

Table 7A-2. West Edgewood Model Hydrologic Data

Existing Conditions											
Hydrologic Units	Width	Area	% DCIA	Slope	Manning's Roughness		Initial Abstractions		Max Inf Rate	Min Inf Rate	Soil Storage
					Impervious	Pervious	Impervious	Pervious			
(HUs)	(ft)	(Ac)	(%)	(%)			(in)	(in)	(in/hr)	(in/hr)	(in)
HUEDGWDW01	4,796	49.4	61.0	6.84	0.015	0.295	0.1	0.220	5.36	0.25	2.67
HUEDGWDW02	1,963	10.1	9.0	6.54	0.015	0.379	0.1	0.243	4.51	0.15	1.84
HUEDGWDW03	157	2.9	40.4	0.93	0.015	0.346	0.1	0.234	5.87	0.27	2.91
HUEDGWDW04	1,045	3.2	14.8	3.50	0.015	0.375	0.1	0.241	3.82	0.10	1.36
HUEDGWDW05	3,808	4.2	48.8	5.80	0.015	0.264	0.1	0.212	6.22	0.33	3.37
HUEDGWDW06	1,067	6.7	3.7	1.51	0.015	0.370	0.1	0.242	8.55	0.47	4.75
HUEDGWDW07	410	3.0	49.8	2.80	0.015	0.222	0.1	0.206	6.05	0.33	3.41
HUEDGWDW08	1,104	9.0	7.6	4.32	0.015	0.342	0.1	0.240	7.30	0.38	4.22
HUEDGWDW09	1,207	14.7	51.0	0.80	0.015	0.199	0.1	0.218	5.67	0.35	2.92
HUEDGWDW10	2,548	7.1	80.1	3.43	0.020	0.133	0.1	0.175	3.58	0.18	1.83
HUEDGWDW11	893	16.3	24.1	0.56	0.015	0.212	0.1	0.226	7.03	0.42	4.08
HUEDGWDW12	935	9.5	31.0	0.61	0.015	0.211	0.1	0.225	7.53	0.53	4.38
HUEDGWDW13	1,000	2.1	84.1	9.26	0.018	0.137	0.1	0.178	4.53	0.25	2.49
HUEDGWDW14	5,440	13.6	86.3	4.56	0.022	0.141	0.1	0.180	3.05	0.13	1.43
HUEDGWDW15	548	6.0	23.4	1.14	0.015	0.213	0.1	0.226	7.83	0.54	4.52
HUEDGWDW16	631	8.0	23.0	1.22	0.015	0.213	0.1	0.227	10.13	0.84	5.70
HUEDGWDW17	631	3.9	23.0	0.42	0.015	0.213	0.1	0.227	9.94	0.82	5.60
HUEDGWDW18	1,081	5.3	80.1	4.55	0.020	0.185	0.1	0.209	6.25	0.34	3.43
HUEDGWDW19	598	4.1	35.6	1.21	0.015	0.225	0.1	0.225	4.82	0.20	2.65
HUEDGWDW20	1,089	13.9	32.2	0.61	0.015	0.211	0.1	0.224	6.02	0.35	3.50
HUEDGWDW21	529	6.0	23.9	0.42	0.015	0.213	0.1	0.226	10.09	0.84	5.67
HUEDGWDW22	626	3.8	23.2	0.54	0.015	0.213	0.1	0.227	10.12	0.84	5.69
HUEDGWDW23	951	5.0	41.6	1.39	0.015	0.303	0.1	0.229	7.72	0.54	4.46
HUEDGWDW24	1,168	12.0	15.8	0.53	0.015	0.336	0.1	0.238	11.04	0.92	6.21
HUEDGWDW25	616	5.0	26.5	0.46	0.015	0.212	0.1	0.226	10.07	0.84	5.66
HUEDGWDW26	1,159	3.8	79.2	6.53	0.015	0.165	0.1	0.186	2.48	0.07	0.94
HUEDGWDW27	1,567	9.8	77.4	1.44	0.015	0.159	0.1	0.184	6.10	0.49	3.39

Table 7A-3. Progresso Model Hydrologic Data

Existing Conditions											
Hydrologic Units	Width	Area	% DCIA	Slope	Manning's Roughness		Initial Abstractions		Max Inf Rate	Min Inf Rate	Soil Storage
					Impervious	Pervious	Impervious	Pervious			
(HUs)	(ft)	(Ac)	(%)	(%)			(in)	(in)	(in/hr)	(in/hr)	(in)
NANDAV1-1	2,048	4.8	77.8	0.20	0.015	0.182	0.1	0.190	2.40	0.06	0.84
NANDAV1-2	3,805	5.6	81.0	0.20	0.015	0.139	0.1	0.179	2.11	0.05	0.74
NANDAV1-3	2,369	5.9	77.9	0.14	0.015	0.181	0.1	0.190	2.33	0.06	0.81
NANDAV2-1	2,749	7.1	60.5	0.11	0.015	0.294	0.1	0.220	3.20	0.08	1.12
NANDAV2-2	1,532	5.3	49.6	0.10	0.015	0.270	0.1	0.210	2.94	0.07	1.03
NANDAV2-3	2,134	4.9	80.9	0.13	0.015	0.140	0.1	0.179	2.11	0.05	0.74
NE2NDAV1	1,454	5.4	80.9	0.45	0.015	0.140	0.1	0.179	2.50	0.06	0.87
NE3RDAV1	1,124	6.1	76.6	0.93	0.015	0.196	0.1	0.194	2.89	0.07	1.01
NE4RDAV1	562	4.3	78.8	0.47	0.015	0.170	0.1	0.187	2.97	0.07	1.04
NESUN	337	1.0	80.4	1.48	0.015	0.148	0.1	0.181	2.80	0.07	0.98
NW10TER1-1	1,596	10.1	47.0	0.14	0.015	0.187	0.1	0.183	2.57	0.06	0.90
NW10TER2-1	1,092	13.1	53.4	0.34	0.015	0.188	0.1	0.184	2.22	0.06	0.78
NW10TER3-1	3,737	8.3	74.1	0.27	0.015	0.125	0.1	0.170	2.41	0.06	0.84
NW10TER3-2	1,411	3.3	81.0	0.29	0.015	0.139	0.1	0.179	2.11	0.05	0.74
NW2AV1-1	1,523	3.8	55.0	0.17	0.015	0.106	0.1	0.158	2.40	0.06	0.84
NW2AV1-2	4,867	4.5	62.0	0.34	0.015	0.111	0.1	0.161	1.92	0.05	0.67
NW2AV2-1	450	7.4	67.7	0.10	0.015	0.210	0.1	0.195	2.40	0.06	0.84
NW2AV2-2	1,490	4.8	60.4	0.73	0.015	0.232	0.1	0.200	2.40	0.06	0.84
NW2AV3-1	2,193	7.5	59.8	0.22	0.015	0.216	0.1	0.195	2.40	0.06	0.84
NW2AV3-2	3,132	9.9	54.3	0.16	0.015	0.188	0.1	0.184	2.40	0.06	0.84
NW2AV4-1	1,380	4.0	53.6	0.22	0.015	0.222	0.1	0.195	2.12	0.05	0.74
NW2AV4-2	1,339	4.1	47.2	0.34	0.015	0.182	0.1	0.182	2.51	0.06	0.88
NW2AV5-1	2,139	5.7	50.5	0.25	0.015	0.220	0.1	0.194	1.63	0.04	0.57
NW2AV5-2	4,191	5.8	46.2	0.33	0.015	0.234	0.1	0.198	2.53	0.06	0.88
NW4AV1-1	2,246	5.4	67.5	0.81	0.015	0.228	0.1	0.200	1.92	0.05	0.67
NW4AV1-2	829	1.8	81.0	0.37	0.015	0.139	0.1	0.179	1.79	0.04	0.63
NW4AV2-1	2,089	5.9	51.5	0.38	0.015	0.155	0.1	0.173	2.40	0.06	0.84
NW4AV2-2	1,524	4.1	55.0	0.31	0.015	0.106	0.1	0.158	2.28	0.06	0.80
NW4AV3-1	653	3.3	73.9	0.10	0.015	0.222	0.1	0.201	2.74	0.07	0.96
NW4AV3-2	379	3.4	65.4	0.10	0.015	0.237	0.1	0.203	1.56	0.04	0.55

Table 7A-3. Progresso Model Hydrologic Data

Existing Conditions											
Hydrologic Units	Width	Area	% DCIA	Slope	Manning's Roughness		Initial Abstractions		Max Inf Rate	Min Inf Rate	Soil Storage
					Impervious	Pervious	Impervious	Pervious			
(HUs)	(ft)	(Ac)	(%)	(%)			(in)	(in)	(in/hr)	(in/hr)	(in)
NW4AV3-3	385	4.3	55.2	0.10	0.015	0.107	0.1	0.158	2.11	0.05	0.74
NW4AV4-1	3,577	4.8	81.0	0.31	0.015	0.139	0.1	0.179	2.18	0.05	0.76
NW4AV4-2	2,312	4.5	81.0	0.22	0.015	0.139	0.1	0.179	3.19	0.08	1.12
NW4AV4-3	2,238	4.6	61.0	0.11	0.015	0.145	0.1	0.172	2.40	0.06	0.84
NW4AV5-1	1,382	4.3	39.6	0.13	0.015	0.245	0.1	0.201	2.54	0.06	0.89
NW4AV5-2	4,119	4.8	55.3	0.30	0.015	0.135	0.1	0.168	2.94	0.07	1.03
NW4AV6-1	2,762	5.2	76.9	0.25	0.015	0.193	0.1	0.193	2.66	0.07	0.93
NW4AV6-2	3,126	5.9	79.3	0.25	0.015	0.164	0.1	0.186	2.52	0.06	0.88
NW4AV6-3	4,885	5.9	56.2	0.37	0.015	0.191	0.1	0.186	2.25	0.06	0.79
NW5AV1-1	2,491	4.9	77.5	0.11	0.015	0.178	0.1	0.189	2.40	0.06	0.84
NW5AV1-2	1,385	3.3	74.7	0.06	0.015	0.173	0.1	0.186	2.60	0.07	0.91
NW5AV1-3	382	7.2	79.5	0.10	0.015	0.161	0.1	0.185	2.44	0.06	0.86
NW5AV2-1	1,719	6.1	52.1	0.53	0.015	0.266	0.1	0.209	2.69	0.07	0.94
NW5AV2-2	3,671	6.7	61.1	0.15	0.015	0.135	0.1	0.169	1.80	0.05	0.63
NW5AV3	4,471	8.6	46.7	0.16	0.015	0.334	0.1	0.231	2.92	0.07	1.02
NW5AV4-1	3,492	5.8	80.4	0.17	0.015	0.148	0.1	0.181	2.40	0.06	0.84
NW5AV4-2	950	1.9	81.0	0.36	0.015	0.139	0.1	0.179	2.64	0.07	0.92
NW5AV4-3	1,582	2.2	77.0	0.43	0.015	0.191	0.1	0.193	3.16	0.08	1.11
NW6AV1	787	6.7	75.6	0.36	0.015	0.206	0.1	0.197	1.74	0.04	0.61
NW7AV1-1	503	8.7	53.2	0.10	0.015	0.234	0.1	0.199	1.76	0.04	0.61
NW7AV1-2	1,980	5.2	78.8	0.09	0.015	0.170	0.1	0.187	2.26	0.06	0.79
NW7AV1-3	6,192	9.1	55.2	0.25	0.015	0.267	0.1	0.210	2.40	0.06	0.84
NW7AV2-1	1,669	8.4	62.5	0.11	0.015	0.228	0.1	0.199	2.49	0.06	0.87
NW7AV2-2	1,774	5.8	48.3	0.32	0.015	0.296	0.1	0.219	2.17	0.05	0.76
NW7AV3-1	3,177	10.4	30.3	0.18	0.015	0.317	0.1	0.224	1.56	0.04	0.54
NW7AV3-2	2,613	9.8	47.0	0.32	0.015	0.228	0.1	0.196	2.69	0.07	0.94
NW7AV4-1	1,920	5.1	59.8	0.30	0.015	0.299	0.1	0.221	2.28	0.06	0.80
NW7AV4-2	1,376	6.0	57.8	0.11	0.015	0.295	0.1	0.220	2.26	0.06	0.79
NW7AV5	673	4.7	71.0	0.29	0.015	0.243	0.1	0.207	3.24	0.08	1.13
NW7AV6	2,555	6.3	80.4	0.31	0.015	0.147	0.1	0.181	3.30	0.08	1.15
NW7AV7-1	1,333	5.6	74.9	0.32	0.015	0.212	0.1	0.198	2.40	0.06	0.84
NW7AV7-2	1,661	5.9	80.0	0.30	0.015	0.154	0.1	0.183	1.56	0.04	0.54

Table 7A-3. Progresso Model Hydrologic Data

Existing Conditions											
Hydrologic Units	Width	Area	% DCIA	Slope	Manning's Roughness		Initial Abstractions		Max Inf Rate	Min Inf Rate	Soil Storage
					Impervious	Pervious	Impervious	Pervious			
(HUs)	(ft)	(Ac)	(%)	(%)			(in)	(in)	(in/hr)	(in/hr)	(in)
NW7TER1-1	1,536	4.3	80.8	0.45	0.015	0.141	0.1	0.180	2.52	0.06	0.88
NW7TER1-2	2,044	4.4	76.4	0.40	0.015	0.171	0.1	0.186	2.62	0.07	0.92
NW8AV1	1,350	5.3	78.6	0.27	0.015	0.173	0.1	0.188	2.65	0.07	0.93
NW8AV2	1,162	5.1	56.8	0.05	0.015	0.258	0.1	0.208	2.40	0.06	0.84
NW9AV1-1	2,714	5.5	69.3	0.78	0.015	0.194	0.1	0.190	2.29	0.06	0.80
NW9AV1-2	2,069	5.9	70.3	0.56	0.015	0.216	0.1	0.198	2.37	0.06	0.83
NW9AV2	3,355	6.3	61.6	0.51	0.015	0.206	0.1	0.192	1.78	0.04	0.62
NW9AV3-1	583	10.6	69.1	0.10	0.015	0.135	0.1	0.172	2.40	0.06	0.84
NW9AV3-2	934	2.4	52.3	0.24	0.015	0.135	0.1	0.167	2.87	0.07	1.00
NW9AV4-1	1,410	4.8	58.6	0.04	0.015	0.126	0.1	0.165	2.40	0.06	0.84
NW9AV4-2	460	7.8	50.7	0.10	0.015	0.217	0.1	0.193	2.40	0.06	0.84
NW9AV5-1	2,418	4.3	47.3	0.08	0.015	0.181	0.1	0.181	2.67	0.07	0.94
NW9AV5-2	2,629	4.0	65.8	0.41	0.015	0.122	0.1	0.166	2.40	0.06	0.84
NW9AV5-3	3,163	4.7	56.4	0.15	0.015	0.188	0.1	0.185	1.96	0.05	0.68
NW9AV6-1	2,264	6.9	81.0	0.23	0.015	0.139	0.1	0.179	2.25	0.06	0.79
NW9AV6-2	1,153	5.1	64.5	0.24	0.015	0.126	0.1	0.167	1.86	0.05	0.65
NW9AV7-1	1,673	5.4	69.7	0.44	0.015	0.205	0.1	0.194	1.83	0.05	0.64
NW9AV7-2	1,554	6.4	60.2	0.31	0.015	0.259	0.1	0.209	3.48	0.09	1.22
REGALS-1	1,160	2.9	31.9	1.02	0.015	0.279	0.1	0.211	2.48	0.06	0.87
REGALS-2	3,575	6.3	44.7	0.26	0.015	0.255	0.1	0.205	2.58	0.06	0.90

Table 7A-4. Victoria Park Model Hydrologic Data

Existing Conditions											
Hydrologic Units	Width	Area	% DCIA	Slope	Manning's Roughness		Initial Abstractions		Max Inf Rate	Min Inf Rate	Soil Storage
					Impervious	Pervious	Impervious	Pervious			
(HUs)	(ft)	(Ac)	(%)	(%)			(in)	(in)	(in/hr)	(in/hr)	(in)
HUVC12AV-1	2,005	21.7	67.5	0.10	0.015	0.147	0.100	0.179	6.35	0.53	3.57
HUVC13AV-1	2,154	39.2	48.7	0.32	0.015	0.180	0.100	0.205	8.42	0.70	4.74
HUVC15AV-1	1,625	17.5	64.8	0.54	0.015	0.204	0.100	0.195	7.61	0.63	4.28
HUVC15AV-2	1,606	27.0	60.6	0.16	0.015	0.150	0.100	0.186	6.89	0.57	3.88
HUVC16AV-1	1,673	18.8	47.8	0.76	0.015	0.188	0.100	0.211	8.55	0.70	4.77
HUVC16AV-2	3,234	45.0	49.2	0.11	0.015	0.180	0.100	0.205	8.41	0.70	4.73
HUVC16AV-3	753	7.9	65.0	0.51	0.015	0.137	0.100	0.176	5.27	0.41	2.88
HUVC16TR-1	1,062	7.3	53.1	0.68	0.015	0.170	0.100	0.199	7.93	0.66	4.46
HUVC17AV-1	1,913	28.2	52.3	0.72	0.015	0.173	0.100	0.201	8.05	0.67	4.53
HUVC17WY-1	3,137	28.0	39.0	0.64	0.015	0.196	0.100	0.215	9.22	0.77	5.19
HUVC17WY-2	928	11.6	57.6	0.64	0.015	0.158	0.100	0.191	7.32	0.61	4.12
HUVC17WY-3	1,075	16.5	59.2	0.38	0.015	0.246	0.100	0.206	6.69	0.50	3.57
HUVC3CT-1	2,173	17.0	54.4	2.22	0.015	0.167	0.100	0.197	7.75	0.65	4.36
HUVC8AV-1	1,227	15.4	74.5	0.48	0.015	0.135	0.100	0.177	4.24	0.30	2.18
HUVC8AV-2	841	11.7	60.2	0.54	0.015	0.163	0.100	0.195	4.70	0.31	2.34
HUVC8AV-3	2,420	30.2	37.7	0.24	0.015	0.204	0.100	0.220	5.37	0.32	2.57
HUVC9AV-1	3,030	21.7	78.5	0.21	0.015	0.137	0.100	0.178	3.95	0.26	1.98
HUVCC13IC005	116,211	533.6	53.8	0.25	0.020	0.205	0.100	0.221	6.33	0.35	3.33
HUVCFED-3	2,172	8.2	66.8	0.05	0.015	0.269	0.100	0.213	3.02	0.08	1.06
HUVCFED-5	1,017	11.9	59.1	0.20	0.015	0.301	0.100	0.222	3.25	0.08	1.14
HUVCFED-6	992	14.0	67.6	0.34	0.015	0.243	0.100	0.206	2.83	0.07	0.99
HUVCFED-7	1,830	17.1	67.5	0.24	0.015	0.232	0.100	0.203	2.75	0.07	0.96
HUVCFED-8	3,857	27.1	78.2	0.30	0.015	0.178	0.100	0.189	2.38	0.06	0.83
HUVCHP-E	1,002	16.7	13.4	0.38	0.015	0.366	0.100	0.239	10.36	0.84	5.75
HUVCHP-NE	1,844	14.8	30.4	0.48	0.015	0.345	0.100	0.233	4.15	0.16	1.64
HUVCHP-NW	2,046	34.7	13.1	0.55	0.015	0.376	0.100	0.242	5.05	0.24	2.17
HUVCHP-SE	2,329	43.8	29.4	0.28	0.015	0.273	0.100	0.226	9.38	0.76	5.20
HUVCHP-SW	1,161	19.0	43.7	0.38	0.015	0.198	0.100	0.211	5.23	0.33	2.55
HUVCHP-W	1,523	25.2	25.8	0.37	0.015	0.342	0.100	0.232	3.94	0.13	1.51
HUVCNR-10	2,080	15.4	79.1	0.81	0.016	0.175	0.100	0.188	2.36	0.06	0.82

Table 7A-4. Victoria Park Model Hydrologic Data

Existing Conditions											
Hydrologic Units	Width	Area	% DCIA	Slope	Manning's Roughness		Initial Abstractions		Max Inf Rate	Min Inf Rate	Soil Storage
					Impervious	Pervious	Impervious	Pervious			
(HUs)	(ft)	(Ac)	(%)	(%)			(in)	(in)	(in/hr)	(in/hr)	(in)
HUVCNR-5	1,588	25.4	70.2	0.72	0.015	0.135	0.100	0.176	5.15	0.40	2.79
HUVCNR-7	2,019	25.0	71.9	0.61	0.016	0.144	0.100	0.179	3.35	0.19	1.57
HUVCSUN-2	1,108	13.4	61.8	0.32	0.015	0.226	0.100	0.201	6.03	0.44	3.18
HUVCSUN-4	1,358	22.5	68.3	0.35	0.015	0.235	0.100	0.204	3.87	0.19	1.70
HUVCSUN-6	1,219	19.5	65.0	0.17	0.015	0.214	0.100	0.198	2.61	0.07	0.91
HUVCSUN-7	1,536	18.3	78.9	0.30	0.015	0.137	0.100	0.178	2.08	0.05	0.73

Appendix 7B
Surface Water Management Model Hydraulic Data

The following tables present the existing hydraulic link and hydraulic node data for the City of Fort Lauderdale EPA SWMM Projects at Edgewood East, Edgewood West, Progresso and Victoria Park.

Table 7B-1. East Edgewood Model Hydraulic Link Data

Existing Conditions - Conduits								
Link Name	Link Type	No. of Barrels	Depth (ft)	Width (ft)	Length (ft)	Manning's Roughness	U/S Inv. (ft NGVD)	D/S Inv. (ft NGVD)
C01-SR84OL	Overflow	N/A	N/A	N/A	100	0.020	6.5	6.4
C01-SR84S	Circular	1	3.0	N/A	460	0.015	0.0	-2.0
C02-SR84	Overflow	N/A	N/A	N/A	100	0.020	6.8	6.7
C03-C01S	Circular	1	1.0	N/A	630	0.015	0.0	0.0
C03-C01SWALE	Channel	N/A	N/A	N/A	630	0.035	3.4	3.3
C04-C06	Overflow	N/A	N/A	N/A	100	0.020	5.8	5.7
C05-C02	Overflow	N/A	N/A	N/A	100	0.020	6.2	6.1
C05-C06	Overflow	N/A	N/A	N/A	100	0.020	5.8	5.7
C06-C03	Overflow	N/A	N/A	N/A	100	0.020	4.7	4.6
C07-C05	Overflow	N/A	N/A	N/A	100	0.020	6.4	6.3
C07-C08	Overflow	N/A	N/A	N/A	100	0.020	6.0	5.9
C08-C06	Overflow	N/A	N/A	N/A	100	0.020	5.2	5.1
C08-C10	Overflow	N/A	N/A	N/A	100	0.020	5.5	5.4
C09-C07	Overflow	N/A	N/A	N/A	100	0.020	6.4	6.3
C10-E15	Overflow	N/A	N/A	N/A	100	0.020	5.5	5.4
C11-C09	Overflow	N/A	N/A	N/A	100	0.020	6.5	6.4
C11-C10	Overflow	N/A	N/A	N/A	100	0.020	5.8	5.7
C11-C14	Overflow	N/A	N/A	N/A	100	0.020	5.8	5.7
C12-C14	Overflow	N/A	N/A	N/A	100	0.020	6.0	5.9
C13-C12	Overflow	N/A	N/A	N/A	100	0.020	5.7	5.6
C8-E14	Overflow	N/A	N/A	N/A	100	0.020	5.6	5.5
E02-SR84OL	Overflow	N/A	N/A	N/A	100	0.020	7.1	7.0
E02-SR84S	Circular	1	2.0	N/A	350	0.015	0.0	0.0
E03-SR84OL	Overflow	N/A	N/A	N/A	100	0.020	8.2	8.1
E03-SR84S	Circular	1	1.3	N/A	530	0.015	0.0	0.0
E04-C04	Overflow	N/A	N/A	N/A	100	0.020	5.9	5.8
E04-SR84	Overflow	N/A	N/A	N/A	100	0.020	7.1	7.0
E05-E04	Overflow	N/A	N/A	N/A	100	0.020	6.6	6.5
E05-E09	Overflow	N/A	N/A	N/A	100	0.020	6.7	6.6
E06-E02	Overflow	N/A	N/A	N/A	100	0.020	7.4	7.3
E06-E10	Overflow	N/A	N/A	N/A	100	0.020	7.6	7.5
E07-E03OL	Overflow	N/A	N/A	N/A	100	0.020	7.8	7.7
E07-E03S	Circular	1	1.3	N/A	690	0.015	0.0	0.0
E08-E14	Overflow	N/A	N/A	N/A	100	0.020	5.2	5.1
E09-E08	Overflow	N/A	N/A	N/A	100	0.020	5.2	5.1
E10-E09	Overflow	N/A	N/A	N/A	100	0.020	6.0	5.9
E10-E15	Overflow	N/A	N/A	N/A	100	0.020	5.9	5.8
E11-E10	Overflow	N/A	N/A	N/A	100	0.020	8.0	7.9
E11-E12	Overflow	N/A	N/A	N/A	100	0.020	7.6	7.5
E12-E07OL	Overflow	N/A	N/A	N/A	100	0.020	7.8	7.7
E12-E07S	Circular	1	1.3	N/A	910	0.015	0.0	0.0
E13-E12	Overflow	N/A	N/A	N/A	100	0.020	7.2	7.1
E14-E15	Overflow	N/A	N/A	N/A	100	0.020	5.1	5.0

Table 7B-1. East Edgewood Model Hydraulic Link Data

Existing Conditions - Conduits								
Link Name	**Link Type**	**No. of Barrels**	**Depth (ft)**	**Width (ft)**	**Length (ft)**	**Manning's Roughness**	**U/S Inv. (ft NGVD)**	**D/S Inv. (ft NGVD)**
E16-E15OL	Overflow	N/A	N/A	N/A	100	0.020	7.2	7.1
E16E15S	Circular	1	2.0	N/A	90	0.015	0.0	0.0
E17-E12OL	Overflow	N/A	N/A	N/A	100	0.020	6.6	6.5
E17-E12S	Circular	1	1.3	N/A	730	0.015	0.0	0.0
E18-C13	Overflow	N/A	N/A	N/A	100	0.020	7.2	7.1
E18-E15	Overflow	N/A	N/A	N/A	100	0.020	5.7	5.6
E19-E15	Overflow	N/A	N/A	N/A	100	0.020	6.1	6.0
E20-C12	Overflow	N/A	N/A	N/A	100	0.020	7.0	6.9
E20-E18	Overflow	N/A	N/A	N/A	100	0.020	7.6	7.5
E22-E17	Overflow	N/A	N/A	N/A	100	0.020	7.1	7.0
E22-E21	Overflow	N/A	N/A	N/A	100	0.020	7.1	7.0
E22-E23	Overflow	N/A	N/A	N/A	100	0.020	7.3	7.2
E23-E117	Overflow	N/A	N/A	N/A	100	0.020	6.9	6.8
E23-E11OL	Overflow	N/A	N/A	N/A	100	0.020	7.2	7.1
E23-E11S	Circular	1	1.3	N/A	980	0.015	0.0	0.0
E23-E16	Overflow	N/A	N/A	N/A	100	0.020	6.8	6.7
exf-e06	Pump	N/A	N/A	N/A	N/A	N/A	N/A	N/A
exf-e07	Pump	N/A	N/A	N/A	N/A	N/A	N/A	N/A
exf-e11	Pump	N/A	N/A	N/A	N/A	N/A	N/A	N/A
exf-e12	Pump	N/A	N/A	N/A	N/A	N/A	N/A	N/A
exf-e17	Pump	N/A	N/A	N/A	N/A	N/A	N/A	N/A
exf-e23	Pump	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SR84-14OL	Overflow	N/A	N/A	N/A	100	0.020	7.9	7.8
SR84-14S	Circular	1	3.0	N/A	300	0.015	0.0	0.0
SR84-15OL	Overflow	N/A	N/A	N/A	100	0.020	7.5	7.4
SR84-15S	Circular	1	3.5	N/A	580	0.015	0.0	0.0
SR84-16OL	Overflow	N/A	N/A	N/A	100	0.020	7.8	7.7
SR84-16S	Circular	1	4.0	N/A	1050	0.015	0.0	0.0
SR84-17OL	Overflow	N/A	N/A	N/A	100	0.020	6.7	6.6
SR84-17S	Circular	1	4.5	N/A	800	0.015	0.0	-1.0
SR84-18OL	Overflow	N/A	N/A	N/A	100	0.020	7.4	7.3
SR84-18S	Circular	1	4.5	N/A	1540	0.015	-1.0	-2.0
SR84-20OL	Overflow	N/A	N/A	N/A	100	0.020	6.5	6.4
SR84-20S	Circular	1	6.0	N/A	1600	0.015	-2.0	-4.0
SR84-22OL	Overflow	N/A	N/A	N/A	100	0.020	6.5	6.4
SR84-22S	Circular	1	2.5	N/A	550	0.015	0.0	-2.0
SR84-C04	Overflow	N/A	N/A	N/A	100	0.020	6.7	6.6
WP-C03AP	Open Rectangular	2	10.0	20	100	0.030	6.0	5.9

Table 7B-2. East Edgewood Model Hydraulic Node Data

Existing Conditions- Nodes			
Node Name	**Node Type**	**Invert (ft NGVD)**	**Initial Stage (ft NGVD)**
EDGWDC-01	Storage Junction	0.0	2.5
EDGWDC-02	Storage Junction	0.0	2.5
EDGWDC-03	Storage Junction	0.0	2.5
EDGWDC-04	Storage Junction	0.0	2.5
EDGWDC-05	Storage Junction	0.0	2.5
EDGWDC-06	Storage Junction	0.0	2.5
EDGWDC-07	Storage Junction	0.0	2.5
EDGWDC-08	Storage Junction	0.0	2.5
EDGWDC-09	Storage Junction	0.0	2.5
EDGWDC-10	Storage Junction	0.0	2.5
EDGWDC-11	Storage Junction	0.0	2.5
EDGWDC-12	Storage Junction	0.0	2.5
EDGWDC-13	Storage Junction	0.0	2.5
EDGWDC-14	Storage Junction	0.0	2.5
EDGWDE-02	Storage Junction	0.0	2.5
EDGWDE-03	Storage Junction	0.0	2.5
EDGWDE-04	Storage Junction	0.0	2.5
EDGWDE-05	Storage Junction	0.0	2.5
EDGWDE-06	Storage Junction	0.0	2.5
EDGWDE-07	Storage Junction	0.0	2.5
EDGWDE-08	Storage Junction	0.0	2.5
EDGWDE-09	Storage Junction	0.0	2.5
EDGWDE-10	Storage Junction	0.0	2.5
EDGWDE-11	Storage Junction	0.0	2.5
EDGWDE-12	Storage Junction	0.0	2.5
EDGWDE-13	Storage Junction	0.0	2.5
EDGWDE-14	Storage Junction	0.0	2.5
EDGWDE-15	Storage Junction	0.0	2.5
EDGWDE-16	Storage Junction	0.0	2.5
EDGWDE-17	Storage Junction	0.0	2.5
EDGWDE-18	Storage Junction	0.0	2.5
EDGWDE-19	Storage Junction	0.0	2.5
EDGWDE-20	Storage Junction	0.0	2.5
EDGWDE-21	Storage Junction	0.0	2.5
EDGWDE-22	Storage Junction	0.0	2.5
EDGWDE-23	Storage Junction	0.0	2.5
EDGWDWP	Storage Junction	0.0	2.5
exf-e06	Outfall	0.0	N/A
exf-e07	Outfall	0.0	N/A
exf-e11	Outfall	0.0	N/A
exf-e12	Outfall	0.0	N/A
exf-e17	Outfall	0.0	N/A
exf-e23	Outfall	0.0	N/A
SR84-14	Junction	0.0	2.5
SR84-15	Storage Junction	0.0	2.5
SR84-16	Junction	0.0	2.5
SR84-17	Storage Junction	0.0	2.5
SR84-18	Junction	-1.0	2.5
SR84-20	Storage Junction	-2.0	2.5

Table 7B-2. East Edgewood Model Hydraulic Node Data

Existing Conditions- Nodes			
Node Name	**Node Type**	**Invert (ft NGVD)**	**Initial Stage (ft NGVD)**
SR84-22	Junction	0.0	2.5
SW20ST-05	Outfall	-4.0	2.5
SW20ST-05OL	Outfall	-4.0	2.5

Table 7B-3. West Edgewood Model Hydraulic Link Data

Existing Conditions - Conduits								
Link Name	**Link Type**	**No. of Barrels**	**Depth (ft)**	**Width (ft)**	**Length (ft)**	**Manning's Roughness**	**U/S Inv. (ft NGVD)**	**D/S Inv. (ft NGVD)**
OSCEOLA-05	Channel	N/A	N/A	N/A	640	0.060	-1.8	-1.9
OSCEOLA-07OL	Overflow	N/A	N/A	N/A	100	0.020	-1.8	-1.9
OSCEOLA-07S	Culvert	2	6.0	7	115	0.015	-1.8	-1.9
OSCEOLA-08	Channel	1	N/A	N/A	390	0.060	-1.8	-1.9
OSCEOLA-09OL	Overflow	N/A	N/A	N/A	100	0.020	-1.9	-1.8
OSCEOLA-09S	Culvert	2	6.0	7	110	0.015	-1.8	-1.9
OSCEOLA-10	Channel	N/A	N/A	N/A	560	0.060	-1.8	-4.0
OSCEOLA-15OL	Overflow	N/A	N/A	N/A	100	0.020	-4.0	-4.1
OSCEOLA-15S	Culvert	2	6.0	7	240	0.015	-4.0	-4.1
OSCEOLA-20	Channel	N/A	N/A	N/A	440	0.060	-4.0	-4.1
OSCEOLA-25S	Culvert	2	7.0	8	300	0.015	-4.0	-4.1
OSCEOLA-30	Channel	1	N/A	N/A	650	0.060	-4.1	-2.5
SR84-25S	Circular	1	2.0	2	1460	0.015	0.1	0.0
SR84-30S	Circular	1	2.0	2	180	0.015	0.0	-4.1
W01-W02S	Circular	1	4.0	4	150	0.015	0.0	0.0
W02-OC	Overflow	N/A	N/A	N/A	100	0.020	0.0	-1.9
W02-W04S	Circular	1	4.0	4	150	0.015	0.0	0.0
W-03DITCH	Channel	N/A	N/A	N/A	410	0.060	-1.3	-1.8
W04-OCOL	Overflow	N/A	N/A	N/A	100	0.020	0.0	-1.8
W04-OCS	Circular	1	4.0	4	50	0.015	0.0	-1.8
W07-W11	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
W08-W03	Overflow	N/A	N/A	N/A	100	0.020	0.0	-1.3
W09-W08	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
W10-OC	Overflow	N/A	N/A	N/A	100	0.020	0.0	-1.9
W10-W14OL	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
W10-W14S	Circular	1	3.0	3	125	0.015	0.0	0.0
W11-OC	Overflow	N/A	N/A	N/A	100	0.020	0.0	-1.8
W11-OCS	Circular	1	1.5	1.5	250	0.015	0.0	-1.8
W11-W10	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
W12-W09	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
W12-W11	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
W14-OCOL	Overflow	N/A	N/A	N/A	100	0.020	0.0	-4.0
W14-OCS	Circular	1	3.0	3	150	0.015	0.0	-4.1
W15-W14	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
W15-W20	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
W16-W11	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
W17-W12	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
W17-W16	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
W19-OC	Overflow	N/A	N/A	N/A	100	0.020	0.0	-4.1
W20-W14	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
W20-W19OL	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
W20-W19S	Circular	1	1.3	1.25	220	0.015	0.0	0.0
W21-W20	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0

Table 7B-3. West Edgewood Model Hydraulic Link Data

Existing Conditions - Conduits								
Link Name	Link Type	No. of Barrels	Depth (ft)	Width (ft)	Length (ft)	Manning's Roughness	U/S Inv. (ft NGVD)	D/S Inv. (ft NGVD)
W22-W21	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
W23-SR84	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.1
W23-W24	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
W24-W21	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
W25-W22	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
W25-W24	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
W26-OC	Overflow	N/A	N/A	N/A	100	0.020	0.0	-4.0
W27-OC	Overflow	N/A	N/A	N/A	100	0.020	0.1	-4.1

Table 7B-4. West Edgewood Model Hydraulic Node Data

Existing Conditions- Nodes			
Node Name	**Node Type**	**Invert (ft NGVD)**	**Initial Stage (ft NGVD)**
OSCEOLA-07	JUNCTION	-1.9	2.5
OSCEOLA-08	JUNCTION	-1.8	2.5
OSCEOLA-09	JUNCTION	-1.9	2.5
OSCEOLA-10	JUNCTION	-1.8	2.5
OSCEOLA-15	JUNCTION	-4.0	2.5
OSCEOLA-20	JUNCTION	-4.1	2.5
OSCEOLA-25	JUNCTION	-4.0	2.5
OSCEOLA-30	JUNCTION	-4.1	2.5
SR84-25	JUNCTION	0.1	2.5
SR84-30	JUNCTION	0.0	2.5
OSCEOLA-35	OUTFALL	-2.5	2.5
EDGWDW-01	STORAGE	0.0	2.5
EDGWDW-02	STORAGE	0.0	2.5
EDGWDW-03	STORAGE	-1.3	2.5
EDGWDW-04	STORAGE	0.0	2.5
EDGWDW-07	STORAGE	0.0	2.5
EDGWDW-08	STORAGE	0.0	2.5
EDGWDW-09	STORAGE	0.0	2.5
EDGWDW-10	STORAGE	0.0	2.5
EDGWDW-11	STORAGE	0.0	2.5
EDGWDW-12	STORAGE	0.0	2.5
EDGWDW-14	STORAGE	0.0	2.5
EDGWDW-15	STORAGE	0.0	2.5
EDGWDW-16	STORAGE	0.0	2.5
EDGWDW-17	STORAGE	0.0	2.5
EDGWDW-19	STORAGE	0.0	2.5
EDGWDW-20	STORAGE	0.0	2.5
EDGWDW-21	STORAGE	0.0	2.5
EDGWDW-22	STORAGE	0.0	2.5
EDGWDW-23	STORAGE	0.0	2.5
EDGWDW-24	STORAGE	0.0	2.5
EDGWDW-25	STORAGE	0.0	2.5
OSCEOLA-05	STORAGE	-1.8	2.5

Table 7B-5. Progresso Model Hydraulic Link Data

Existing Conditions - Conduits								
Link Name	**Link Type**	**No. of Barrels**	**Depth (ft)**	**Width (ft)**	**Length (ft)**	**Manning's Roughness**	**U/S Inv. (ft NGVD)**	**D/S Inv. (ft NGVD)**
BRO-OF1	Circular	1	6.0	6.0	1500	0.015	-0.5	-8.7
ESUNR-10	Circular	1	4.0	4.0	1400	0.015	0.0	-4.0
Exfil1_Dummy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Exfil2_Dummy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Exfil3_Dummy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Exfil4_Dummy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Exfil5_Dummy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Exfil6_Dummy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Exfil7_Dummy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NANDAV1-2	Circular	1	1.3	1.3	275	0.015	2.7	2.4
NANDAV1-2OL	Overflow	N/A	N/A	N/A	100	0.020	2.7	2.4
NANDAV1-4	Circular	1	2.0	2.0	643	0.015	2.0	1.4
NANDAV1-4OL	Overflow	N/A	N/A	N/A	100	0.020	2.0	2.4
NANDAV1-6	Circular	1	1.3	1.3	182	0.015	2.4	2.0
NANDAV2-2	Circular	1	1.3	1.3	292	0.015	1.4	1.4
NANDAV2-4	Circular	1	2.5	2.5	280	0.015	1.4	1.4
NANDAV2-4OL1	Overflow	N/A	N/A	N/A	100	0.020	1.4	1.4
NANDAV2-4OL2	Overflow	N/A	N/A	N/A	100	0.020	1.4	1.4
NANDAV2-4OL3	Overflow	N/A	N/A	N/A	100	0.020	1.4	2.0
NANDAV2-6	Circular	1	2.5	2.5	340	0.015	1.4	0.5
NE2AV1-2	Circular	1	1.0	1.0	320	0.015	1.7	1.4
NE3AV1-2	Circular	1	0.8	0.8	690	0.015	3.0	0.0
NE3AV1-2OL1	Overflow	N/A	N/A	N/A	100	0.020	3.0	1.7
NE3AV1-2OL2	Overflow	N/A	N/A	N/A	100	0.020	3.0	3.1
NE3AV1-4	Circular	1	1.0	1.0	350	0.015	3.0	1.7
NE4A-15OL2	Overflow	N/A	N/A	N/A	200	0.015	0.0	0.0
NE4AV1-2	Circular	1	1.5	1.5	516	0.015	3.1	0.0
NESUN-2	Circular	1	1.3	1.3	380	0.015	3.5	0.0
NEW-2	Circular	1	4.0	4.0	333	0.015	1.0	0.8
NW10TR1-2	Circular	1	1.3	1.3	295	0.015	1.9	1.6
NW10TR2-2	Circular	1	1.0	1.0	316	0.015	1.8	-0.5
NW10TR2-2OL1	Overflow	N/A	N/A	N/A	100	0.020	1.8	2.0
NW10TR2-2OL2	Overflow	N/A	N/A	N/A	100	0.020	1.8	-0.5
NW10TR2-2OL3	Overflow	N/A	N/A	N/A	100	0.020	1.8	1.6
NW10TR2-2OL4	Overflow	N/A	N/A	N/A	100	0.020	1.8	1.9
NW10TR3-2	Circular	1	1.0	1.0	407	0.015	2.5	2.3
NW10TR3-4	Circular	1	1.3	1.3	331	0.015	2.3	2.0
NW10TR3-4OL1	Overflow	N/A	N/A	N/A	100	0.020	2.3	1.8
NW2AV1-2	Circular	1	1.3	1.3	250	0.015	2.0	1.4
NW2AV1-4	Circular	1	1.3	1.3	350	0.015	1.4	1.0
NW2AV1-4OL	Overflow	N/A	N/A	N/A	100	0.020	1.4	1.0
NW2AV2-2	Circular	1	1.0	1.0	310	0.015	0.9	0.6
NW2AV2-2OL	Overflow	N/A	N/A	N/A	100	0.020	0.9	0.6

Table 7B-5. Progresso Model Hydraulic Link Data

Existing Conditions - Conduits								
Link Name	Link Type	No. of Barrels	Depth (ft)	Width (ft)	Length (ft)	Manning's Roughness	U/S Inv. (ft NGVD)	D/S Inv. (ft NGVD)
NW2AV2-2OL1	Overflow	N/A	N/A	N/A	100	0.020	0.9	2.0
NW2AV2-4	Circular	1	1.3	1.3	315	0.015	0.6	0.0
NW2AV3-2	Circular	1	1.3	1.3	300	0.015	0.1	0.3
NW2AV3-4	Circular	1	1.0	1.0	646	0.015	1.1	0.1
NW2AV3-4OL1	Overflow	N/A	N/A	N/A	100	0.020	1.1	0.9
NW2AV4-2	Circular	1	1.3	1.3	310	0.015	0.5	0.2
NW2AV4-2OL1	Overflow	N/A	N/A	N/A	100	0.020	0.5	0.5
NW2AV4-2OL2	Overflow	N/A	N/A	N/A	100	0.020	0.5	0.1
NW2AV4-4	Circular	1	1.0	1.0	303	0.015	0.5	0.5
NW2AV4-4OL1	Overflow	N/A	N/A	N/A	100	0.020	0.5	2.0
NW2AV4-4OL2	Overflow	N/A	N/A	N/A	100	0.020	0.5	1.4
NW2AV4-4OL3	Overflow	N/A	N/A	N/A	100	0.020	0.5	1.1
NW2AV5-2	Circular	1	2.5	2.5	285	0.015	0.5	0.9
NW2AV5-2OL1	Overflow	N/A	N/A	N/A	100	0.020	0.5	1.4
NW2AV5-2OL2	Overflow	N/A	N/A	N/A	100	0.020	0.5	0.5
NW2AV5-6	Circular	1	2.5	2.5	340	0.015	0.9	0.6
NW2AV5-6OL1	Overflow	N/A	N/A	N/A	100	0.020	0.9	0.5
NW2AV5-6OL2	Overflow	N/A	N/A	N/A	100	0.020	0.9	0.2
NW4AV1-2	Circular	1	1.5	1.5	705	0.015	1.5	0.3
NW4AV1-6	Circular	1	1.0	1.0	553	0.015	2.2	1.5
NW4AV1-6OL	Overflow	N/A	N/A	N/A	100	0.020	2.2	1.5
NW4AV2-2	Circular	1	4.0	4.0	313	0.015	0.8	0.5
NW4AV2-2OL	Overflow	N/A	N/A	N/A	100	0.020	0.8	1.0
NW4AV2-4	Circular	1	4.0	4.0	385	0.015	0.5	0.4
NW4AV2-4OL	Overflow	N/A	N/A	N/A	100	0.020	0.5	0.4
NW4AV3-2	Circular	1	3.5	3.5	308	0.015	0.0	0.0
NW4AV3-2OL	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
NW4AV3-4	Circular	1	4.0	4.0	368	0.015	0.0	0.0
NW4AV3-6	Circular	1	4.0	4.0	350	0.015	0.0	1.0
NW4AV3-6OL1	Overflow	N/A	N/A	N/A	100	0.020	0.0	0.0
NW4AV3-6OL2	Overflow	N/A	N/A	N/A	100	0.020	0.0	1.0
NW4AV4-2	Circular	1	3.0	3.0	335	0.015	0.2	0.3
NW4AV4-2OL1	Overflow	N/A	N/A	N/A	100	0.020	0.2	0.3
NW4AV4-2OL2	Overflow	N/A	N/A	N/A	100	0.020	0.2	0.1
NW4AV4-4	Circular	1	3.5	3.5	303	0.015	0.3	0.0
NW4AV4-4OL1	Overflow	N/A	N/A	N/A	100	0.020	0.3	0.1
NW4AV4-4OL2	Overflow	N/A	N/A	N/A	100	0.020	0.3	0.0
NW4AV4-6	Circular	1	1.0	1.0	277	0.015	1.4	0.3
NW4AV4-6OL1	Overflow	N/A	N/A	N/A	100	0.020	1.4	0.3
NW4AV4-6OL2	Overflow	N/A	N/A	N/A	100	0.020	1.4	1.0
NW4AV4-6OL3	Overflow	N/A	N/A	N/A	100	0.020	1.4	1.7
NW4AV4-6OL4	Overflow	N/A	N/A	N/A	100	0.020	1.4	0.2
NW4AV4-8	Circular	1	1.0	1.0	390	0.015	1.7	1.4

Table 7B-5. Progresso Model Hydraulic Link Data

Existing Conditions - Conduits								
Link Name	Link Type	No. of Barrels	Depth (ft)	Width (ft)	Length (ft)	Manning's Roughness	U/S Inv. (ft NGVD)	D/S Inv. (ft NGVD)
NW4AV4-8OL	Overflow	N/A	N/A	N/A	100	0.020	1.7	0.4
NW4AV5-2	Circular	1	2.5	2.5	333	0.015	0.1	0.2
NW4AV5-2OL1	Overflow	N/A	N/A	N/A	100	0.020	0.1	0.2
NW4AV5-2OL2	Overflow	N/A	N/A	N/A	100	0.020	0.1	1.0
NW4AV5-4	Circular	1	1.5	1.5	314	0.015	0.2	0.1
NW4AV5-4OL1	Overflow	N/A	N/A	N/A	100	0.020	0.2	0.1
NW4AV5-4OL2	Overflow	N/A	N/A	N/A	100	0.020	0.2	0.5
NW4AV6-2	Circular	1	2.5	2.5	644	0.015	0.6	0.1
NW4AV6-2OL1	Overflow	N/A	N/A	N/A	100	0.020	0.6	0.9
NW4AV6-2OL2	Overflow	N/A	N/A	N/A	100	0.020	0.6	0.2
NW4AV6-2OL3	Overflow	N/A	N/A	N/A	100	0.020	0.6	0.1
NW4AV6-2OL4	Overflow	N/A	N/A	N/A	200	0.020	0.6	-4.0
NW4AV6-6	Circular	1	2.5	2.5	332	0.015	0.3	0.6
NW4AV6-6OL1	Overflow	N/A	N/A	N/A	100	0.020	0.3	0.6
NW4AV6-6OL2	Overflow	N/A	N/A	N/A	100	0.020	0.3	1.0
NW4AV6-8	Circular	1	2.5	2.5	280	0.015	1.0	0.3
NW4AV6-8OL2	Overflow	N/A	N/A	N/A	100	0.020	1.0	2.8
NW4AV6-8OL3	Overflow	N/A	N/A	N/A	100	0.020	1.0	1.0
NW5AV1-2	Circular	1	4.0	4.0	715	0.015	0.4	0.3
NW5AV1-6	Circular	1	6.0	6.0	570	0.015	0.3	0.2
NW5AV1-6OL	Overflow	N/A	N/A	N/A	100	0.020	0.3	0.4
NW5AV1-8	Circular	1	1.3	1.3	350	0.015	2.7	0.2
NW5AV1-8OL	Overflow	N/A	N/A	N/A	100	0.020	2.7	0.2
NW5AV1-9	Circular	1	6.0	6.0	120	0.015	0.2	-0.5
NW5AV1-9OL	Overflow	N/A	N/A	N/A	100	0.020	0.2	0.3
NW5AV2-2	Circular	1	1.0	1.0	326	0.015	2.3	1.3
NW5AV2-6	Circular	1	1.3	1.3	315	0.015	1.3	1.0
NW5AV2-6OL	Overflow	N/A	N/A	N/A	100	0.020	1.3	1.0
NW5AV3-21	Circular	1	1.3	1.3	615	0.015	0.2	0.0
NW5AV3-22	Circular	1	1.5	1.5	357	0.015	0.2	0.2
NW5AV4-2	Circular	1	1.0	1.0	345	0.015	2.8	1.0
NW5AV4-4	Circular	1	1.3	1.3	293	0.015	1.0	0.1
NW5AV4-6	Circular	1	1.0	1.0	252	0.015	1.2	1.0
NW5AV4-6OL1	Overflow	N/A	N/A	N/A	100	0.020	1.2	1.0
NW5AV4-6OL2	Overflow	N/A	N/A	N/A	100	0.020	1.2	0.3
NW6AV1-2	Circular	1	4.5	4.5	330	0.015	-0.3	0.3
NW6AV1-4OL2	Overflow	N/A	N/A	N/A	100	0.020	-0.3	0.8
NW7AV1-2	Circular	1	4.5	4.5	325	0.015	-0.1	-0.3
NW7AV1-2OL1	Overflow	N/A	N/A	N/A	100	0.020	-0.1	0.0
NW7AV1-2OL2	Overflow	N/A	N/A	N/A	100	0.020	-0.1	0.8
NW7AV1-2OL3	Overflow	N/A	N/A	N/A	100	0.020	-0.1	-0.3
NW7AV1-4	Circular	1	1.3	1.3	462	0.015	1.9	-0.1

Table 7B-5. Progresso Model Hydraulic Link Data

Existing Conditions - Conduits								
Link Name	Link Type	No. of Barrels	Depth (ft)	Width (ft)	Length (ft)	Manning's Roughness	U/S Inv. (ft NGVD)	D/S Inv. (ft NGVD)
NW7AV1-4OL	Overflow	N/A	N/A	N/A	100	0.020	1.9	0.0
NW7AV1-6	Circular	1	1.5	1.5	308	0.015	0.8	-0.1
NW7AV1-6OL	Overflow	N/A	N/A	N/A	1200	0.015	0.8	-8.7
NW7AV1-8	Circular	1	1.5	1.5	483	0.015	0.9	0.8
NW7AV1-8OL	Overflow	N/A	N/A	N/A	100	0.020	0.9	0.0
NW7AV2-2	Circular	1	4.5	4.5	670	0.015	0.0	-0.1
NW7AV2-2OL	Overflow	N/A	N/A	N/A	100	0.020	0.0	1.5
NW7AV2-4	Circular	1	1.3	1.3	312	0.015	1.5	0.0
NW7AV3-2	Circular	1	4.0	4.0	685	0.015	0.1	0.0
NW7AV3-2OL1	Overflow	N/A	N/A	N/A	100	0.020	0.1	0.2
NW7AV3-2OL2	Overflow	N/A	N/A	N/A	100	0.020	0.1	2.3
NW7AV3-2OL3	Overflow	N/A	N/A	N/A	100	0.020	0.1	0.3
NW7AV3-2OL4	Overflow	N/A	N/A	N/A	100	0.020	0.1	0.0
NW7AV3-4	Circular	1	4.0	4.0	595	0.015	0.3	0.1
NW7AV4-2	Circular	1	3.0	3.0	696	0.015	0.2	0.1
NW7AV4-4	Circular	1	1.3	1.3	285	0.015	1.8	0.2
NW7AV5-2	Circular	1	2.5	2.5	198	0.015	0.8	0.4
NW7AV5-4	Circular	1	2.5	2.5	594	0.015	0.4	0.2
NW7AV5-4OL	Overflow	N/A	N/A	N/A	100	0.020	0.4	0.2
NW7AV6-2	Circular	1	2.0	2.0	492	0.015	2.2	0.2
NW7AV6-2OL	Overflow	N/A	N/A	N/A	100	0.020	2.2	0.2
NW7AV6-2OL1	Overflow	N/A	N/A	N/A	100	0.020	2.2	0.6
NW7AV6-2OL2	Overflow	N/A	N/A	N/A	100	0.020	2.2	1.6
NW7AV7-2	Circular	1	1.3	1.3	317	0.015	0.6	1.0
NW7AV7-2OL1	Overflow	N/A	N/A	N/A	100	0.020	0.6	1.0
NW7AV7-2OL2	Overflow	N/A	N/A	N/A	100	0.020	0.6	1.8
NW7AV7-4	Circular	1	1.3	1.3	182	0.015	1.0	2.3
NW7AV7-6	Circular	1	1.3	1.3	456	0.015	2.3	2.2
NW7AV7-6OL1	Overflow	N/A	N/A	N/A	100	0.020	2.3	1.0
NW7AV7-6OL2	Overflow	N/A	N/A	N/A	100	0.020	2.3	2.2
NW7TR1-2	Circular	1	1.0	1.0	307	0.015	1.6	1.2
NW7TR1-4	Circular	1	1.3	1.3	325	0.015	1.2	0.7
NW7TR1-4OL	Overflow	N/A	N/A	N/A	100	0.020	1.2	1.6
NW8AV1-2	Circular	1	1.0	1.0	312	0.015	1.8	0.6
NW8AV1-2OL	Overflow	N/A	N/A	N/A	100	0.020	1.8	1.6
NW8AV2-2	Circular	1	1.3	1.3	45	0.015	1.9	0.5
NW8AV2-2OL	Overflow	N/A	N/A	N/A	100	0.020	1.9	1.8
NW8ST-10OL2	Overflow	N/A	N/A	N/A	200	0.015	1.8	0.0
NW9A-10OL	Overflow	N/A	N/A	N/A	200	0.015	2.3	-3.0
NW9AV1-2	Circular	1	1.3	1.3	320	0.015	0.0	0.9

Table 7B-5. Progresso Model Hydraulic Link Data

Existing Conditions - Conduits								
Link Name	Link Type	No. of Barrels	Depth (ft)	Width (ft)	Length (ft)	Manning's Roughness	U/S Inv. (ft NGVD)	D/S Inv. (ft NGVD)
NW9AV1-4	Circular	1	1.0	1.0	410	0.015	2.1	0.0
NW9AV1-4OL	Overflow	N/A	N/A	N/A	100	0.020	2.1	0.0
NW9AV2-2	Horizontal Ellipse	1	1.0	1.0	322	0.015	2.2	0.0
NW9AV2-2OL	Overflow	N/A	N/A	N/A	100	0.020	2.2	0.0
NW9AV3-2	Circular	1	4.0	4.0	358	0.015	0.4	0.3
NW9AV3-4	Circular	1	1.3	1.3	370	0.015	2.3	0.4
NW9AV4-2	Circular	1	4.0	4.0	335	0.015	0.4	0.4
NW9AV4-4	Circular	1	1.0	1.0	807	0.015	2.2	0.4
NW9AV4-4OL	Overflow	N/A	N/A	N/A	100	0.020	2.2	2.3
NW9AV5-2	Circular	1	2.8	2.8	343	0.015	0.7	0.6
NW9AV5-2OL	Overflow	N/A	N/A	N/A	100	0.020	0.7	0.6
NW9AV5-4	Circular	1	1.3	1.3	287	0.015	1.6	0.7
NW9AV5-6	Circular	1	3.0	3.0	304	0.015	0.6	0.5
NW9AV5-6OL	Overflow	N/A	N/A	N/A	100	0.020	0.6	0.5
NW9AV5-8	Circular	1	3.5	3.5	360	0.015	0.5	0.4
NW9AV6-2	Circular	1	1.3	1.3	330	0.015	1.4	-0.5
NW9AV6-2OL1	Overflow	N/A	N/A	N/A	100	0.020	1.4	-0.5
NW9AV6-2OL2	Overflow	N/A	N/A	N/A	100	0.020	1.4	1.2
NW9AV6-2OL3	Overflow	N/A	N/A	N/A	100	0.020	1.4	1.8
NW9AV6-2OL4	Overflow	N/A	N/A	N/A	100	0.020	1.4	2.2
NW9AV6-4	Circular	1	2.8	2.8	643	0.015	-0.5	0.7
NW9AV6-4OL1	Overflow	N/A	N/A	N/A	100	0.020	-0.5	1.6
NW9AV6-4OL2	Overflow	N/A	N/A	N/A	100	0.020	-0.5	0.7
NW9AV6-6	Circular	1	1.5	1.5	295	0.015	-0.6	-0.5
NW9AV7-2	Circular	1	2.0	2.0	360	0.015	1.6	-0.6
NW9AV7-4	Circular	1	1.3	1.3	284	0.015	2.0	1.6
REGALS-2	Circular	1	1.3	1.3	455	0.015	1.6	0.5
REGALS-6	Circular	1	1.0	1.0	510	0.015	2.5	1.6
WSUNR-05	Circular	1	7.0	7.0	1950	0.015	-4.0	-4.0
WSUNR-05OL	Overflow	N/A	N/A	N/A	200	0.015	-4.0	-4.0

Table 7B-6. Progresso Model Hydraulic Node Data

Existing Conditions- Nodes			
Node Name	**Node Type**	**Invert (ft NGVD)**	**Initial Stage (ft NGVD)**
BRO-OF1	Junction	-0.5	2.5
ESUNR-10	Storage Junction	0.0	2.5
Exfil1-NBroward	Outfall	0.0	N/A
Exfil2_NE2AV1	Outfall	0.0	N/A
Exfil3_NANDAV1	Outfall	0.0	N/A
Exfil4_NW2AV3	Outfall	0.0	N/A
Exfil5_NANDAV1	Outfall	0.0	N/A
Exfil6_NANDAV2	Outfall	0.0	N/A
Exfil7_NW5AV3-2	Outfall	0.0	N/A
NANDAV1-2	Storage Junction	2.7	2.7
NANDAV1-4	Storage Junction	2.0	2.5
NANDAV1-6	Storage Junction	2.4	2.5
NANDAV2-2	Storage Junction	1.4	2.5
NANDAV2-4	Storage Junction	1.4	2.5
NANDAV2-6	Storage Junction	1.4	2.5
NE2AV1-2	Storage Junction	1.7	2.5
NE3AV1-2	Storage Junction	3.0	3.0
NE4A-15	Outfall	0.0	2.5
NE4AV1-2	Storage Junction	3.1	3.1
NESUN-2	Storage Junction	3.5	3.5
NEW-2	Junction	1.0	2.5
NFNR020	Outfall	-8.7	2.5
NFNR020OL	Outfall	-8.7	2.5
NW10TR1-2	Storage Junction	1.9	2.5
NW10TR2-2	Storage Junction	1.8	2.5
NW10TR3-2	Storage Junction	2.5	2.5
NW10TR3-4	Storage Junction	2.3	2.5
NW15A-15	Outfall	-3.0	2.5
NW2AV1-2	Storage Junction	2.0	2.5
NW2AV1-4	Storage Junction	1.4	2.5
NW2AV2-2	Storage Junction	0.9	2.5
NW2AV2-4	Storage Junction	0.6	2.5
NW2AV3-2	Storage Junction	0.1	2.5
NW2AV3-4	Storage Junction	1.1	2.5
NW2AV4-3	Storage Junction	0.5	2.5
NW2AV4-4	Storage Junction	0.5	2.5
NW2AV5-2	Storage Junction	0.5	2.5
NW2AV5-6	Storage Junction	0.9	2.5
NW4AV1-2	Storage Junction	1.5	2.5
NW4AV1-6	Storage Junction	2.2	2.5
NW4AV2-2	Storage Junction	0.8	2.5
NW4AV2-4	Storage Junction	0.5	2.5
NW4AV3-2	Storage Junction	0.0	2.5
NW4AV3-4	Storage Junction	0.0	2.5
NW4AV3-6	Storage Junction	0.0	2.5
NW4AV4-2	Storage Junction	0.2	2.5
NW4AV4-4	Junction	0.3	2.5
NW4AV4-6	Storage Junction	1.4	2.5
NW4AV4-8	Storage Junction	1.7	2.5

Table 7B-6. Progresso Model Hydraulic Node Data

Existing Conditions- Nodes			
Node Name	**Node Type**	**Invert (ft NGVD)**	**Initial Stage (ft NGVD)**
NW4AV5-2	Storage Junction	0.1	2.5
NW4AV5-4	Storage Junction	0.2	2.5
NW4AV6-2	Storage Junction	0.6	2.5
NW4AV6-6	Storage Junction	0.3	2.5
NW4AV6-8	Storage Junction	1.0	2.5
NW5A-05	Outfall	-4.0	2.5
NW5A-05OL	Outfall	-4.0	2.5
NW5AV1-2	Storage Junction	0.4	2.5
NW5AV1-6	Storage Junction	0.3	2.5
NW5AV1-8	Storage Junction	2.7	2.7
NW5AV1-9	Junction	0.2	2.5
NW5AV2-2	Storage Junction	2.3	2.5
NW5AV2-6	Storage Junction	1.3	2.5
NW5AV3-2	Storage Junction	0.2	2.5
NW5AV4-2	Storage Junction	2.8	2.8
NW5AV4-4	Storage Junction	1.0	2.5
NW5AV4-6	Storage Junction	1.2	2.5
NW6AV1-2	Storage Junction	-0.3	2.5
NW7AV1-2	Storage Junction	-0.1	2.5
NW7AV1-4	Storage Junction	1.9	2.5
NW7AV1-6	Storage Junction	0.8	2.5
NW7AV1-8	Junction	0.9	2.5
NW7AV2-2	Storage Junction	0.0	2.5
NW7AV2-4	Storage Junction	1.5	2.5
NW7AV3-2	Storage Junction	0.1	2.5
NW7AV3-4	Storage Junction	0.3	2.5
NW7AV4-2	Storage Junction	0.2	2.5
NW7AV4-4	Storage Junction	1.8	2.5
NW7AV5-2	Junction	0.8	2.5
NW7AV5-4	Storage Junction	0.4	2.5
NW7AV6-2	Storage Junction	2.2	2.5
NW7AV7-2	Storage Junction	0.6	2.5
NW7AV7-4	Storage Junction	1.0	2.5
NW7AV7-6	Junction	2.3	2.5
NW7TR1-2	Storage Junction	1.6	2.5
NW7TR1-4	Storage Junction	1.2	2.5
NW8AV1-2	Storage Junction	1.8	2.5
NW8AV2-2	Storage Junction	1.9	2.5
NW8ST-10	Outfall	0.0	2.5
NW9AV1-2	Storage Junction	0.0	2.5
NW9AV1-4	Storage Junction	2.1	2.5
NW9AV2-2	Storage Junction	2.2	2.5
NW9AV3-2	Storage Junction	0.4	2.5
NW9AV3-4	Storage Junction	2.3	2.5
NW9AV4-2	Storage Junction	0.4	2.5
NW9AV4-4	Storage Junction	2.2	2.5
NW9AV5-2	Storage Junction	0.7	2.5
NW9AV5-4	Storage Junction	1.6	2.5
NW9AV5-6	Junction	0.6	2.5

Table 7B-6. Progresso Model Hydraulic Node Data

Existing Conditions- Nodes			
Node Name	**Node Type**	**Invert (ft NGVD)**	**Initial Stage (ft NGVD)**
NW9AV5-8	Storage Junction	0.5	2.5
NW9AV6-2	Storage Junction	1.4	2.5
NW9AV6-4	Storage Junction	-0.5	2.5
NW9AV6-6	Junction	-0.6	2.5
NW9AV7-2	Storage Junction	1.6	2.5
NW9AV7-4	Storage Junction	2.0	2.5
REGALS-2	Storage Junction	1.6	2.5
REGALS-4	Storage Junction	2.5	2.5
WSUNR-05	Storage Junction	-4.0	2.5

Table 7B-7. Victoria Park Model Hydraulic Link Data

Existing Conditions - Conduits								
Link Name	Link Type	No. of Barrels	Depth (ft)	Width (ft)	Length (ft)	Manning's Roughness	U/S Inv. (ft NGVD)	D/S Inv. (ft NGVD)
BNRNRSPUR005	Bridge	1	9.5	N/A	200	0.027	-5.0	-5.0
BRWRD-OL	Overflow	1	N/A	N/A	100	0.010	5.2	5.1
BRWRD-OL1	Overflow	1	N/A	N/A	100	0.010	11.4	11.3
BRWRD-OL2	Overflow	1	N/A	N/A	100	0.010	7.9	7.8
BRWRD-OL4	Overflow	1	N/A	N/A	100	0.010	5.2	5.0
BRWRD-S1	Circular	1	1	N/A	675	0.013	5.5	3.5
BRWRD-S2	Circular	1	1.5	N/A	297	0.013	3.5	2.5
BRWRD-S3	Circular	1	2	N/A	340	0.013	2.5	1.5
C13IC005	Channel	1	N/A	N/A	500	0.010	-10.0	-10.1
C13IC010	Channel	1	N/A	N/A	5500	0.010	-10.0	-10.0
C13ICSPUR002	Channel	1	N/A	N/A	2200	0.010	-10.0	-10.0
C13ICSPUR005	Channel	1	N/A	N/A	2350	0.010	-9.9	-10.0
ESUNR-01S	Circular	1	5	N/A	1850	0.013	-2.8	-6.0
ESUNR-02OL	Overflow	1	N/A	N/A	100	0.010	8.2	8.3
ESUNR-02S	Circular	1	5	N/A	570	0.013	-2.5	-2.8
ESUNR-04OL	Overflow	1	N/A	N/A	100	0.010	7.2	7.3
ESUNR-05OL	Overflow	1	N/A	N/A	100	0.010	7.0	7.0
ESUNR-05S	Circular	1	5	N/A	930	0.013	-2.0	-2.5
ESUNR-06S	Circular	1	4.5	N/A	1580	0.013	-1.3	-2.0
ESUNR-07OL	Overflow	1	N/A	N/A	100	0.010	6.7	6.6
ESUNR-07S	Circular	1	4	N/A	2750	0.013	-0.4	-1.3
exf-1	Pump	N/A	N/A	N/A	N/A	N/A	N/A	N/A
exf-2	Pump	N/A	N/A	N/A	N/A	N/A	N/A	N/A
exf-3	Pump	N/A	N/A	N/A	N/A	N/A	N/A	N/A
exf-4	Pump	N/A	N/A	N/A	N/A	N/A	N/A	N/A
exf-5	Pump	N/A	N/A	N/A	N/A	N/A	N/A	N/A
exf-6	Pump	N/A	N/A	N/A	N/A	N/A	N/A	N/A
exf-7	Pump	N/A	N/A	N/A	N/A	N/A	N/A	N/A
exf-8	Pump	N/A	N/A	N/A	N/A	N/A	N/A	N/A
HYPKE-OL	Overflow	1	N/A	N/A	100	0.010	6.2	6.1
HYPKE-OL2	Overflow	1	N/A	N/A	100	0.010	6.8	6.7
HYPKNE-OL	Overflow	1	N/A	N/A	100	0.010	6.5	6.4
HYPKNW-OL1	Overflow	1	N/A	N/A	100	0.010	4.5	6.6
HYPKNW-OL2	Overflow	1	N/A	N/A	200	0.010	6.5	6.4
HYPKNW-OL3	Overflow	1	N/A	N/A	400	0.010	6.0	6.1
HYPKSE-OL2	Overflow	1	N/A	N/A	200	0.010	7.1	7.0
HYPKSW2-OL	Overflow	1	N/A	N/A	100	0.010	5.5	5.4
HYPKW-OL	Overflow	1	N/A	N/A	100	0.010	6.2	6.1
NE11AV-OL	Overflow	1	N/A	N/A	100	0.010	7.5	7.4
NE11AV-OL2	Overflow	1	N/A	N/A	100	0.010	7.5	7.4
NE12AV-OL	Overflow	1	N/A	N/A	200	0.010	7.1	7.1
NE14AV-OL	Overflow	1	N/A	N/A	100	0.010	7.8	7.7
NE14AV-OL2	Overflow	1	N/A	N/A	100	0.010	7.9	7.8

Table 7B-7. Victoria Park Model Hydraulic Link Data

Existing Conditions - Conduits								
Link Name	**Link Type**	**No. of Barrels**	**Depth (ft)**	**Width (ft)**	**Length (ft)**	**Manning's Roughness**	**U/S Inv. (ft NGVD)**	**D/S Inv. (ft NGVD)**
NE15AV-OL	Overflow	1	N/A	N/A	100	0.010	6.9	6.8
NE15AV-OL2	Overflow	1	N/A	N/A	100	0.010	8.3	8.2
NE15AV-S	Circular	1	1.5	N/A	330	0.013	1.0	-2.0
NE16AV-OL	Overflow	1	N/A	N/A	100	0.010	8.2	8.1
NE16AV-OL2	Overflow	1	N/A	N/A	100	0.010	8.2	8.1
NE16AV-S	Circular	1	2	N/A	500	0.013	2.0	0.1
NE16AV-S2	Circular	1	3	N/A	140	0.013	0.1	0.0
NE16TR-OL	Overflow	1	N/A	N/A	100	0.010	9.7	8.3
NE16TR-OL2	Overflow	1	N/A	N/A	100	0.010	10.5	10.4
NE17AV-OL	Overflow	1	N/A	N/A	100	0.010	8.6	8.5
NE17AV-OL2	Overflow	1	N/A	N/A	100	0.010	8.0	7.9
NE17AV-S	Circular	1	1	N/A	1500	0.013	3.0	2.0
NE17TR-OL	Overflow	1	N/A	N/A	100	0.010	9.0	8.9
NE17WY-OL	Overflow	1	N/A	N/A	100	0.010	9.2	9.1
NE17WY-OL3	Overflow	1	N/A	N/A	100	0.010	8.3	8.1
NE17WY-S	Circular	1	1.25	N/A	200	0.013	3.0	-2.8
NE3CT-OL	Overflow	1	N/A	N/A	730	0.010	5.0	4.9
NE3CT-OL2	Overflow	1	N/A	N/A	100	0.010	7.3	7.2
NE3CT-S1	Circular	1	3.5	N/A	720	0.013	0.0	-1.0
NE3CT-S2	Circular	1	4	N/A	340	0.013	-1.0	-4.9
NE3ST-OL	Overflow	1	N/A	N/A	200	0.010	5.7	5.6
NE4PL-OL	Overflow	1	N/A	N/A	100	0.010	7.9	7.8
NE4ST-OL	Overflow	1	N/A	N/A	100	0.010	7.5	7.4
NE4ST-OL2	Overflow	1	N/A	N/A	100	0.010	5.1	5.0
NE4ST-OL3	Overflow	1	N/A	N/A	100	0.010	7.1	7.1
NE4ST-S	Circular	1	2.75	N/A	680	0.013	0.4	0.1
NE5ST-OL	Overflow	1	N/A	N/A	100	0.010	8.5	8.4
NE5ST-OL2	Overflow	1	N/A	N/A	100	0.010	5.1	5.0
NE5ST-S	Circular	1	0.88	N/A	340	0.024	0.0	-1.5
NE6ST-OL	Overflow	1	N/A	N/A	100	0.010	8.5	8.4
NE6ST-OL2	Overflow	1	N/A	N/A	200	0.010	7.2	7.1
NE6ST-S	Circular	1	1	N/A	950	0.024	2.0	0.9
NE7AV-OL1	Overflow	1	N/A	N/A	100	0.010	5.1	5.0
NE7AV-OL2	Overflow	1	N/A	N/A	100	0.010	5.6	5.5
NE7AV-OL3	Overflow	1	N/A	N/A	100	0.010	5.2	5.1
NE7AV-S	Circular	1	1.5	N/A	650	0.024	0.0	-0.3
NE7AV-S2	Circular	1	2	N/A	660	0.024	-0.3	-0.6
NE7AV-S3	Circular	1	2.5	N/A	990	0.024	-0.6	-1.0
NE7ST-OL	Overflow	1	N/A	N/A	100	0.010	7.0	6.9
NE7ST-OL2	Overflow	1	N/A	N/A	100	0.010	6.8	6.7
NE8AV-S	Ellipse	1	1	1.5	1130	0.024	0.9	0.0
NE8ST-OL	Overflow	1	N/A	N/A	100	0.010	9.0	8.9
NE8ST-OL2	Overflow	1	N/A	N/A	100	0.010	8.2	8.1

Table 7B-7. Victoria Park Model Hydraulic Link Data

Existing Conditions - Conduits								
Link Name	Link Type	No. of Barrels	Depth (ft)	Width (ft)	Length (ft)	Manning's Roughness	U/S Inv. (ft NGVD)	D/S Inv. (ft NGVD)
NE9ST-OL	Overflow	1	N/A	N/A	100	0.010	7.4	7.3
NFED-55S	Circular	1	3.5	N/A	210	0.013	-0.2	-0.4
NFED-60OL	Overflow	1	N/A	N/A	100	0.010	6.3	6.3
NFED-60OL2	Overflow	1	N/A	N/A	100	0.010	7.3	7.4
NFED-60S	Circular	1	3	N/A	420	0.013	0.1	-0.2
NFED-65OL	Overflow	1	N/A	N/A	100	0.010	6.1	6.0
NFED-65S	Circular	1	3	N/A	615	0.013	0.0	-1.0
NFED-67OL	Overflow	1	N/A	N/A	100	0.010	6.2	6.1
NFED-67S	Circular	1	3.5	N/A	620	0.013	-1.0	-1.5
NFED-68S	Circular	1	3.5	N/A	270	0.013	-1.5	-2.0
NFED-70OL	Overflow	1	N/A	N/A	100	0.010	5.7	5.6
NFED-70S	Circular	1	4	N/A	555	0.013	-2.0	-2.2
NFED-75S	Circular	1	4.5	N/A	570	0.013	-2.2	-2.4
NFED-80OL	Overflow	1	N/A	N/A	100	0.010	5.4	5.3
NFED-80OL2	Overflow	1	N/A	N/A	100	0.010	5.7	5.6
NFED-80S	Circular	1	4.5	N/A	705	0.013	-2.4	-2.7
NFEDBR-S	Circular	1	4.5	N/A	450	0.013	-2.7	-2.4
NFNRSPUR007	Channel	1	N/A	N/A	175	0.010	-5.0	-5.0
NFNRSPUR009	Channel	1	N/A	N/A	1250	0.010	-5.1	-5.0
NRNRSPUR010	Channel	1	N/A	N/A	530	0.010	-5.1	-5.1
SE11AV-OL2	Overflow	1	N/A	N/A	100	0.010	7.3	7.2
SE12AV-OL	Overflow	1	N/A	N/A	700	0.010	7.1	7.0
SE12AV-S	Circular	1	2.5	N/A	1050	0.013	1.5	0.0
SE8AV-OL	Overflow	1	N/A	N/A	100	0.010	5.0	4.9
SE8AV-S	Circular	1	3	N/A	525	0.024	-1.0	-2.1

Table 7B-8. Victoria Park Model Hydraulic Node Data

Existing Conditions- Nodes			
Node Name	**Node Type**	**Invert (ft NGVD)**	**Initial Stage (ft NGVD)**
BRWRD-12AV	Junction	1.5	2.5
BRWRD-13AV	Storage Junction	2.5	2.5
BRWRD-14AV	Junction	3.5	3.5
BRWRD-16AV	Storage Junction	5.5	5.5
BRWRD-8AV	Storage Junction	-1.0	2.5
C13IC005	Storage Junction	-10.0	2.5
C13IC010	Junction	-13.5	2.6
C13ICSPUR002	Storage Junction	-10.0	2.6
C13ICSPUR005	Junction	-9.9	2.6
ESUNR-01	Junction	-2.8	2.5
ESUNR-02	Storage Junction	-2.5	2.5
ESUNR-05	Storage Junction	-2.0	2.5
ESUNR-06	Storage Junction	-1.3	3.5
ESUNR-07	Storage Junction	-0.4	2.5
exf-1	Outfall	0.0	N/A
exf-2	Outfall	0.0	N/A
exf-3	Outfall	0.0	N/A
exf-4	Outfall	0.0	N/A
exf-5	Outfall	0.0	N/A
exf-6	Outfall	0.0	N/A
exf-7	Outfall	0.0	N/A
exf-8	Outfall	0.0	N/A
HYPK-E	Storage Junction	6.0	6.0
HYPK-NE	Storage Junction	5.6	5.6
HYPK-NW	Storage Junction	4.0	4.0
HYPK-SE	Storage Junction	2.0	2.5
HYPK-SW2	Storage Junction	0.9	2.5
HYPK-W	Storage Junction	0.0	2.5
NE16AV-9ST	Storage Junction	1.0	2.5
NE16TR-2CT	Storage Junction	9.7	9.7
NE17AV-5ST	Storage Junction	0.0	2.5
NE17WY-10ST	Storage Junction	3.0	5.5
NE17WY-7ST	Storage Junction	0.0	2.5
NE17WY-8ST	Storage Junction	0.0	2.5
NE2ST-12AV	Storage Junction	7.5	7.5
NE2ST-7AV	Storage Junction	-0.6	2.5
NE3CT-16AV	Junction	0.0	2.5
NE3CT-17AV	Storage Junction	-1.0	2.5
NE4PL-14AV	Storage Junction	7.8	7.8
NE4PL-16AV	Junction	2.0	2.5
NE4ST-14AV	Storage Junction	0.4	2.5
NE4ST-16AV	Junction	0.1	2.5
NE4ST-7AV	Storage Junction	-0.3	2.5
NE5ST-7AV	Storage Junction	0.0	2.5
NE8ST-16TR	Storage Junction	0.0	2.5
NFED-55	Junction	-0.2	2.5
NFED-60	Storage Junction	0.0	2.5
NFED-65	Storage Junction	0.0	2.5
NFED-67	Storage Junction	-1.0	2.5

Table 7B-8. Victoria Park Model Hydraulic Node Data

Existing Conditions- Nodes			
Node Name	**Node Type**	**Invert (ft NGVD)**	**Initial Stage (ft NGVD)**
NFED-70	Storage Junction	-1.5	2.5
NFED-72	Junction	-2.0	2.5
NFED-75	Junction	-2.2	2.5
NFED-80	Storage Junction	-2.4	2.5
NFED-BR	Junction	-2.7	2.6
NFNRSPUR004	Outfall	-5.0	2.5
NFNRSPUR005	Storage Junction	-5.0	2.5
NFNRSPUR007	Storage Junction	-5.0	2.5
NFNRSPUR009	Storage Junction	-5.1	2.4
NFNRSPUR010	Junction	-5.1	2.4
OUT_IC015	Outfall	-10.1	2.5

Appendix 7C
Surface Water Management Model Results

The following tables present the base model and alternative results for simulations of the City of Fort Lauderdale EPA SWMM for the Edgewood East Project.

Table 7C-1. Edgewood East Base Model Results

Model Node	Description	5-Yr LOS Goal Met	Reference Elevation (ft NGVD)	Design Storm Peak Stages (ft NGVD)				
				2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
EDGWDC-01	North end of swale @ SW 26th St/ Rd elv.	Yes	6.2	5.7	6.4	6.6	7.0	7.2
EDGWDC-02	SW 26th St & SW 14th Ave/ Rd CL elv.	No	5.9	6.3	6.4	6.6	7.0	7.2
EDGWDC-03	South end of swale @ SW 28th St & SW 12th Ave/ Rd elv.	No	4.9	5.7	6.4	6.6	7.0	7.2
EDGWDC-04	SW 26th St, west of SW 9th Ave/ LiDAR	No	5.0	6.3	6.5	6.6	7.0	7.2
EDGWDC-05	SW 29th St & SW 14th Ave/ Rd CL elv.	No	5.4	6.0	6.4	6.6	7.0	7.2
EDGWDC-06	SW 29th St, east of SW 12th Ave/ LiDAR	No	4.2	5.7	6.4	6.6	7.0	7.2
EDGWDC-07	SW 31st St & SW 14th Ave/ Rd CL elv.	No	6.2	6.3	6.5	6.6	7.0	7.2
EDGWDC-08	SW 31st St, west of SW 9th Ave/ LiDAR	No	5.0	5.7	6.4	6.6	7.0	7.2
EDGWDC-09	SW 32nd St, west of SW 12th Ave/ LiDAR	No	6.0	6.5	6.6	6.6	7.0	7.2
EDGWDC-10	SW 32nd St, west of SW 9th Ave/ LiDAR	No	5.1	5.8	6.4	6.6	7.0	7.2
EDGWDC-11	SW 12th Ave, south of SW 32nd Ct/ LiDAR	No	5.7	6.2	6.4	6.6	7.0	7.2
EDGWDC-12	Alley Behind Marlee Ind. (SW 11th Ct)/ LiDAR	No	5.1	6.3	6.5	6.6	7.0	7.2
EDGWDC-13	SW 32nd Ct, west of SW 9th Ave/ LiDAR	Yes	7.2	6.3	6.5	6.6	7.0	7.2
EDGWDC-14	SW 12th Ave, north of I 595/ LiDAR	No	5.8	6.3	6.5	6.6	7.0	7.2
EDGWDE-02	SW 25th St & SW 3rd Ave/ LiDAR	No	7.3	7.8	8.0	8.0	8.4	8.5
EDGWDE-03	SW 25th St & SW 2nd Ave/ LiDAR	Yes	8.4	8.4	8.5	8.5	8.6	8.7
EDGWDE-04	SW 26th Ct & SW 8th Ave/ LiDAR	No	6.1	6.5	6.5	6.6	7.0	7.2
EDGWDE-05	Broward County Schoolboard Property Parking Lot, SW 28th St, west of SW 8th Ave/ LiDAR	No	6.4	7.0	7.1	7.1	7.1	7.2
EDGWDE-06	SW 26th St & SW 4th Ave/ LiDAR	No	6.7	7.6	7.9	8.0	8.4	8.5
EDGWDE-07	SW 27th St & SW 2nd Ave/ LiDAR	No	7.3	8.0	8.3	8.3	8.5	8.6
EDGWDE-08	SW 29th ST, west of SW 8th Ave/ LiDAR	No	5.3	5.8	6.4	6.6	7.0	7.2
EDGWDE-09	Rd/prkng behind Floyd Hull Stadium/ LiDAR	No	5.2	5.8	6.4	6.6	7.0	7.2
EDGWDE-10	Low in SW 4th Ave Southbound @ SW 28th St / LiDAR	Yes	6.5	6.4	6.5	6.6	7.0	7.2
EDGWDE-11	SW 29th St & SW 3rd Ave/ LiDAR	Yes	8.0	7.6	7.8	7.9	8.1	8.3
EDGWDE-12	SW 30th St & SW 2nd Ave/ LiDAR	No	6.5	7.5	7.8	7.9	8.1	8.3
EDGWDE-13	SW 1st Tr, south of SW 30th St/ LiDAR	No	7.3	7.7	7.8	7.9	8.1	8.3

Table 7C-1. Edgewood East Base Model Results

Model Node	Description	5-Yr LOS Goal Met	Reference Elevation (ft NGVD)	Design Storm Peak Stages (ft NGVD)				
				2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
EDGWDE-14	SW 8th Ave, south of SW 30th St/ LiDAR	No	5.2	5.8	6.4	6.6	7.0	7.2
EDGWDE-15	Low point of Snyder Park Road/ LiDAR	No	4.3	5.8	6.4	6.6	7.0	7.2
EDGWDE-16	Parking Lot near SW 4th Ave, east side of culvert/ LiDAR	No	5.9	7.0	7.8	7.9	8.1	8.2
EDGWDE-17	SW 32nd St & SW 2nd Ave/ LiDAR	Yes	8.0	7.5	7.8	7.9	8.1	8.3
EDGWDE-18	Low point of Snyder Park Trail/ Survey	No	5.8	3.4	6.4	6.6	7.0	7.2
EDGWDE-19	SW 33rd St & Snyder Park Rd/ Rd CL elv.	Yes	8.5	3.3	5.6	6.6	7.0	7.2
EDGWDE-20	SW 33rd Ct, south of SW 33rd St/ LiDAR	Yes	7.8	7.1	7.2	7.3	7.7	7.7
EDGWDE-21	Snyder Park parking lot/ Survey	No	7.1	7.6	7.8	7.9	8.1	8.3
EDGWDE-22	SW 33rd St & SW 3rd Ave/ LiDAR	No	7.1	7.6	7.8	7.9	8.1	8.3
EDGWDE-23	SW 32nd St & SW 3rd Ave/ LiDAR	No	7.1	7.3	7.8	7.9	8.1	8.3
EDGWDWP	Walled Barret Property/ LiDAR	No	5.0	5.6	6.4	6.6	7.0	7.2
SR84-14	SR 84 @ SW 2nd Ave/ LiDAR	Yes	8.2	7.9	8.1	8.2	8.4	8.6
SR84-15	SR 84 @ SW 3rd Ave/ LiDAR	Yes	8.1	7.8	8.0	8.0	8.4	8.6
SR84-16	SR 84 @ SW 4th Ave/ LiDAR	Yes	8.1	7.4	7.8	7.9	8.4	8.6
SR84-17	SR 84, west of SW 6th Ave/ LiDAR	Yes	8.5	7.0	7.4	7.4	7.5	7.6
SR84-18	SR 84, west of SW 9th Ave/ LiDAR	Yes	7.8	6.3	6.9	7.0	7.0	7.2
SR84-20	SR 84 @ SW 12th Ave/ LiDAR	Yes	8.2	4.8	5.5	5.8	6.4	6.9
SR84-22	SR 84 @ SW 14th Ave/ LiDAR	Yes	8.0	4.8	5.5	5.8	6.4	6.9
SW20ST-05	BC	N/A	N/A	4.2	5.1	5.4	5.9	6.2
SW20ST-05OL	BC	N/A	N/A	4.2	5.1	5.4	5.9	6.2

Table 7C-2a. Edgewood East Alternative No. 1, 10% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Stages (ft NGVD)			Alt. 1 [10%] Stages (ft NGVD)			Delta (Alt. 1 [10%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDC-01	Yes	6.2	5.7	6.4	6.6	5.8	6.4	6.6	0.1	0.0	0.0
EDGWDC-02	No	5.9	6.3	6.4	6.6	6.3	6.4	6.6	0.0	0.0	0.0
EDGWDC-03	No	4.9	5.7	6.4	6.6	5.9	6.4	6.6	0.1	0.0	0.0
EDGWDC-04	No	5.0	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
EDGWDC-05	No	5.4	6.0	6.4	6.6	6.0	6.4	6.6	0.0	0.0	0.0
EDGWDC-06	No	4.2	5.7	6.4	6.6	5.9	6.4	6.6	0.1	0.0	0.0
EDGWDC-07	No	6.2	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
EDGWDC-08	No	5.0	5.7	6.4	6.6	5.9	6.4	6.6	0.1	0.0	0.0
EDGWDC-09	No	6.0	6.5	6.6	6.6	6.5	6.6	6.6	0.0	0.0	0.0
EDGWDC-10	No	5.1	5.8	6.4	6.6	5.9	6.4	6.6	0.1	0.0	0.0
EDGWDC-11	No	5.7	6.2	6.4	6.6	6.2	6.4	6.6	0.0	0.0	0.0
EDGWDC-12	No	5.1	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
EDGWDC-13	Yes	7.2	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
EDGWDC-14	No	5.8	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
EDGWDE-02	No	7.3	7.8	8.0	8.0	7.9	8.0	8.1	0.0	0.0	0.0
EDGWDE-03	Yes	8.4	8.4	8.5	8.5	8.4	8.5	8.5	0.0	0.0	0.0
EDGWDE-04	No	6.1	6.5	6.5	6.6	6.5	6.5	6.6	0.0	0.0	0.0
EDGWDE-05	No	6.4	7.0	7.1	7.1	7.0	7.1	7.1	0.0	0.0	0.0
EDGWDE-06	No	6.7	7.6	7.9	8.0	7.6	8.0	8.1	0.0	0.0	0.0
EDGWDE-07	No	7.3	8.0	8.3	8.3	8.0	8.3	8.3	0.0	0.0	0.0
EDGWDE-08	No	5.3	5.8	6.4	6.6	5.9	6.4	6.6	0.0	0.0	0.0
EDGWDE-09	No	5.2	5.8	6.4	6.6	5.9	6.4	6.6	0.0	0.0	0.0
EDGWDE-10	Yes	6.5	6.4	6.5	6.6	6.4	6.5	6.6	0.0	0.0	0.0
EDGWDE-11	Yes	8.0	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-12	No	6.5	7.5	7.8	7.9	7.5	7.8	7.9	0.0	0.0	0.0
EDGWDE-13	No	7.3	7.7	7.8	7.9	7.7	7.8	7.9	0.0	0.0	0.0
EDGWDE-14	No	5.2	5.8	6.4	6.6	5.9	6.4	6.6	0.0	0.0	0.0
EDGWDE-15	No	4.3	5.8	6.4	6.6	5.9	6.4	6.6	0.0	0.0	0.0
EDGWDE-16	No	5.9	7.0	7.8	7.9	7.4	7.8	7.9	0.3	0.0	0.0

Table 7C-2a. Edgewood East Alternative No. 1, 10% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Stages (ft NGVD)			Alt. 1 [10%] Stages (ft NGVD)			Delta (Alt. 1 [10%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDE-17	Yes	8.0	7.5	7.8	7.9	7.5	7.8	7.9	0.0	0.0	0.0
EDGWDE-18	No	5.8	3.4	6.4	6.6	3.6	6.4	6.6	0.2	0.0	0.0
EDGWDE-19	Yes	8.5	3.3	5.6	6.6	3.3	6.2	6.6	0.0	0.7	0.0
EDGWDE-20	Yes	7.8	7.1	7.2	7.3	7.1	7.2	7.3	0.0	0.0	0.0
EDGWDE-21	No	7.1	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-22	No	7.1	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-23	No	7.1	7.3	7.8	7.9	7.4	7.8	7.9	0.1	0.0	0.0
EDGWDWP	No	5.0	5.6	6.4	6.6	5.6	6.4	6.6	0.0	0.0	0.0
SR84-14	Yes	8.2	7.9	8.1	8.2	8.0	8.2	8.2	0.1	0.1	0.1
SR84-15	Yes	8.1	7.8	8.0	8.0	7.9	8.0	8.1	0.1	0.0	0.0
SR84-16	Yes	8.1	7.4	7.8	7.9	7.6	7.9	8.0	0.2	0.1	0.1
SR84-17	Yes	8.5	7.0	7.4	7.4	7.2	7.4	7.5	0.2	0.1	0.0
SR84-18	Yes	7.8	6.3	6.9	7.0	6.5	7.0	7.0	0.3	0.1	0.0
SR84-20	Yes	8.2	4.8	5.5	5.8	4.9	5.6	5.8	0.1	0.0	0.0
SR84-22	Yes	8.0	4.8	5.5	5.8	4.9	5.6	5.8	0.1	0.0	0.0
SW20ST-05	N/A	N/A	4.2	5.1	5.4	4.2	5.1	5.4	0.0	0.0	0.0
SW20ST-05OL	N/A	N/A	4.2	5.1	5.4	4.2	5.1	5.4	0.0	0.0	0.0
								Maximum:	**0.3**	**0.7**	**0.1**
								Minimum:	**0.0**	**0.0**	**0.0**

Table 7C-2b. Edgewood East Alternative No. 1, 10% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Stages (ft NGVD)		Alt. 1 [10%] Stages (ft NGVD)		Delta (Alt. 1 [10%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDC-01	Yes	6.2	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDC-02	No	5.9	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDC-03	No	4.9	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDC-04	No	5.0	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDC-05	No	5.4	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDC-06	No	4.2	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDC-07	No	6.2	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDC-08	No	5.0	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDC-09	No	6.0	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDC-10	No	5.1	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDC-11	No	5.7	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDC-12	No	5.1	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDC-13	Yes	7.2	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDC-14	No	5.8	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDE-02	No	7.3	8.4	8.5	8.4	8.6	0.0	0.0
EDGWDE-03	Yes	8.4	8.6	8.7	8.6	8.7	0.0	0.0
EDGWDE-04	No	6.1	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDE-05	No	6.4	7.1	7.2	7.1	7.2	0.0	0.0
EDGWDE-06	No	6.7	8.4	8.5	8.4	8.6	0.0	0.0
EDGWDE-07	No	7.3	8.5	8.6	8.5	8.6	0.0	0.0
EDGWDE-08	No	5.3	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDE-09	No	5.2	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDE-10	Yes	6.5	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDE-11	Yes	8.0	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-12	No	6.5	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-13	No	7.3	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-14	No	5.2	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDE-15	No	4.3	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDE-16	No	5.9	8.1	8.2	8.1	8.2	0.0	0.0

Table 7C-2b. Edgewood East Alternative No. 1, 10% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Stages (ft NGVD)		Alt. 1 [10%] Stages (ft NGVD)		Delta (Alt. 1 [10%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDE-17	Yes	8.0	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-18	No	5.8	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDE-19	Yes	8.5	7.0	7.2	7.0	7.2	0.0	0.0
EDGWDE-20	Yes	7.8	7.7	7.7	7.7	7.7	0.0	0.0
EDGWDE-21	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-22	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-23	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDWP	No	5.0	7.0	7.2	7.0	7.2	0.0	0.0
SR84-14	Yes	8.2	8.4	8.6	8.4	8.6	0.0	0.0
SR84-15	Yes	8.1	8.4	8.6	8.4	8.6	0.0	0.0
SR84-16	Yes	8.1	8.4	8.6	8.4	8.6	0.0	0.0
SR84-17	Yes	8.5	7.5	7.6	7.6	7.6	0.0	0.0
SR84-18	Yes	7.8	7.0	7.2	7.1	7.2	0.0	0.0
SR84-20	Yes	8.2	6.4	6.9	6.5	7.0	0.1	0.1
SR84-22	Yes	8.0	6.4	6.9	6.5	7.0	0.1	0.1
SW20ST-05	N/A	N/A	5.9	6.2	5.9	6.2	0.0	0.0
SW20ST-05OL	N/A	N/A	5.9	6.2	5.9	6.2	0.0	0.0
						Maximum:	**0.1**	**0.1**
						Minimum:	**0.0**	**0.0**

Table 7C-3a. Edgewood East Alternative No. 1, 20% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Stages (ft NGVD)			Alt. 1 [20%] Stages (ft NGVD)			Delta (Alt. 1 [20%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDC-01	Yes	6.2	5.7	6.4	6.6	5.9	6.4	6.6	0.2	0.1	0.1
EDGWDC-02	No	5.9	6.3	6.4	6.6	6.3	6.5	6.6	0.0	0.0	0.1
EDGWDC-03	No	4.9	5.7	6.4	6.6	5.9	6.5	6.6	0.2	0.1	0.1
EDGWDC-04	No	5.0	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.1
EDGWDC-05	No	5.4	6.0	6.4	6.6	6.0	6.5	6.6	0.0	0.1	0.1
EDGWDC-06	No	4.2	5.7	6.4	6.6	5.9	6.5	6.6	0.2	0.1	0.1
EDGWDC-07	No	6.2	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.1
EDGWDC-08	No	5.0	5.7	6.4	6.6	5.9	6.5	6.6	0.1	0.1	0.1
EDGWDC-09	No	6.0	6.5	6.6	6.6	6.5	6.6	6.6	0.0	0.0	0.0
EDGWDC-10	No	5.1	5.8	6.4	6.6	5.9	6.5	6.6	0.1	0.1	0.1
EDGWDC-11	No	5.7	6.2	6.4	6.6	6.2	6.5	6.6	0.0	0.0	0.1
EDGWDC-12	No	5.1	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
EDGWDC-13	Yes	7.2	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
EDGWDC-14	No	5.8	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.1
EDGWDE-02	No	7.3	7.8	8.0	8.0	7.9	8.0	8.1	0.1	0.0	0.1
EDGWDE-03	Yes	8.4	8.4	8.5	8.5	8.4	8.5	8.5	0.0	0.0	0.0
EDGWDE-04	No	6.1	6.5	6.5	6.6	6.5	6.6	6.6	0.0	0.0	0.1
EDGWDE-05	No	6.4	7.0	7.1	7.1	7.0	7.1	7.1	0.0	0.0	0.0
EDGWDE-06	No	6.7	7.6	7.9	8.0	7.6	8.0	8.1	0.1	0.1	0.1
EDGWDE-07	No	7.3	8.0	8.3	8.3	8.0	8.3	8.3	0.0	0.0	0.0
EDGWDE-08	No	5.3	5.8	6.4	6.6	5.9	6.5	6.6	0.1	0.1	0.1
EDGWDE-09	No	5.2	5.8	6.4	6.6	5.9	6.5	6.6	0.1	0.1	0.1
EDGWDE-10	Yes	6.5	6.4	6.5	6.6	6.4	6.5	6.6	0.0	0.0	0.1
EDGWDE-11	Yes	8.0	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-12	No	6.5	7.5	7.8	7.9	7.5	7.8	7.9	0.0	0.0	0.0
EDGWDE-13	No	7.3	7.7	7.8	7.9	7.7	7.8	7.9	0.0	0.0	0.0
EDGWDE-14	No	5.2	5.8	6.4	6.6	5.9	6.5	6.6	0.1	0.1	0.1
EDGWDE-15	No	4.3	5.8	6.4	6.6	5.9	6.5	6.6	0.1	0.1	0.1
EDGWDE-16	No	5.9	7.0	7.8	7.9	7.4	7.8	7.9	0.4	0.0	0.0

Table 7C-3a. Edgewood East Alternative No. 1, 20% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Stages (ft NGVD)			Alt. 1 [20%] Stages (ft NGVD)			Delta (Alt. 1 [20%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDE-17	Yes	8.0	7.5	7.8	7.9	7.5	7.8	7.9	0.0	0.0	0.0
EDGWDE-18	No	5.8	3.4	6.4	6.6	4.0	6.5	6.6	0.6	0.1	0.1
EDGWDE-19	Yes	8.5	3.3	5.6	6.6	3.3	6.4	6.6	0.0	0.9	0.1
EDGWDE-20	Yes	7.8	7.1	7.2	7.3	7.1	7.2	7.3	0.0	0.0	0.0
EDGWDE-21	No	7.1	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-22	No	7.1	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-23	No	7.1	7.3	7.8	7.9	7.4	7.8	7.9	0.1	0.0	0.0
EDGWDWP	No	5.0	5.6	6.4	6.6	5.6	6.5	6.6	0.0	0.1	0.1
SR84-14	Yes	8.2	7.9	8.1	8.2	8.1	8.3	8.3	0.2	0.2	0.2
SR84-15	Yes	8.1	7.8	8.0	8.0	7.9	8.0	8.1	0.1	0.0	0.1
SR84-16	Yes	8.1	7.4	7.8	7.9	7.8	8.0	8.1	0.4	0.1	0.1
SR84-17	Yes	8.5	7.0	7.4	7.4	7.3	7.5	7.5	0.3	0.1	0.1
SR84-18	Yes	7.8	6.3	6.9	7.0	6.8	7.0	7.0	0.6	0.1	0.1
SR84-20	Yes	8.2	4.8	5.5	5.8	4.9	5.6	5.8	0.1	0.1	0.1
SR84-22	Yes	8.0	4.8	5.5	5.8	4.9	5.6	5.8	0.1	0.1	0.1
SW20ST-05	N/A	N/A	4.2	5.1	5.4	4.2	5.1	5.4	0.0	0.0	0.0
SW20ST-05OL	N/A	N/A	4.2	5.1	5.4	4.2	5.1	5.4	0.0	0.0	0.0
								Maximum:	**0.6**	**0.9**	**0.2**
								Minimum:	**0.0**	**0.0**	**0.0**

Table 7C-3b. Edgewood East Alternative No. 1, 20% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Stages (ft NGVD)		Alt. 1 [20%] Stages (ft NGVD)		Delta (Alt. 1 [20%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDC-01	Yes	6.2	7.0	7.2	7.0	7.2	0.1	0.1
EDGWDC-02	No	5.9	7.0	7.2	7.0	7.2	0.1	0.1
EDGWDC-03	No	4.9	7.0	7.2	7.0	7.2	0.1	0.1
EDGWDC-04	No	5.0	7.0	7.2	7.0	7.2	0.1	0.1
EDGWDC-05	No	5.4	7.0	7.2	7.0	7.2	0.1	0.1
EDGWDC-06	No	4.2	7.0	7.2	7.0	7.2	0.1	0.1
EDGWDC-07	No	6.2	7.0	7.2	7.0	7.2	0.1	0.1
EDGWDC-08	No	5.0	7.0	7.2	7.0	7.2	0.1	0.1
EDGWDC-09	No	6.0	7.0	7.2	7.0	7.2	0.1	0.1
EDGWDC-10	No	5.1	7.0	7.2	7.0	7.2	0.1	0.1
EDGWDC-11	No	5.7	7.0	7.2	7.0	7.2	0.1	0.1
EDGWDC-12	No	5.1	7.0	7.2	7.0	7.2	0.1	0.1
EDGWDC-13	Yes	7.2	7.0	7.2	7.0	7.2	0.1	0.1
EDGWDC-14	No	5.8	7.0	7.2	7.0	7.2	0.1	0.1
EDGWDE-02	No	7.3	8.4	8.5	8.4	8.6	0.0	0.0
EDGWDE-03	Yes	8.4	8.6	8.7	8.6	8.7	0.0	0.0
EDGWDE-04	No	6.1	7.0	7.2	7.0	7.2	0.1	0.1
EDGWDE-05	No	6.4	7.1	7.2	7.1	7.3	0.0	0.1
EDGWDE-06	No	6.7	8.4	8.5	8.4	8.6	0.0	0.0
EDGWDE-07	No	7.3	8.5	8.6	8.5	8.6	0.0	0.0
EDGWDE-08	No	5.3	7.0	7.2	7.0	7.3	0.1	0.1
EDGWDE-09	No	5.2	7.0	7.2	7.0	7.3	0.1	0.1
EDGWDE-10	Yes	6.5	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDE-11	Yes	8.0	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-12	No	6.5	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-13	No	7.3	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-14	No	5.2	7.0	7.2	7.0	7.3	0.1	0.1
EDGWDE-15	No	4.3	7.0	7.2	7.0	7.3	0.1	0.1
EDGWDE-16	No	5.9	8.1	8.2	8.1	8.2	0.0	0.0

Table 7C-3b. Edgewood East Alternative No. 1, 20% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Stages (ft NGVD)		Alt. 1 [20%] Stages (ft NGVD)		Delta (Alt. 1 [20%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDE-17	Yes	8.0	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-18	No	5.8	7.0	7.2	7.0	7.3	0.1	0.1
EDGWDE-19	Yes	8.5	7.0	7.2	7.0	7.3	0.1	0.1
EDGWDE-20	Yes	7.8	7.7	7.7	7.7	7.7	0.0	0.0
EDGWDE-21	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-22	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-23	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDWP	No	5.0	7.0	7.2	7.0	7.2	0.1	0.1
SR84-14	Yes	8.2	8.4	8.6	8.5	8.6	0.0	0.0
SR84-15	Yes	8.1	8.4	8.6	8.5	8.6	0.0	0.0
SR84-16	Yes	8.1	8.4	8.6	8.4	8.6	0.0	0.0
SR84-17	Yes	8.5	7.5	7.6	7.6	7.6	0.0	0.0
SR84-18	Yes	7.8	7.0	7.2	7.1	7.3	0.0	0.1
SR84-20	Yes	8.2	6.4	6.9	6.6	7.1	0.2	0.3
SR84-22	Yes	8.0	6.4	6.9	6.6	7.1	0.2	0.3
SW20ST-05	N/A	N/A	5.9	6.2	5.9	6.2	0.0	0.0
SW20ST-05OL	N/A	N/A	5.9	6.2	5.9	6.2	0.0	0.0
						Maximum:	**0.2**	**0.3**
						Minimum:	**0.0**	**0.0**

Table 7C-4a. Edgewood East Alternative No. 1, 30% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Stages (ft NGVD)			Alt. 1 [30%] Stages (ft NGVD)			Delta (Alt. 1 [30%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDC-01	No	6.2	5.7	6.4	6.6	5.9	6.5	6.7	0.2	0.1	0.1
EDGWDC-02	No	5.9	6.3	6.4	6.6	6.3	6.5	6.7	0.0	0.1	0.1
EDGWDC-03	No	4.9	5.7	6.4	6.6	5.9	6.5	6.7	0.2	0.1	0.1
EDGWDC-04	No	5.0	6.3	6.5	6.6	6.3	6.5	6.7	0.0	0.0	0.1
EDGWDC-05	No	5.4	6.0	6.4	6.6	6.0	6.5	6.7	0.0	0.1	0.1
EDGWDC-06	No	4.2	5.7	6.4	6.6	5.9	6.5	6.7	0.2	0.1	0.1
EDGWDC-07	No	6.2	6.3	6.5	6.6	6.3	6.5	6.7	0.0	0.0	0.1
EDGWDC-08	No	5.0	5.7	6.4	6.6	5.9	6.5	6.7	0.2	0.1	0.1
EDGWDC-09	No	6.0	6.5	6.6	6.6	6.5	6.6	6.7	0.0	0.0	0.1
EDGWDC-10	No	5.1	5.8	6.4	6.6	5.9	6.5	6.7	0.1	0.1	0.1
EDGWDC-11	No	5.7	6.2	6.4	6.6	6.2	6.5	6.7	0.0	0.1	0.1
EDGWDC-12	No	5.1	6.3	6.5	6.6	6.3	6.5	6.7	0.0	0.0	0.1
EDGWDC-13	Yes	7.2	6.3	6.5	6.6	6.3	6.5	6.7	0.0	0.0	0.1
EDGWDC-14	No	5.8	6.3	6.5	6.6	6.3	6.5	6.7	0.0	0.0	0.1
EDGWDE-02	No	7.3	7.8	8.0	8.0	7.9	8.0	8.1	0.1	0.0	0.1
EDGWDE-03	Yes	8.4	8.4	8.5	8.5	8.4	8.5	8.5	0.0	0.0	0.0
EDGWDE-04	No	6.1	6.5	6.5	6.6	6.5	6.6	6.7	0.0	0.0	0.1
EDGWDE-05	No	6.4	7.0	7.1	7.1	7.0	7.1	7.1	0.0	0.0	0.0
EDGWDE-06	No	6.7	7.6	7.9	8.0	7.7	8.0	8.1	0.1	0.1	0.1
EDGWDE-07	No	7.3	8.0	8.3	8.3	8.0	8.3	8.3	0.0	0.0	0.0
EDGWDE-08	No	5.3	5.8	6.4	6.6	5.9	6.5	6.7	0.1	0.1	0.1
EDGWDE-09	No	5.2	5.8	6.4	6.6	5.9	6.5	6.7	0.1	0.1	0.1
EDGWDE-10	Yes	6.5	6.4	6.5	6.6	6.4	6.5	6.7	0.0	0.0	0.1
EDGWDE-11	Yes	8.0	7.6	7.8	7.9	7.7	7.8	7.9	0.0	0.0	0.0
EDGWDE-12	No	6.5	7.5	7.8	7.9	7.5	7.8	7.9	0.0	0.0	0.0
EDGWDE-13	No	7.3	7.7	7.8	7.9	7.7	7.8	7.9	0.0	0.0	0.0
EDGWDE-14	No	5.2	5.8	6.4	6.6	5.9	6.5	6.7	0.1	0.1	0.1
EDGWDE-15	No	4.3	5.8	6.4	6.6	5.9	6.5	6.7	0.1	0.1	0.1
EDGWDE-16	No	5.9	7.0	7.8	7.9	7.5	7.8	7.9	0.4	0.0	0.0

Table 7C-4a. Edgewood East Alternative No. 1, 30% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Stages (ft NGVD)			Alt. 1 [30%] Stages (ft NGVD)			Delta (Alt. 1 [30%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDE-17	Yes	8.0	7.5	7.8	7.9	7.5	7.8	7.9	0.0	0.0	0.0
EDGWDE-18	No	5.8	3.4	6.4	6.6	4.4	6.5	6.7	1.0	0.1	0.1
EDGWDE-19	Yes	8.5	3.3	5.6	6.6	3.3	6.5	6.7	0.0	0.9	0.1
EDGWDE-20	Yes	7.8	7.1	7.2	7.3	7.1	7.2	7.3	0.0	0.0	0.0
EDGWDE-21	No	7.1	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-22	No	7.1	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-23	No	7.1	7.3	7.8	7.9	7.5	7.8	7.9	0.2	0.0	0.0
EDGWDWP	No	5.0	5.6	6.4	6.6	5.6	6.5	6.7	0.0	0.1	0.1
SR84-14	Yes	8.2	7.9	8.1	8.2	8.2	8.3	8.4	0.3	0.2	0.2
SR84-15	Yes	8.1	7.8	8.0	8.0	7.9	8.0	8.1	0.1	0.1	0.1
SR84-16	Yes	8.1	7.4	7.8	7.9	7.8	8.0	8.1	0.4	0.2	0.2
SR84-17	Yes	8.5	7.0	7.4	7.4	7.4	7.5	7.5	0.3	0.1	0.1
SR84-18	Yes	7.8	6.3	6.9	7.0	6.9	7.0	7.0	0.7	0.1	0.1
SR84-20	Yes	8.2	4.8	5.5	5.8	5.0	5.7	5.8	0.2	0.1	0.1
SR84-22	Yes	8.0	4.8	5.5	5.8	5.0	5.7	5.8	0.2	0.1	0.1
SW20ST-05	N/A	N/A	4.2	5.1	5.4	4.2	5.1	5.4	0.0	0.0	0.0
SW20ST-05OL	N/A	N/A	4.2	5.1	5.4	4.2	5.1	5.4	0.0	0.0	0.0
								Maximum:	**1.0**	**0.9**	**0.2**
								Minimum:	**0.0**	**0.0**	**0.0**

Table 7C-4b. Edgewood East Alternative No. 1, 30% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Stages (ft NGVD)		Alt. 1 [30%] Stages (ft NGVD)		Delta (Alt. 1 [30%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDC-01	No	6.2	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDC-02	No	5.9	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDC-03	No	4.9	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDC-04	No	5.0	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDC-05	No	5.4	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDC-06	No	4.2	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDC-07	No	6.2	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDC-08	No	5.0	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDC-09	No	6.0	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDC-10	No	5.1	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDC-11	No	5.7	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDC-12	No	5.1	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDC-13	Yes	7.2	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDC-14	No	5.8	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDE-02	No	7.3	8.4	8.5	8.4	8.6	0.0	0.0
EDGWDE-03	Yes	8.4	8.6	8.7	8.6	8.7	0.0	0.0
EDGWDE-04	No	6.1	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDE-05	No	6.4	7.1	7.2	7.1	7.3	0.0	0.1
EDGWDE-06	No	6.7	8.4	8.5	8.4	8.6	0.0	0.0
EDGWDE-07	No	7.3	8.5	8.6	8.5	8.6	0.0	0.0
EDGWDE-08	No	5.3	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDE-09	No	5.2	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDE-10	Yes	6.5	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDE-11	Yes	8.0	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-12	No	6.5	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-13	No	7.3	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-14	No	5.2	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDE-15	No	4.3	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDE-16	No	5.9	8.1	8.2	8.1	8.2	0.0	0.0

Table 7C-4b. Edgewood East Alternative No. 1, 30% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Stages (ft NGVD)		Alt. 1 [30%] Stages (ft NGVD)		Delta (Alt. 1 [30%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDE-17	Yes	8.0	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-18	No	5.8	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDE-19	Yes	8.5	7.0	7.2	7.1	7.3	0.1	0.1
EDGWDE-20	Yes	7.8	7.7	7.7	7.7	7.7	0.0	0.0
EDGWDE-21	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-22	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-23	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDWP	No	5.0	7.0	7.2	7.1	7.3	0.1	0.1
SR84-14	Yes	8.2	8.4	8.6	8.5	8.6	0.0	0.0
SR84-15	Yes	8.1	8.4	8.6	8.5	8.6	0.0	0.0
SR84-16	Yes	8.1	8.4	8.6	8.5	8.6	0.1	0.0
SR84-17	Yes	8.5	7.5	7.6	7.6	7.7	0.0	0.0
SR84-18	Yes	7.8	7.0	7.2	7.1	7.3	0.0	0.1
SR84-20	Yes	8.2	6.4	6.9	6.7	7.2	0.3	0.4
SR84-22	Yes	8.0	6.4	6.9	6.7	7.2	0.3	0.4
SW20ST-05	N/A	N/A	5.9	6.2	5.9	6.2	0.0	0.0
SW20ST-05OL	N/A	N/A	5.9	6.2	5.9	6.2	0.0	0.0
						Maximum:	**0.3**	**0.4**
						Minimum:	**0.0**	**0.0**

Table 7C-5a. Edgewood East Alternative No. 2, Lower K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2 [K = 1 x 10^{-4}] (ft NGVD)			Delta (Alt. 2 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDC-01	Yes	6.2	5.7	6.4	6.6	5.4	6.3	6.5	-0.3	-0.1	-0.1
EDGWDC-02	No	5.9	6.3	6.4	6.6	6.3	6.4	6.5	0.0	0.0	-0.1
EDGWDC-03	No	4.9	5.7	6.4	6.6	5.4	6.3	6.5	-0.3	-0.1	-0.1
EDGWDC-04	No	5.0	6.3	6.5	6.6	6.0	6.3	6.5	-0.3	-0.2	-0.1
EDGWDC-05	No	5.4	6.0	6.4	6.6	6.0	6.3	6.5	0.0	-0.1	-0.1
EDGWDC-06	No	4.2	5.7	6.4	6.6	5.5	6.3	6.5	-0.3	-0.1	-0.1
EDGWDC-07	No	6.2	6.3	6.5	6.6	6.3	6.5	6.5	0.0	0.0	-0.1
EDGWDC-08	No	5.0	5.7	6.4	6.6	5.6	6.3	6.5	-0.2	-0.1	-0.1
EDGWDC-09	No	6.0	6.5	6.6	6.6	6.5	6.6	6.6	0.0	0.0	0.0
EDGWDC-10	No	5.1	5.8	6.4	6.6	5.8	6.3	6.5	0.0	-0.1	-0.1
EDGWDC-11	No	5.7	6.2	6.4	6.6	6.2	6.4	6.5	0.0	0.0	-0.1
EDGWDC-12	No	5.1	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
EDGWDC-13	Yes	7.2	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
EDGWDC-14	No	5.8	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
EDGWDE-02	No	7.3	7.8	8.0	8.0	7.8	8.0	8.0	0.0	0.0	0.0
EDGWDE-03	Yes	8.4	8.4	8.5	8.5	8.4	8.5	8.5	0.0	0.0	0.0
EDGWDE-04	No	6.1	6.5	6.5	6.6	6.4	6.5	6.6	0.0	0.0	0.0
EDGWDE-05	No	6.4	7.0	7.1	7.1	7.0	7.1	7.1	0.0	0.0	0.0
EDGWDE-06	No	6.7	7.6	7.9	8.0	7.6	7.9	8.0	0.0	0.0	0.0
EDGWDE-07	No	7.3	8.0	8.3	8.3	8.0	8.3	8.3	0.0	0.0	0.0
EDGWDE-08	No	5.3	5.8	6.4	6.6	5.8	6.3	6.5	0.0	-0.1	-0.1
EDGWDE-09	No	5.2	5.8	6.4	6.6	5.8	6.3	6.5	0.0	-0.1	-0.1
EDGWDE-10	Yes	6.5	6.4	6.5	6.6	6.4	6.5	6.5	0.0	0.0	0.0
EDGWDE-11	Yes	8.0	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-12	No	6.5	7.5	7.8	7.9	7.5	7.8	7.9	0.0	0.0	0.0
EDGWDE-13	No	7.3	7.7	7.8	7.9	7.7	7.8	7.9	0.0	0.0	0.0
EDGWDE-14	No	5.2	5.8	6.4	6.6	5.8	6.3	6.5	0.0	-0.1	-0.1
EDGWDE-15	No	4.3	5.8	6.4	6.6	5.8	6.3	6.5	0.0	-0.1	-0.1

Table 7C-5a. Edgewood East Alternative No. 2, Lower K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2 [K = 1 x 10^{-4}] (ft NGVD)			Delta (Alt. 2 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDE-16	No	5.9	7.0	7.8	7.9	7.0	7.8	7.9	0.0	0.0	0.0
EDGWDE-17	Yes	8.0	7.5	7.8	7.9	7.5	7.8	7.9	0.0	0.0	0.0
EDGWDE-18	No	5.8	3.4	6.4	6.6	3.3	6.3	6.5	-0.1	-0.1	-0.1
EDGWDE-19	Yes	8.5	3.3	5.6	6.6	3.3	4.4	6.5	0.0	-1.1	-0.1
EDGWDE-20	Yes	7.8	7.1	7.2	7.3	7.1	7.2	7.3	0.0	0.0	0.0
EDGWDE-21	No	7.1	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-22	No	7.1	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-23	No	7.1	7.3	7.8	7.9	7.3	7.8	7.9	0.0	0.0	0.0
EDGWDWP	No	5.0	5.6	6.4	6.6	5.6	6.3	6.5	0.0	-0.1	-0.1
SR84-14	Yes	8.2	7.9	8.1	8.2	7.9	8.1	8.2	0.0	0.0	0.0
SR84-15	Yes	8.1	7.8	8.0	8.0	7.8	8.0	8.0	0.0	0.0	0.0
SR84-16	Yes	8.1	7.4	7.8	7.9	7.3	7.8	7.9	-0.1	0.0	0.0
SR84-17	Yes	8.5	7.0	7.4	7.4	6.9	7.3	7.4	-0.1	0.0	0.0
SR84-18	Yes	7.8	6.3	6.9	7.0	6.1	6.8	6.9	-0.2	-0.1	-0.1
SR84-20	Yes	8.2	4.8	5.5	5.8	4.8	5.5	5.7	0.0	0.0	0.0
SR84-22	Yes	8.0	4.8	5.5	5.8	4.8	5.5	5.7	0.0	0.0	0.0
SW20ST-05	N/A	N/A	4.2	5.1	5.4	4.2	5.1	5.4	0.0	0.0	0.0
SW20ST-05OL	N/A	N/A	4.2	5.1	5.4	4.2	5.1	5.4	0.0	0.0	0.0
								Maximum:	**0.0**	**0.0**	**0.0**
								Minimum*:	**-0.3**	**-1.1**	**-0.1**

* EDGWDE-19 removed from comparison

Table 7C-5b. Edgewood East Alternative No. 2, Lower K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2 [K = 1 x 10^{-4}] (ft NGVD)		Delta (Alt. 2 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDC-01	Yes	6.2	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-02	No	5.9	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-03	No	4.9	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-04	No	5.0	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-05	No	5.4	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-06	No	4.2	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-07	No	6.2	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-08	No	5.0	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-09	No	6.0	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-10	No	5.1	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-11	No	5.7	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-12	No	5.1	7.0	7.2	6.9	7.0	0.0	-0.1
EDGWDC-13	Yes	7.2	7.0	7.2	6.9	7.0	0.0	-0.1
EDGWDC-14	No	5.8	7.0	7.2	6.9	7.0	-0.1	-0.1
EDGWDE-02	No	7.3	8.4	8.5	8.4	8.5	0.0	0.0
EDGWDE-03	Yes	8.4	8.6	8.7	8.6	8.7	0.0	0.0
EDGWDE-04	No	6.1	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDE-05	No	6.4	7.1	7.2	7.1	7.2	0.0	0.0
EDGWDE-06	No	6.7	8.4	8.5	8.4	8.5	0.0	0.0
EDGWDE-07	No	7.3	8.5	8.6	8.5	8.6	0.0	0.0
EDGWDE-08	No	5.3	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDE-09	No	5.2	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDE-10	Yes	6.5	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDE-11	Yes	8.0	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-12	No	6.5	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-13	No	7.3	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-14	No	5.2	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDE-15	No	4.3	7.0	7.2	6.9	7.1	-0.1	-0.1

Table 7C-5b. Edgewood East Alternative No. 2, Lower K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2 [K = 1 x 10^{-4}] (ft NGVD)		Delta (Alt. 2 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDE-16	No	5.9	8.1	8.2	8.1	8.2	0.0	0.0
EDGWDE-17	Yes	8.0	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-18	No	5.8	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDE-19	Yes	8.5	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDE-20	Yes	7.8	7.7	7.7	7.7	7.7	0.0	0.0
EDGWDE-21	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-22	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-23	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDWP	No	5.0	7.0	7.2	6.9	7.1	-0.1	-0.1
SR84-14	Yes	8.2	8.4	8.6	8.4	8.6	0.0	0.0
SR84-15	Yes	8.1	8.4	8.6	8.4	8.6	0.0	0.0
SR84-16	Yes	8.1	8.4	8.6	8.4	8.6	0.0	0.0
SR84-17	Yes	8.5	7.5	7.6	7.5	7.6	0.0	0.0
SR84-18	Yes	7.8	7.0	7.2	7.0	7.1	0.0	-0.1
SR84-20	Yes	8.2	6.4	6.9	6.3	6.7	0.0	-0.2
SR84-22	Yes	8.0	6.4	6.9	6.3	6.7	-0.1	-0.2
SW20ST-05	N/A	N/A	5.9	6.2	5.9	6.2	0.0	0.0
SW20ST-05OL	N/A	N/A	5.9	6.2	5.9	6.2	0.0	0.0
						Maximum:	**0.0**	**0.0**
						Minimum*:	**-0.1**	**-0.2**

* EDGWDE-19 removed from comparison

Table 7C-6a. Edgewood East Alternative No. 2, Higher K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2 [K = 5 x 10^{-4}] (ft NGVD)			Delta (Alt. 2 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDC-01	Yes	6.2	5.7	6.4	6.6	5.4	6.2	6.4	-0.3	-0.2	-0.2
EDGWDC-02	No	5.9	6.3	6.4	6.6	6.3	6.4	6.5	0.0	0.0	-0.1
EDGWDC-03	No	4.9	5.7	6.4	6.6	5.4	6.2	6.4	-0.3	-0.2	-0.2
EDGWDC-04	No	5.0	6.3	6.5	6.6	5.4	6.1	6.4	-0.9	-0.4	-0.2
EDGWDC-05	No	5.4	6.0	6.4	6.6	6.0	6.2	6.4	0.0	-0.2	-0.2
EDGWDC-06	No	4.2	5.7	6.4	6.6	5.4	6.2	6.4	-0.3	-0.2	-0.2
EDGWDC-07	No	6.2	6.3	6.5	6.6	6.3	6.5	6.5	0.0	0.0	-0.1
EDGWDC-08	No	5.0	5.7	6.4	6.6	5.6	6.2	6.4	-0.2	-0.2	-0.2
EDGWDC-09	No	6.0	6.5	6.6	6.6	6.5	6.6	6.6	0.0	0.0	0.0
EDGWDC-10	No	5.1	5.8	6.4	6.6	5.8	6.2	6.4	0.0	-0.2	-0.2
EDGWDC-11	No	5.7	6.2	6.4	6.6	6.2	6.4	6.5	0.0	0.0	-0.1
EDGWDC-12	No	5.1	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
EDGWDC-13	Yes	7.2	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
EDGWDC-14	No	5.8	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
EDGWDE-02	No	7.3	7.8	8.0	8.0	7.8	8.0	8.0	0.0	0.0	0.0
EDGWDE-03	Yes	8.4	8.4	8.5	8.5	8.4	8.5	8.5	0.0	0.0	0.0
EDGWDE-04	No	6.1	6.5	6.5	6.6	6.0	6.4	6.5	-0.4	-0.1	-0.1
EDGWDE-05	No	6.4	7.0	7.1	7.1	7.0	7.1	7.1	0.0	0.0	0.0
EDGWDE-06	No	6.7	7.6	7.9	8.0	7.6	7.9	8.0	0.0	0.0	0.0
EDGWDE-07	No	7.3	8.0	8.3	8.3	8.0	8.3	8.3	0.0	0.0	0.0
EDGWDE-08	No	5.3	5.8	6.4	6.6	5.7	6.2	6.4	-0.1	-0.2	-0.2
EDGWDE-09	No	5.2	5.8	6.4	6.6	5.7	6.2	6.4	-0.1	-0.2	-0.2
EDGWDE-10	Yes	6.5	6.4	6.5	6.6	6.4	6.5	6.5	0.0	0.0	0.0
EDGWDE-11	Yes	8.0	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-12	No	6.5	7.5	7.8	7.9	7.5	7.8	7.9	0.0	0.0	0.0
EDGWDE-13	No	7.3	7.7	7.8	7.9	7.7	7.8	7.9	0.0	0.0	0.0
EDGWDE-14	No	5.2	5.8	6.4	6.6	5.7	6.2	6.4	-0.1	-0.2	-0.2
EDGWDE-15	No	4.3	5.8	6.4	6.6	5.7	6.2	6.4	-0.1	-0.2	-0.2

Table 7C-6a. Edgewood East Alternative No. 2, Higher K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2 [K = 5 x 10^{-4}] (ft NGVD)			Delta (Alt. 2 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDE-16	No	5.9	7.0	7.8	7.9	7.0	7.8	7.9	-0.1	0.0	0.0
EDGWDE-17	Yes	8.0	7.5	7.8	7.9	7.5	7.8	7.9	0.0	0.0	0.0
EDGWDE-18	No	5.8	3.4	6.4	6.6	3.2	6.2	6.4	-0.2	-0.2	-0.2
EDGWDE-19	Yes	8.5	3.3	5.6	6.6	3.3	3.9	5.8	0.0	-1.7	-0.8
EDGWDE-20	Yes	7.8	7.1	7.2	7.3	7.1	7.2	7.3	0.0	0.0	0.0
EDGWDE-21	No	7.1	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-22	No	7.1	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-23	No	7.1	7.3	7.8	7.9	7.3	7.8	7.9	0.0	0.0	0.0
EDGWDWP	No	5.0	5.6	6.4	6.6	5.6	6.2	6.4	0.0	-0.2	-0.2
SR84-14	Yes	8.2	7.9	8.1	8.2	7.9	8.1	8.2	0.0	0.0	0.0
SR84-15	Yes	8.1	7.8	8.0	8.0	7.8	8.0	8.0	0.0	0.0	0.0
SR84-16	Yes	8.1	7.4	7.8	7.9	7.3	7.8	7.9	-0.1	0.0	0.0
SR84-17	Yes	8.5	7.0	7.4	7.4	6.9	7.3	7.4	-0.1	0.0	0.0
SR84-18	Yes	7.8	6.3	6.9	7.0	6.0	6.7	6.9	-0.2	-0.2	-0.1
SR84-20	Yes	8.2	4.8	5.5	5.8	4.8	5.5	5.7	0.0	0.0	0.0
SR84-22	Yes	8.0	4.8	5.5	5.8	4.8	5.5	5.7	0.0	0.0	0.0
SW20ST-05	N/A	N/A	4.2	5.1	5.4	4.2	5.1	5.4	0.0	0.0	0.0
SW20ST-05OL	N/A	N/A	4.2	5.1	5.4	4.2	5.1	5.4	0.0	0.0	0.0
								Maximum:	**0.0**	**0.0**	**0.0**
								Minimum*:	**-0.9**	**-1.7**	**-0.8**

* EDGWDE-19 removed from comparison

Table 7C-6b. Edgewood East Alternative No. 2, Higher K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2 [K = 5 x 10^{-4}] (ft NGVD)		Delta (Alt. 2 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDC-01	Yes	6.2	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-02	No	5.9	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-03	No	4.9	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-04	No	5.0	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-05	No	5.4	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-06	No	4.2	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-07	No	6.2	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-08	No	5.0	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-09	No	6.0	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-10	No	5.1	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-11	No	5.7	7.0	7.2	6.8	6.9	-0.2	-0.2
EDGWDC-12	No	5.1	7.0	7.2	6.9	7.0	0.0	-0.1
EDGWDC-13	Yes	7.2	7.0	7.2	6.9	7.0	0.0	-0.1
EDGWDC-14	No	5.8	7.0	7.2	6.9	7.0	-0.1	-0.2
EDGWDE-02	No	7.3	8.4	8.5	8.4	8.5	0.0	0.0
EDGWDE-03	Yes	8.4	8.6	8.7	8.6	8.7	0.0	0.0
EDGWDE-04	No	6.1	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDE-05	No	6.4	7.1	7.2	7.1	7.2	0.0	0.0
EDGWDE-06	No	6.7	8.4	8.5	8.4	8.5	0.0	0.0
EDGWDE-07	No	7.3	8.5	8.6	8.5	8.6	0.0	0.0
EDGWDE-08	No	5.3	7.0	7.2	6.8	7.0	-0.1	-0.2
EDGWDE-09	No	5.2	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDE-10	Yes	6.5	7.0	7.2	6.8	7.0	-0.1	-0.2
EDGWDE-11	Yes	8.0	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-12	No	6.5	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-13	No	7.3	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-14	No	5.2	7.0	7.2	6.8	7.0	-0.1	-0.2
EDGWDE-15	No	4.3	7.0	7.2	6.8	7.0	-0.1	-0.2

Table 7C-6b. Edgewood East Alternative No. 2, Higher K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2 [K = 5 x 10^{-4}] (ft NGVD)		Delta (Alt. 2 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDE-16	No	5.9	8.1	8.2	8.1	8.2	0.0	0.0
EDGWDE-17	Yes	8.0	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-18	No	5.8	7.0	7.2	6.8	7.0	-0.1	-0.2
EDGWDE-19	Yes	8.5	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDE-20	Yes	7.8	7.7	7.7	7.7	7.7	0.0	0.0
EDGWDE-21	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-22	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-23	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDWP	No	5.0	7.0	7.2	6.8	7.0	-0.2	-0.2
SR84-14	Yes	8.2	8.4	8.6	8.4	8.6	0.0	0.0
SR84-15	Yes	8.1	8.4	8.6	8.4	8.6	0.0	0.0
SR84-16	Yes	8.1	8.4	8.6	8.4	8.6	0.0	0.0
SR84-17	Yes	8.5	7.5	7.6	7.5	7.6	0.0	0.0
SR84-18	Yes	7.8	7.0	7.2	7.0	7.1	0.0	-0.1
SR84-20	Yes	8.2	6.4	6.9	6.3	6.6	-0.1	-0.3
SR84-22	Yes	8.0	6.4	6.9	6.3	6.6	-0.1	-0.3
SW20ST-05	N/A	N/A	5.9	6.2	5.9	6.2	0.0	0.0
SW20ST-05OL	N/A	N/A	5.9	6.2	5.9	6.2	0.0	0.0
						Maximum:	**0.0**	**0.0**
						Minimum*:	**-0.2**	**-0.3**

* EDGWDE-19 removed from comparison

Table 7C-7a. Edgewood East Alternative No. 3 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 3 Peak Stages (ft NGVD)			Delta (Alt. 3 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDC-01	Yes	6.2	5.7	6.4	6.6	5.2	6.2	6.4	-0.5	-0.2	-0.2
EDGWDC-02	No	5.9	6.3	6.4	6.6	6.3	6.4	6.5	0.0	0.0	-0.1
EDGWDC-03	No	4.9	5.7	6.4	6.6	5.2	6.2	6.4	-0.5	-0.2	-0.2
EDGWDC-04	No	5.0	6.3	6.5	6.6	6.2	6.4	6.5	-0.1	0.0	-0.1
EDGWDC-05	No	5.4	6.0	6.4	6.6	6.0	6.2	6.4	0.0	-0.2	-0.2
EDGWDC-06	No	4.2	5.7	6.4	6.6	5.3	6.2	6.4	-0.5	-0.2	-0.2
EDGWDC-07	Yes	6.2	6.3	6.5	6.6	6.0	6.4	6.4	-0.2	-0.1	-0.1
EDGWDC-08	No	5.0	5.7	6.4	6.6	5.4	6.2	6.4	-0.4	-0.2	-0.2
EDGWDC-09	No	6.0	6.5	6.6	6.6	6.5	6.6	6.6	0.0	0.0	0.0
EDGWDC-10	No	5.1	5.8	6.4	6.6	5.7	6.2	6.4	-0.1	-0.2	-0.2
EDGWDC-11	No	5.7	6.2	6.4	6.6	6.2	6.3	6.4	0.0	-0.1	-0.1
EDGWDC-12	No	5.1	6.3	6.5	6.6	6.2	6.4	6.5	-0.1	-0.1	-0.1
EDGWDC-13	Yes	7.2	6.3	6.5	6.6	6.0	6.4	6.5	-0.3	-0.1	-0.1
EDGWDC-14	No	5.8	6.3	6.5	6.6	6.3	6.4	6.5	0.0	-0.1	-0.1
EDGWDE-02	No	7.3	7.8	8.0	8.0	7.8	8.0	8.0	0.0	0.0	0.0
EDGWDE-03	Yes	8.4	8.4	8.5	8.5	8.4	8.5	8.5	0.0	0.0	0.0
EDGWDE-04	No	6.1	6.5	6.5	6.6	6.5	6.5	6.6	0.0	0.0	0.0
EDGWDE-05	No	6.4	7.0	7.1	7.1	7.0	7.1	7.1	0.0	0.0	0.0
EDGWDE-06	No	6.7	7.6	7.9	8.0	7.6	7.9	8.0	0.0	0.0	0.0
EDGWDE-07	No	7.3	8.0	8.3	8.3	8.0	8.3	8.3	0.0	0.0	0.0
EDGWDE-08	No	5.3	5.8	6.4	6.6	5.7	6.2	6.4	-0.1	-0.2	-0.2
EDGWDE-09	No	5.2	5.8	6.4	6.6	5.8	6.2	6.4	-0.1	-0.2	-0.2
EDGWDE-10	Yes	6.5	6.4	6.5	6.6	6.4	6.5	6.5	0.0	0.0	0.0
EDGWDE-11	Yes	8.0	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-12	No	6.5	7.5	7.8	7.9	7.5	7.8	7.9	0.0	0.0	0.0
EDGWDE-13	No	7.3	7.7	7.8	7.9	7.7	7.8	7.9	0.0	0.0	0.0
EDGWDE-14	No	5.2	5.8	6.4	6.6	5.7	6.2	6.4	-0.1	-0.2	-0.2
EDGWDE-15	No	4.3	5.8	6.4	6.6	5.7	6.2	6.4	-0.1	-0.2	-0.2
EDGWDE-16	No	5.9	7.0	7.8	7.9	6.9	7.8	7.9	-0.1	0.0	0.0

Table 7C-7a. Edgewood East Alternative No. 3 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 3 Peak Stages (ft NGVD)			Delta (Alt. 3 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDE-17	Yes	8.0	7.5	7.8	7.9	7.5	7.8	7.9	0.0	0.0	0.0
EDGWDE-18	No	5.8	3.4	6.4	6.6	3.2	6.1	6.4	-0.2	-0.3	-0.2
EDGWDE-19	Yes	8.5	3.3	5.6	6.6	3.3	3.9	5.5	0.0	-1.7	-1.1
EDGWDE-20	Yes	7.8	7.1	7.2	7.3	7.1	7.2	7.3	0.0	0.0	0.0
EDGWDE-21	No	7.1	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-22	No	7.1	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-23	No	7.1	7.3	7.8	7.9	7.3	7.8	7.9	0.0	0.0	0.0
EDGWDWP	No	5.0	5.6	6.4	6.6	5.6	6.1	6.4	0.0	-0.3	-0.2
SR84-14	Yes	8.2	7.9	8.1	8.2	7.9	8.1	8.2	0.0	0.0	0.0
SR84-15	Yes	8.1	7.8	8.0	8.0	7.8	8.0	8.0	0.0	0.0	0.0
SR84-16	Yes	8.1	7.4	7.8	7.9	7.4	7.8	7.9	0.0	0.0	0.0
SR84-17	Yes	8.5	7.0	7.4	7.4	7.0	7.4	7.4	0.0	0.0	0.0
SR84-18	Yes	7.8	6.3	6.9	7.0	6.2	6.9	6.9	0.0	0.0	0.0
SR84-20	Yes	8.2	4.8	5.5	5.8	4.8	5.5	5.7	-0.1	0.0	0.0
SR84-22	Yes	8.0	4.8	5.5	5.8	4.8	5.5	5.7	-0.1	0.0	0.0
SW20ST-05	N/A	N/A	4.2	5.1	5.4	4.2	5.1	5.4	0.0	0.0	0.0
SW20ST-05OL	N/A	N/A	4.2	5.1	5.4	4.2	5.1	5.4	0.0	0.0	0.0
								Maximum:	**0.0**	**0.0**	**0.0**
								Minimum*:	**-0.5**	**-1.7**	**-1.1**

* EDGWDE-19 removed from comparison

Table 7C-7b. Edgewood East Alternative No. 3 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 3 Peak Stages (ft NGVD)		Delta (Alt. 3 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDC-01	Yes	6.2	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-02	No	5.9	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-03	No	4.9	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-04	No	5.0	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-05	No	5.4	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-06	No	4.2	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-07	Yes	6.2	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-08	No	5.0	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-09	No	6.0	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-10	No	5.1	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDC-11	No	5.7	7.0	7.2	6.8	6.9	-0.2	-0.2
EDGWDC-12	No	5.1	7.0	7.2	6.8	7.0	-0.1	-0.2
EDGWDC-13	Yes	7.2	7.0	7.2	6.8	7.0	-0.1	-0.2
EDGWDC-14	No	5.8	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDE-02	No	7.3	8.4	8.5	8.4	8.5	0.0	0.0
EDGWDE-03	Yes	8.4	8.6	8.7	8.6	8.7	0.0	0.0
EDGWDE-04	No	6.1	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDE-05	No	6.4	7.1	7.2	7.1	7.2	0.0	0.0
EDGWDE-06	No	6.7	8.4	8.5	8.4	8.5	0.0	0.0
EDGWDE-07	No	7.3	8.5	8.6	8.5	8.6	0.0	0.0
EDGWDE-08	No	5.3	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDE-09	No	5.2	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDE-10	Yes	6.5	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDE-11	Yes	8.0	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-12	No	6.5	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-13	No	7.3	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-14	No	5.2	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDE-15	No	4.3	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDE-16	No	5.9	8.1	8.2	8.1	8.2	0.0	0.0

Table 7C-7b. Edgewood East Alternative No. 3 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 3 Peak Stages (ft NGVD)		Delta (Alt. 3 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDE-17	Yes	8.0	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-18	No	5.8	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDE-19	Yes	8.5	7.0	7.2	6.8	7.0	-0.2	-0.2
EDGWDE-20	Yes	7.8	7.7	7.7	7.7	7.7	0.0	0.0
EDGWDE-21	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-22	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-23	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDWP	No	5.0	7.0	7.2	6.8	7.0	-0.2	-0.2
SR84-14	Yes	8.2	8.4	8.6	8.4	8.6	0.0	0.0
SR84-15	Yes	8.1	8.4	8.6	8.4	8.6	0.0	0.0
SR84-16	Yes	8.1	8.4	8.6	8.4	8.6	0.0	0.0
SR84-17	Yes	8.5	7.5	7.6	7.5	7.6	0.0	0.0
SR84-18	Yes	7.8	7.0	7.2	7.0	7.1	0.0	-0.1
SR84-20	Yes	8.2	6.4	6.9	6.3	6.6	-0.1	-0.3
SR84-22	Yes	8.0	6.4	6.9	6.3	6.6	-0.1	-0.3
SW20ST-05	N/A	N/A	5.9	6.2	5.9	6.2	0.0	0.0
SW20ST-05OL	N/A	N/A	5.9	6.2	5.9	6.2	0.0	0.0
						Maximum:	**0.0**	**0.0**
						Minimum*:	**-0.2**	**-0.3**

* EDGWDE-19 removed from comparison

Table 7C-8a. Edgewood East Alternative No. 4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 4 Peak Stages (ft NGVD)			Delta (Alt. 4 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDC-01	Yes	6.2	5.7	6.4	6.6	5.2	6.1	6.3	-0.5	-0.3	-0.3
EDGWDC-02	No	5.9	6.3	6.4	6.6	6.3	6.4	6.5	0.0	0.0	-0.1
EDGWDC-03	No	4.9	5.7	6.4	6.6	5.2	6.1	6.3	-0.5	-0.3	-0.3
EDGWDC-04	No	5.0	6.3	6.5	6.6	6.3	6.5	6.5	0.0	0.0	-0.1
EDGWDC-05	No	5.4	6.0	6.4	6.6	6.0	6.2	6.3	0.0	-0.2	-0.3
EDGWDC-06	No	4.2	5.7	6.4	6.6	5.2	6.1	6.3	-0.5	-0.3	-0.3
EDGWDC-07	No	6.2	6.3	6.5	6.6	6.3	6.5	6.5	0.0	0.0	-0.1
EDGWDC-08	No	5.0	5.7	6.4	6.6	4.7	6.1	6.3	-1.1	-0.3	-0.3
EDGWDC-09	No	6.0	6.5	6.6	6.6	6.5	6.6	6.6	0.0	0.0	0.0
EDGWDC-10	No	5.1	5.8	6.4	6.6	5.3	6.1	6.3	-0.5	-0.3	-0.3
EDGWDC-11	No	5.7	6.2	6.4	6.6	6.2	6.4	6.5	0.0	0.0	-0.1
EDGWDC-12	No	5.1	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
EDGWDC-13	Yes	7.2	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
EDGWDC-14	No	5.8	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
EDGWDE-02	No	7.3	7.8	8.0	8.0	7.8	8.0	8.0	0.0	0.0	0.0
EDGWDE-03	Yes	8.4	8.4	8.5	8.5	8.4	8.5	8.5	0.0	0.0	0.0
EDGWDE-04	No	6.1	6.5	6.5	6.6	6.5	6.5	6.6	0.0	0.0	0.0
EDGWDE-05	No	6.4	7.0	7.1	7.1	7.0	7.1	7.1	0.0	0.0	0.0
EDGWDE-06	No	6.7	7.6	7.9	8.0	7.6	7.9	8.0	0.0	0.0	0.0
EDGWDE-07	No	7.3	8.0	8.3	8.3	8.0	8.3	8.3	0.0	0.0	0.0
EDGWDE-08	No	5.3	5.8	6.4	6.6	5.8	6.1	6.3	0.0	-0.3	-0.3
EDGWDE-09	No	5.2	5.8	6.4	6.6	5.8	6.1	6.3	0.0	-0.3	-0.3
EDGWDE-10	Yes	6.5	6.4	6.5	6.6	6.4	6.5	6.5	0.0	0.0	0.0
EDGWDE-11	Yes	8.0	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-12	No	6.5	7.5	7.8	7.9	7.5	7.8	7.9	0.0	0.0	0.0
EDGWDE-13	No	7.3	7.7	7.8	7.9	7.7	7.8	7.9	0.0	0.0	0.0
EDGWDE-14	No	5.2	5.8	6.4	6.6	5.8	6.1	6.3	0.0	-0.3	-0.3
EDGWDE-15	No	4.3	5.8	6.4	6.6	5.8	6.1	6.3	0.0	-0.3	-0.3
EDGWDE-16	No	5.9	7.0	7.8	7.9	7.0	7.8	7.9	0.0	0.0	0.0

Table 7C-8a. Edgewood East Alternative No. 4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 4 Peak Stages (ft NGVD)			Delta (Alt. 4 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDE-17	Yes	8.0	7.5	7.8	7.9	7.5	7.8	7.9	0.0	0.0	0.0
EDGWDE-18	Yes	5.8	3.4	6.4	6.6	3.6	6.0	6.3	0.2	-0.4	-0.3
EDGWDE-19	Yes	8.5	3.3	5.6	6.6	3.6	6.0	6.3	0.3	0.4	-0.3
EDGWDE-20	No	7.8	7.1	7.2	7.3	10.2	10.4	10.4	3.2	3.2	3.1
EDGWDE-21	No	7.1	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-22	No	7.1	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-23	No	7.1	7.3	7.8	7.9	7.3	7.8	7.9	0.0	0.0	0.0
EDGWDWP	No	5.0	5.6	6.4	6.6	5.6	6.0	6.3	0.0	-0.4	-0.3
SR84-14	N/A	8.2	7.9	8.1	8.2	7.9	8.1	8.2	0.0	0.0	0.0
SR84-15	Yes	8.1	7.8	8.0	8.0	7.8	8.0	8.0	0.0	0.0	0.0
SR84-16	Yes	8.1	7.4	7.8	7.9	7.4	7.8	7.9	0.0	0.0	0.0
SR84-17	Yes	8.5	7.0	7.4	7.4	7.0	7.4	7.4	0.0	0.0	0.0
SR84-18	Yes	7.8	6.3	6.9	7.0	6.2	6.9	6.9	0.0	0.0	0.0
SR84-20	Yes	8.2	4.8	5.5	5.8	4.8	5.5	5.7	-0.1	0.0	0.0
SR84-22	Yes	8.0	4.8	5.5	5.8	4.8	5.5	5.7	-0.1	0.0	0.0
SW20ST-05	N/A	N/A	4.2	5.1	5.4	4.2	5.1	5.4	0.0	0.0	0.0
SW20ST-05OL	N/A	N/A	4.2	5.1	5.4	4.2	5.1	5.4	0.0	0.0	0.0
								Maximum*:	**3.2**	**3.2**	**3.1**
								Minimum:	**-1.1**	**-0.4**	**-0.3**

* Snyder Park Nodes removed from maximum comparison

Table 7C-8b. Edgewood East Alternative No. 4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 4 Peak Stages (ft NGVD)		Delta (Alt. 4 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDC-01	No	6.2	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-02	No	5.9	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-03	No	4.9	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-04	No	5.0	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-05	No	5.4	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-06	Yes	4.2	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-07	No	6.2	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-08	No	5.0	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-09	No	6.0	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-10	No	5.1	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDC-11	No	5.7	7.0	7.2	6.8	7.1	-0.1	-0.1
EDGWDC-12	No	5.1	7.0	7.2	6.8	7.0	-0.1	-0.1
EDGWDC-13	Yes	7.2	7.0	7.2	6.8	7.0	-0.1	-0.1
EDGWDC-14	No	5.8	7.0	7.2	6.8	7.0	-0.1	-0.1
EDGWDE-02	No	7.3	8.4	8.5	8.4	8.5	0.0	0.0
EDGWDE-03	Yes	8.4	8.6	8.7	8.6	8.7	0.0	0.0
EDGWDE-04	No	6.1	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDE-05	No	6.4	7.1	7.2	7.1	7.2	0.0	0.0
EDGWDE-06	No	6.7	8.4	8.5	8.4	8.5	0.0	0.0
EDGWDE-07	No	7.3	8.5	8.6	8.5	8.6	0.0	0.0
EDGWDE-08	No	5.3	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDE-09	No	5.2	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDE-10	Yes	6.5	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDE-11	Yes	8.0	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-12	No	6.5	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-13	No	7.3	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-14	No	5.2	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDE-15	No	4.3	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDE-16	No	5.9	8.1	8.2	8.1	8.2	0.0	0.0

Table 7C-8b. Edgewood East Alternative No. 4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 4 Peak Stages (ft NGVD)		Delta (Alt. 4 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDE-17	Yes	8.0	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-18	Yes	5.8	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDE-19	Yes	8.5	7.0	7.2	6.9	7.1	-0.1	-0.1
EDGWDE-20	No	7.8	7.7	7.7	11.5	12.0	3.9	4.3
EDGWDE-21	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-22	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-23	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDWP	No	5.0	7.0	7.2	6.9	7.1	-0.1	-0.1
SR84-14	N/A	8.2	8.4	8.6	8.4	8.6	0.0	0.0
SR84-15	Yes	8.1	8.4	8.6	8.4	8.6	0.0	0.0
SR84-16	Yes	8.1	8.4	8.6	8.4	8.6	0.0	0.0
SR84-17	Yes	8.5	7.5	7.6	7.5	7.6	0.0	0.0
SR84-18	Yes	7.8	7.0	7.2	7.0	7.1	0.0	-0.1
SR84-20	Yes	8.2	6.4	6.9	6.3	6.7	-0.1	-0.2
SR84-22	Yes	8.0	6.4	6.9	6.3	6.7	-0.1	-0.2
SW20ST-05	N/A	N/A	5.9	6.2	5.9	6.2	0.0	0.0
SW20ST-05OL	N/A	N/A	5.9	6.2	5.9	6.2	0.0	0.0
						Maximum*:	**3.9**	**4.3**
						Minimum:	**-0.1**	**-0.2**

* Snyder Park Nodes removed from maximum comparison

Table 7C-9a. Edgewood East Alternative No. 5 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 5 Peak Stages (ft NGVD)			Delta (Alt. 5 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDC-01	Yes	6.2	5.7	6.4	6.6	4.8	5.4	6.0	-0.9	-0.9	-0.6
EDGWDC-02	No	5.9	6.3	6.4	6.6	6.3	6.4	6.5	0.0	0.0	-0.1
EDGWDC-03	No	4.9	5.7	6.4	6.6	4.8	5.4	6.0	-1.0	-0.9	-0.5
EDGWDC-04	No	5.0	6.3	6.5	6.6	5.3	6.0	6.2	-1.0	-0.5	-0.4
EDGWDC-05	No	5.4	6.0	6.4	6.6	6.0	6.2	6.3	0.0	-0.2	-0.3
EDGWDC-06	No	4.2	5.7	6.4	6.6	4.8	5.4	6.0	-1.0	-0.9	-0.5
EDGWDC-07	Yes	6.2	6.3	6.5	6.6	6.0	6.4	6.4	-0.2	-0.1	-0.1
EDGWDC-08	No	5.0	5.7	6.4	6.6	4.5	5.6	6.0	-1.3	-0.8	-0.5
EDGWDC-09	No	6.0	6.5	6.6	6.6	6.5	6.6	6.6	0.0	0.0	0.0
EDGWDC-10	No	5.1	5.8	6.4	6.6	4.0	5.8	6.0	-1.8	-0.6	-0.5
EDGWDC-11	No	5.7	6.2	6.4	6.6	6.2	6.3	6.4	0.0	-0.1	-0.2
EDGWDC-12	No	5.1	6.3	6.5	6.6	6.2	6.4	6.5	-0.1	-0.1	-0.1
EDGWDC-13	Yes	7.2	6.3	6.5	6.6	6.0	6.4	6.4	-0.3	-0.2	-0.1
EDGWDC-14	No	5.8	6.3	6.5	6.6	6.3	6.4	6.5	0.0	-0.1	-0.1
EDGWDE-02	No	7.3	7.8	8.0	8.0	7.8	8.0	8.0	0.0	0.0	0.0
EDGWDE-03	Yes	8.4	8.4	8.5	8.5	8.4	8.5	8.5	0.0	0.0	0.0
EDGWDE-04	No	6.1	6.5	6.5	6.6	6.0	6.4	6.5	-0.5	-0.1	-0.1
EDGWDE-05	No	6.4	7.0	7.1	7.1	7.0	7.1	7.1	0.0	0.0	0.0
EDGWDE-06	No	6.7	7.6	7.9	8.0	7.6	7.9	8.0	0.0	0.0	0.0
EDGWDE-07	No	7.3	8.0	8.3	8.3	8.0	8.3	8.3	0.0	0.0	0.0
EDGWDE-08	No	5.3	5.8	6.4	6.6	5.6	5.9	6.0	-0.3	-0.4	-0.5
EDGWDE-09	No	5.2	5.8	6.4	6.6	5.7	6.0	6.1	-0.1	-0.4	-0.5
EDGWDE-10	Yes	6.5	6.4	6.5	6.6	6.4	6.5	6.5	0.0	0.0	0.0
EDGWDE-11	Yes	8.0	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-12	No	6.5	7.5	7.8	7.9	7.5	7.8	7.9	0.0	0.0	0.0
EDGWDE-13	No	7.3	7.7	7.8	7.9	7.7	7.8	7.9	0.0	0.0	0.0
EDGWDE-14	No	5.2	5.8	6.4	6.6	5.5	5.9	6.0	-0.3	-0.4	-0.5
EDGWDE-15	No	4.3	5.8	6.4	6.6	5.5	5.9	6.0	-0.3	-0.4	-0.5
EDGWDE-16	No	5.9	7.0	7.8	7.9	6.9	7.8	7.9	-0.2	0.0	0.0

Table 7C-9a. Edgewood East Alternative No. 5 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 5 Peak Stages (ft NGVD)			Delta (Alt. 5 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDE-17	Yes	8.0	7.5	7.8	7.9	7.5	7.8	7.9	0.0	0.0	0.0
EDGWDE-18	Yes	5.8	3.4	6.4	6.6	3.2	4.8	5.6	-0.2	-1.6	-0.9
EDGWDE-19	Yes	8.5	3.3	5.6	6.6	3.2	4.8	5.6	-0.1	-0.8	-0.9
EDGWDE-20	No	7.8	7.1	7.2	7.3	5.8	10.4	10.4	-1.2	3.1	3.1
EDGWDE-21	No	7.1	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-22	No	7.1	7.6	7.8	7.9	7.6	7.8	7.9	0.0	0.0	0.0
EDGWDE-23	No	7.1	7.3	7.8	7.9	7.3	7.8	7.9	0.0	0.0	0.0
EDGWDWP	No	5.0	5.6	6.4	6.6	5.6	6.0	6.0	0.0	-0.4	-0.5
SR84-14	N/A	8.2	7.9	8.1	8.2	7.9	8.1	8.2	0.0	0.0	0.0
SR84-15	Yes	8.1	7.8	8.0	8.0	7.8	8.0	8.0	0.0	0.0	0.0
SR84-16	Yes	8.1	7.4	7.8	7.9	7.3	7.8	7.9	-0.1	0.0	0.0
SR84-17	Yes	8.5	7.0	7.4	7.4	6.8	7.3	7.4	-0.2	0.0	0.0
SR84-18	Yes	7.8	6.3	6.9	7.0	6.0	6.7	6.9	-0.3	-0.2	-0.1
SR84-20	Yes	8.2	4.8	5.5	5.8	4.7	5.3	5.7	-0.1	-0.2	-0.1
SR84-22	Yes	8.0	4.8	5.5	5.8	4.7	5.3	5.7	-0.1	-0.2	-0.1
SW20ST-05	N/A	N/A	4.2	5.1	5.4	4.2	5.1	5.4	0.0	0.0	0.0
SW20ST-05OL	N/A	N/A	4.2	5.1	5.4	4.2	5.1	5.4	0.0	0.0	0.0
								Maximum*:	**0.0**	**3.1**	**3.1**
								Minimum:	**-1.8**	**-1.6**	**-0.9**

* Snyder Park Nodes removed from maximum comparison

Table 7C-9b. Edgewood East Alternative No. 5 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 5 Peak Stages (ft NGVD)		Delta (Alt. 5 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDC-01	Yes	6.2	7.0	7.2	6.6	6.8	-0.4	-0.4
EDGWDC-02	No	5.9	7.0	7.2	6.7	6.8	-0.3	-0.4
EDGWDC-03	No	4.9	7.0	7.2	6.6	6.8	-0.4	-0.4
EDGWDC-04	No	5.0	7.0	7.2	6.6	6.8	-0.4	-0.4
EDGWDC-05	No	5.4	7.0	7.2	6.6	6.8	-0.4	-0.4
EDGWDC-06	No	4.2	7.0	7.2	6.6	6.8	-0.4	-0.4
EDGWDC-07	Yes	6.2	7.0	7.2	6.6	6.8	-0.3	-0.4
EDGWDC-08	No	5.0	7.0	7.2	6.6	6.8	-0.4	-0.4
EDGWDC-09	No	6.0	7.0	7.2	6.8	6.8	-0.2	-0.4
EDGWDC-10	No	5.1	7.0	7.2	6.6	6.8	-0.4	-0.4
EDGWDC-11	No	5.7	7.0	7.2	6.5	6.7	-0.4	-0.5
EDGWDC-12	No	5.1	7.0	7.2	6.7	6.9	-0.3	-0.3
EDGWDC-13	Yes	7.2	7.0	7.2	6.7	6.9	-0.3	-0.3
EDGWDC-14	No	5.8	7.0	7.2	6.7	6.8	-0.3	-0.3
EDGWDE-02	No	7.3	8.4	8.5	8.4	8.5	0.0	0.0
EDGWDE-03	Yes	8.4	8.6	8.7	8.6	8.7	0.0	0.0
EDGWDE-04	No	6.1	7.0	7.2	6.6	6.8	-0.4	-0.4
EDGWDE-05	No	6.4	7.1	7.2	7.1	7.2	0.0	0.0
EDGWDE-06	No	6.7	8.4	8.5	8.4	8.5	0.0	0.0
EDGWDE-07	No	7.3	8.5	8.6	8.5	8.6	0.0	0.0
EDGWDE-08	No	5.3	7.0	7.2	6.6	6.8	-0.4	-0.4
EDGWDE-09	No	5.2	7.0	7.2	6.6	6.8	-0.4	-0.4
EDGWDE-10	Yes	6.5	7.0	7.2	6.7	6.9	-0.3	-0.3
EDGWDE-11	Yes	8.0	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-12	No	6.5	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-13	No	7.3	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-14	No	5.2	7.0	7.2	6.6	6.8	-0.4	-0.4
EDGWDE-15	No	4.3	7.0	7.2	6.6	6.8	-0.4	-0.4
EDGWDE-16	No	5.9	8.1	8.2	8.1	8.2	0.0	0.0

Table 7C-9b. Edgewood East Alternative No. 5 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 5 Peak Stages (ft NGVD)		Delta (Alt. 5 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDE-17	Yes	8.0	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-18	Yes	5.8	7.0	7.2	6.6	6.8	-0.4	-0.4
EDGWDE-19	Yes	8.5	7.0	7.2	6.6	6.8	-0.4	-0.4
EDGWDE-20	No	7.8	7.7	7.7	10.5	10.9	2.9	3.2
EDGWDE-21	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-22	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDE-23	No	7.1	8.1	8.3	8.1	8.3	0.0	0.0
EDGWDWP	No	5.0	7.0	7.2	6.6	6.8	-0.4	-0.4
SR84-14	N/A	8.2	8.4	8.6	8.4	8.6	0.0	0.0
SR84-15	Yes	8.1	8.4	8.6	8.4	8.6	0.0	0.0
SR84-16	Yes	8.1	8.4	8.6	8.4	8.6	0.0	0.0
SR84-17	Yes	8.5	7.5	7.6	7.5	7.6	0.0	0.0
SR84-18	Yes	7.8	7.0	7.2	7.0	7.1	0.0	-0.1
SR84-20	Yes	8.2	6.4	6.9	6.2	6.5	-0.1	-0.4
SR84-22	Yes	8.0	6.4	6.9	6.2	6.5	-0.1	-0.4
SW20ST-05	N/A	N/A	5.9	6.2	5.9	6.2	0.0	0.0
SW20ST-05OL	N/A	N/A	5.9	6.2	5.9	6.2	0.0	0.0
						Maximum*:	**2.9**	**3.2**
						Minimum:	**-0.4**	**-0.5**

* Snyder Park Nodes removed from maximum comparison

Appendix 7D
Surface Water Management Model Results

The following tables present the base model and alternative results for simulations of the City of Fort Lauderdale EPA SWMM for the Edgewood West Project.

Table 7D-1. Edgewood West Base Model Results

Model Node	Description	5-Yr LOS Goal Met	Reference Elevation (ft NGVD)	Design Storm Peak Stages (ft NGVD)				
				2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
EDGWDW-11	SW 32nd Ct, west of SW 17th Ave/ Rd CL elv.	No	3.5	4.2	4.8	5.0	6.3	6.9
EDGWDW-07	SW 32nd Pl & SW 17th Ave/ Rd CL elv.	No	4.0	4.2	4.8	5.0	6.3	6.9
OSCEOLA-05	Osceola Canal at 90o bend - overtopping elev to west end of SW 32nd Pl/ LiDAR	No	4.0	4.1	4.8	5.0	6.3	6.9
OSCEOLA-20	Osceola Canal at north end culvert under SW 30th St, SW 19th Terr overtopping elev / LiDAR	No	3.8	3.8	4.6	4.9	6.2	6.9
OSCEOLA-25	Osceola Canal at south end culvert under SR 84, SW 19th Terr overtopping elev / LiDAR	No	3.8	3.8	4.6	4.9	6.2	6.9
EDGWDW-17	SW 31st Ct just east of SW 15th Ave/ Rd CL elev.	No	5.5	6.0	6.1	6.1	6.4	6.9
EDGWDW-21	SW 30th St west of SW 15th Ave/ LiDAR	No	5.8	6.1	6.3	6.3	6.8	6.9
EDGWDW-23	SW 27th Ct west of SW 15th Ave/ Rd CL elev.	No	6.5	6.8	6.9	7.0	7.1	7.2
EDGWDW-12	SW 32nd Ct, west of SW 15th Ave/ Rd CL elv.	No	5.6	5.8	5.9	6.0	6.3	6.9
EDGWDW-16	SW 30th Pl, at SW 15th Ave/ LiDAR	No	5.8	6.0	6.1	6.1	6.4	6.9
EDGWDW-10	SW 32nd St, west of SW 18th Terr/ LiDAR	No	4.4	3.8	4.7	4.9	6.3	6.9
EDGWDW-19	SW 19th Ave south of SW 28th St/ LiDAR	No	4.5	4.6	4.8	4.9	6.2	6.9
EDGWDW-20	SW 29th St & SW 18th Terr/ LiDAR	No	5.3	5.4	5.6	5.6	6.2	6.9
EDGWDW-09	SW 33rd Ct & SW 15th Ave/ Rd CL elv.	Yes	5.7	5.6	5.8	5.9	6.3	6.9
EDGWDW-22	SW 30th St & SW 15th Ave/ LiDAR	Yes	6.4	6.4	6.5	6.5	6.8	6.9
EDGWDW-24	SW 15th Ave btn SW 28th & 29th St - streets w/in Mobil Home Park not considered/ LiDAR	Yes	6.4	6.3	6.4	6.4	6.8	6.9
EDGWDW-14	SW 18th Terr, north of SW 32nd St/ LiDAR	Yes	4.6	3.8	4.6	4.9	6.3	6.9
EDGWDW-25	SW 28th ST, east of SW 15th Ave/ Rd CL elev.	Yes	7.0	6.9	6.9	6.9	7.0	7.0
OSCEOLA-09	Osceola Canal at south end culvert under SW 32nd St, road overtopping elev / LiDAR	Yes	4.8	3.9	4.7	4.9	6.3	6.9
OSCEOLA-10	Osceola Canal at north end culvert under SW 32nd St, road overtopping elev / LiDAR	Yes	4.8	3.9	4.7	4.9	6.3	6.9
EDGWDW-15	SW 30th Pl west of SW 15th Ave/ LiDAR	Yes	5.8	5.4	5.6	5.7	6.3	6.9

Table 7D-1. Edgewood West Base Model Results

Model Node	Description	5-Yr LOS Goal Met	Reference Elevation (ft NGVD)	Design Storm Peak Stages (ft NGVD)				
				2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
OSCEOLA-07	Osceola Canal at south end culvert under SW 32nd Ct, road overtopping elev / LiDAR	Yes	5.1	4.0	4.7	5.0	6.3	6.9
OSCEOLA-08	Osceola Canal at north end culvert under SW 32nd Ct, road overtopping elev / LiDAR	Yes	5.1	4.0	4.7	4.9	6.3	6.9
OSCEOLA-15	Osceola Canal at south end culvert under SW 30th St, road overtopping elev / LiDAR	Yes	5.2	3.8	4.6	4.9	6.3	6.9
EDGWDW-08	SW 15th Ave, btn SW 32nd & 33rd Pl / Rd CL elev.	Yes	5.7	4.1	4.8	5.0	6.3	6.9
EDGWDW-01	FDOT SWM facility along east side of I-95 & I-595 intersection / LiDAR	Yes	9.0	4.1	4.8	5.1	6.3	6.9
EDGWDW-02	FDOT SWM facility at NE corner of I-95 & I-595 intersection between ramps from I-595 WB to I-95 NB & SB / LiDAR	Yes	12.7	4.1	4.8	5.0	6.3	6.9
EDGWDW-03	South end of Osceola Canal "spur" that extends south towards ramp from I-595 WB to I-95 SB / LiDAR	Yes	13.0	4.1	4.8	5.0	6.3	6.9
EDGWDW-04	FDOT SWM facility at NE corner of I-95 & I-595 intersection between ramps from I-595 WB to I-95 SB and Osceola Canal / LiDAR & Design Plan berm elev	Yes	13.0	4.1	4.8	5.0	6.3	6.9
OSCEOLA-30	Osceola Canal at north end culvert under SR 84, outside model boundary	--	--	3.8	4.6	4.9	6.1	6.5
OSCEOLA-35	Osceola Canal north of SR 84 - Boundary Condition	--	--	3.7	4.5	4.8	5.9	6.3

Table 7D-2a. Edgewood West Alternative No. 1 Model Results - Maintenance

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 Peak Stages (ft NGVD)			Delta (Alt. 1 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDW-11	No	3.5	4.2	4.8	5.0	4.2	4.9	5.1	0.0	0.1	0.1
EDGWDW-07	No	4.0	4.2	4.8	5.0	4.2	4.9	5.1	0.0	0.1	0.1
OSCEOLA-05	No	4.0	4.1	4.8	5.0	4.1	4.9	5.1	0.1	0.1	0.1
OSCEOLA-20	No	3.8	3.8	4.6	4.9	3.8	4.6	4.9	0.0	0.0	0.1
OSCEOLA-25	No	3.8	3.8	4.6	4.9	3.8	4.6	4.9	0.0	0.0	0.1
EDGWDW-17	No	5.5	6.0	6.1	6.1	6.0	6.1	6.1	0.0	0.0	0.0
EDGWDW-21	No	5.8	6.1	6.3	6.3	6.1	6.3	6.3	0.0	0.0	0.0
EDGWDW-23	No	6.5	6.8	6.9	7.0	6.8	6.9	7.0	0.0	0.0	0.0
EDGWDW-12	No	5.6	5.8	5.9	6.0	5.8	5.9	6.0	0.0	0.0	0.0
EDGWDW-16	No	5.8	6.0	6.1	6.1	6.0	6.1	6.1	0.0	0.0	0.0
EDGWDW-10	No	4.4	3.8	4.7	4.9	3.8	4.8	5.0	0.0	0.1	0.1
EDGWDW-19	No	4.5	4.6	4.8	4.9	4.6	4.8	4.9	0.0	0.0	0.0
EDGWDW-20	No	5.3	5.4	5.6	5.6	5.4	5.6	5.6	0.0	0.0	0.0
EDGWDW-09	Yes	5.7	5.6	5.8	5.9	5.6	5.8	5.9	0.0	0.0	0.0
EDGWDW-22	Yes	6.4	6.4	6.5	6.5	6.4	6.5	6.5	0.0	0.0	0.0
EDGWDW-24	Yes	6.4	6.3	6.4	6.4	6.3	6.4	6.4	0.0	0.0	0.0
EDGWDW-14	Yes	4.6	3.8	4.6	4.9	3.8	4.7	5.0	0.0	0.1	0.1
EDGWDW-25	Yes	7.0	6.9	6.9	6.9	6.9	6.9	6.9	0.0	0.0	0.0
OSCEOLA-09	Yes	4.8	3.9	4.7	4.9	4.0	4.8	5.0	0.0	0.1	0.1
OSCEOLA-10	Yes	4.8	3.9	4.7	4.9	4.0	4.8	5.0	0.0	0.1	0.1
EDGWDW-15	Yes	5.8	5.4	5.6	5.7	5.4	5.6	5.7	0.0	0.0	0.0
OSCEOLA-07	Yes	5.1	4.0	4.7	5.0	4.1	4.8	5.1	0.0	0.1	0.1
OSCEOLA-08	Yes	5.1	4.0	4.7	4.9	4.0	4.8	5.0	0.0	0.1	0.1
OSCEOLA-15	Yes	5.2	3.8	4.6	4.9	3.8	4.7	5.0	0.0	0.1	0.1
EDGWDW-08	Yes	5.7	4.1	4.8	5.0	4.1	4.9	5.1	0.1	0.1	0.1
EDGWDW-01	Yes	9.0	4.1	4.8	5.1	4.2	5.0	5.3	0.1	0.2	0.2
EDGWDW-02	Yes	12.7	4.1	4.8	5.0	4.2	4.8	5.0	0.1	0.1	0.1
EDGWDW-03	Yes	13.0	4.1	4.8	5.0	4.1	4.9	5.1	0.1	0.1	0.1
EDGWDW-04	Yes	13.0	4.1	4.8	5.0	4.1	4.9	5.1	0.1	0.1	0.1

Table 7D-2a. Edgewood West Alternative No. 1 Model Results - Maintenance

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 Peak Stages (ft NGVD)			Delta (Alt. 1 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
OSCEOLA-30	--	--	3.8	4.6	4.9	3.8	4.5	4.9	0.0	0.0	0.0
OSCEOLA-35	--	--	3.7	4.5	4.8	3.7	4.5	4.8	0.0	0.0	0.0
								Maximum:	**0.1**	**0.2**	**0.2**
								Minimum:	**0.0**	**0.0**	**0.0**

Table 7D-2b. Edgewood West Alternative No. 1 Model Results - Maintenance

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 Peak Stages (ft NGVD)		Delta (Alt. 1 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDW-11	No	3.5	6.3	6.9	6.6	7.3	0.3	0.4
EDGWDW-07	No	4.0	6.3	6.9	6.6	7.3	0.3	0.4
OSCEOLA-05	No	4.0	6.3	6.9	6.6	7.3	0.3	0.4
OSCEOLA-20	No	3.8	6.2	6.9	6.6	7.3	0.3	0.4
OSCEOLA-25	No	3.8	6.2	6.9	6.6	7.3	0.3	0.4
EDGWDW-17	No	5.5	6.4	6.9	6.6	7.3	0.2	0.4
EDGWDW-21	No	5.8	6.8	6.9	6.8	7.3	0.0	0.4
EDGWDW-23	No	6.5	7.1	7.2	7.1	7.3	0.0	0.1
EDGWDW-12	No	5.6	6.3	6.9	6.6	7.3	0.3	0.4
EDGWDW-16	No	5.8	6.4	6.9	6.6	7.3	0.2	0.4
EDGWDW-10	No	4.4	6.3	6.9	6.6	7.3	0.3	0.4
EDGWDW-19	No	4.5	6.2	6.9	6.6	7.3	0.3	0.4
EDGWDW-20	No	5.3	6.2	6.9	6.6	7.3	0.3	0.4
EDGWDW-09	Yes	5.7	6.3	6.9	6.6	7.3	0.3	0.4
EDGWDW-22	Yes	6.4	6.8	6.9	6.8	7.3	0.0	0.4
EDGWDW-24	Yes	6.4	6.8	6.9	6.8	7.3	0.0	0.4
EDGWDW-14	Yes	4.6	6.3	6.9	6.6	7.3	0.3	0.4
EDGWDW-25	Yes	7.0	7.0	7.0	7.0	7.3	0.0	0.3
OSCEOLA-09	Yes	4.8	6.3	6.9	6.6	7.3	0.3	0.4
OSCEOLA-10	Yes	4.8	6.3	6.9	6.6	7.3	0.3	0.4
EDGWDW-15	Yes	5.8	6.3	6.9	6.6	7.3	0.3	0.4
OSCEOLA-07	Yes	5.1	6.3	6.9	6.6	7.3	0.3	0.4
OSCEOLA-08	Yes	5.1	6.3	6.9	6.6	7.3	0.3	0.4
OSCEOLA-15	Yes	5.2	6.3	6.9	6.6	7.3	0.3	0.4
EDGWDW-08	Yes	5.7	6.3	6.9	6.6	7.3	0.3	0.4
EDGWDW-01	Yes	9.0	6.3	6.9	6.6	7.4	0.4	0.5
EDGWDW-02	Yes	12.7	6.3	6.9	6.6	7.3	0.3	0.4
EDGWDW-03	Yes	13.0	6.3	6.9	6.6	7.3	0.3	0.4
EDGWDW-04	Yes	13.0	6.3	6.9	6.6	7.3	0.3	0.4

Table 7D-2b. Edgewood West Alternative No. 1 Model Results - Maintenance

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 Peak Stages (ft NGVD)		Delta (Alt. 1 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
OSCEOLA-30	--	--	6.1	6.5	6.0	6.4	0.0	-0.1
OSCEOLA-35	--	--	5.9	6.3	5.9	6.3	0.0	0.0
						Maximum:	**0.4**	**0.5**
						Minimum:	**0.0**	**-0.1**

Table 7D-3a. Edgewood West Alternative No. 2 Model Results - Exfiltration

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2 Exfiltration (K_s=1x10^{-4}) Peak Stages (ft NGVD)			Delta (Alt. 2 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDW-11	No	3.5	4.2	4.8	5.0	4.2	4.8	5.0	0.0	0.0	0.0
EDGWDW-07	No	4.0	4.2	4.8	5.0	4.2	4.8	5.0	0.0	0.0	0.0
OSCEOLA-05	No	4.0	4.1	4.8	5.0	4.1	4.8	5.0	0.0	0.0	0.0
OSCEOLA-20	No	3.8	3.8	4.6	4.9	3.8	4.6	4.9	0.0	0.0	0.0
OSCEOLA-25	No	3.8	3.8	4.6	4.9	3.8	4.6	4.9	0.0	0.0	0.0
EDGWDW-17	No	5.5	6.0	6.1	6.1	5.4	5.8	6.0	-0.6	-0.3	-0.1
EDGWDW-21	No	5.8	6.1	6.3	6.3	5.9	6.1	6.1	-0.2	-0.2	-0.2
EDGWDW-23	No	6.5	6.8	6.9	7.0	5.7	6.5	6.7	-1.1	-0.5	-0.3
EDGWDW-12	No	5.6	5.8	5.9	6.0	5.8	5.9	6.0	0.0	0.0	0.0
EDGWDW-16	No	5.8	6.0	6.1	6.1	5.4	5.8	6.0	-0.6	-0.3	-0.1
EDGWDW-10	No	4.4	3.8	4.7	4.9	3.8	4.6	4.9	0.0	0.0	0.0
EDGWDW-19	No	4.5	4.6	4.8	4.9	4.6	4.7	4.9	0.0	0.0	0.0
EDGWDW-20	No	5.3	5.4	5.6	5.6	5.3	5.5	5.6	-0.1	0.0	0.0
EDGWDW-09	Yes	5.7	5.6	5.8	5.9	5.6	5.8	5.9	0.0	0.0	0.0
EDGWDW-22	Yes	6.4	6.4	6.5	6.5	5.4	5.9	6.1	-1.0	-0.6	-0.4
EDGWDW-24	Yes	6.4	6.3	6.4	6.4	6.3	6.3	6.4	0.0	-0.1	-0.1
EDGWDW-14	Yes	4.6	3.8	4.6	4.9	3.8	4.6	4.9	0.0	0.0	0.0
EDGWDW-25	Yes	7.0	6.9	6.9	6.9	5.5	6.2	6.5	-1.4	-0.6	-0.4
OSCEOLA-09	Yes	4.8	3.9	4.7	4.9	3.9	4.7	4.9	0.0	0.0	0.0
OSCEOLA-10	Yes	4.8	3.9	4.7	4.9	3.9	4.7	4.9	0.0	0.0	0.0
EDGWDW-15	Yes	5.8	5.4	5.6	5.7	5.4	5.6	5.7	-0.1	0.0	0.0
OSCEOLA-07	Yes	5.1	4.0	4.7	5.0	4.0	4.7	4.9	0.0	0.0	0.0
OSCEOLA-08	Yes	5.1	4.0	4.7	4.9	4.0	4.7	4.9	0.0	0.0	0.0
OSCEOLA-15	Yes	5.2	3.8	4.6	4.9	3.8	4.6	4.9	0.0	0.0	0.0
EDGWDW-08	Yes	5.7	4.1	4.8	5.0	4.1	4.8	5.0	0.0	0.0	0.0
EDGWDW-01	Yes	9.0	4.1	4.8	5.1	4.1	4.8	5.1	0.0	0.0	0.0
EDGWDW-02	Yes	12.7	4.1	4.8	5.0	4.1	4.8	4.9	0.0	0.0	0.0

Table 7D-3a. Edgewood West Alternative No. 2 Model Results - Exfiltration

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2 Exfiltration (K_s=1x10^{-4}) Peak Stages (ft NGVD)			Delta (Alt. 2 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDW-03	Yes	13.0	4.1	4.8	5.0	4.1	4.8	5.0	0.0	0.0	0.0
EDGWDW-04	Yes	13.0	4.1	4.8	5.0	4.1	4.8	5.0	0.0	0.0	0.0
OSCEOLA-30	--	--	3.8	4.6	4.9	3.8	4.5	4.9	0.0	0.0	0.0
OSCEOLA-35	--	--	3.7	4.5	4.8	3.7	4.5	4.8	0.0	0.0	0.0
								Maximum:	**0.0**	**0.0**	**0.0**
								Minimum:	**-1.4**	**-0.6**	**-0.4**

Table 7D-3b. Edgewood West Alternative No. 2 Model Results - Exfiltration

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2 Exfiltration (K_s=1x10^{-4}) Peak Stages (ft NGVD)		Delta (Alt. 2 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDW-11	No	3.5	6.3	6.9	6.2	6.9	0.0	0.0
EDGWDW-07	No	4.0	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-05	No	4.0	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-20	No	3.8	6.2	6.9	6.2	6.9	0.0	0.0
OSCEOLA-25	No	3.8	6.2	6.9	6.2	6.9	0.0	0.0
EDGWDW-17	No	5.5	6.4	6.9	6.4	6.9	0.0	0.0
EDGWDW-21	No	5.8	6.8	6.9	6.7	6.9	-0.1	0.0
EDGWDW-23	No	6.5	7.1	7.2	7.1	7.1	-0.1	0.0
EDGWDW-12	No	5.6	6.3	6.9	6.3	6.9	0.0	0.0
EDGWDW-16	No	5.8	6.4	6.9	6.4	6.9	0.0	0.0
EDGWDW-10	No	4.4	6.3	6.9	6.2	6.9	0.0	0.0
EDGWDW-19	No	4.5	6.2	6.9	6.2	6.9	0.0	0.0
EDGWDW-20	No	5.3	6.2	6.9	6.2	6.9	0.0	0.0
EDGWDW-09	Yes	5.7	6.3	6.9	6.3	6.9	0.0	0.0
EDGWDW-22	Yes	6.4	6.8	6.9	6.7	6.9	-0.1	0.0
EDGWDW-24	Yes	6.4	6.8	6.9	6.7	6.9	-0.1	0.0
EDGWDW-14	Yes	4.6	6.3	6.9	6.2	6.9	0.0	0.0
EDGWDW-25	Yes	7.0	7.0	7.0	7.0	7.0	0.0	0.0
OSCEOLA-09	Yes	4.8	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-10	Yes	4.8	6.3	6.9	6.2	6.9	0.0	0.0
EDGWDW-15	Yes	5.8	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-07	Yes	5.1	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-08	Yes	5.1	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-15	Yes	5.2	6.3	6.9	6.2	6.9	0.0	0.0
EDGWDW-08	Yes	5.7	6.3	6.9	6.3	6.9	0.0	0.0
EDGWDW-01	Yes	9.0	6.3	6.9	6.3	6.9	0.0	0.0
EDGWDW-02	Yes	12.7	6.3	6.9	6.2	6.9	0.0	0.0

Table 7D-3b. Edgewood West Alternative No. 2 Model Results - Exfiltration

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2 Exfiltration (K_s=1x10^{-4}) Peak Stages (ft NGVD)		Delta (Alt. 2 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDW-03	Yes	13.0	6.3	6.9	6.3	6.9	0.0	0.0
EDGWDW-04	Yes	13.0	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-30	--	--	6.1	6.5	6.1	6.5	0.0	0.0
OSCEOLA-35	--	--	5.9	6.3	5.9	6.3	0.0	0.0
						Maximum:	**0.0**	**0.0**
						Minimum:	**-0.1**	**0.0**

Table 7D-4a. Edgewood West Alternative No. 2 Model Results - Exfiltration

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2 Exfiltration (K_s=5x10^{-4}) Peak Stages (ft NGVD)			Delta (Alt. 2 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDW-11	No	3.5	4.2	4.8	5.0	4.2	4.8	4.9	0.0	0.0	0.0
EDGWDW-07	No	4.0	4.2	4.8	5.0	4.2	4.8	4.9	0.0	0.0	0.0
OSCEOLA-05	No	4.0	4.1	4.8	5.0	4.1	4.8	4.9	0.0	0.0	0.0
OSCEOLA-20	No	3.8	3.8	4.6	4.9	3.8	4.5	4.9	0.0	0.0	0.0
OSCEOLA-25	No	3.8	3.8	4.6	4.9	3.8	4.5	4.9	0.0	0.0	0.0
EDGWDW-17	No	5.5	6.0	6.1	6.1	3.0	3.6	5.0	-3.0	-2.5	-1.1
EDGWDW-21	No	5.8	6.1	6.3	6.3	5.6	6.0	6.1	-0.5	-0.2	-0.2
EDGWDW-23	No	6.5	6.8	6.9	7.0	3.8	5.6	6.1	-3.0	-1.3	-0.8
EDGWDW-12	No	5.6	5.8	5.9	6.0	5.8	5.9	5.9	0.0	0.0	0.0
EDGWDW-16	No	5.8	6.0	6.1	6.1	3.0	3.7	5.1	-3.0	-2.4	-1.1
EDGWDW-10	No	4.4	3.8	4.7	4.9	3.8	4.6	4.9	0.0	0.0	0.0
EDGWDW-19	No	4.5	4.6	4.8	4.9	4.6	4.7	4.9	0.0	0.0	0.0
EDGWDW-20	No	5.3	5.4	5.6	5.6	5.3	5.5	5.5	-0.1	-0.1	-0.1
EDGWDW-09	Yes	5.7	5.6	5.8	5.9	5.5	5.8	5.9	0.0	0.0	0.0
EDGWDW-22	Yes	6.4	6.4	6.5	6.5	3.0	3.5	5.0	-3.4	-3.0	-1.6
EDGWDW-24	Yes	6.4	6.3	6.4	6.4	6.3	6.3	6.4	0.0	-0.1	-0.1
EDGWDW-14	Yes	4.6	3.8	4.6	4.9	3.8	4.6	4.9	0.0	0.0	0.0
EDGWDW-25	Yes	7.0	6.9	6.9	6.9	3.0	3.5	4.9	-3.8	-3.4	-2.0
OSCEOLA-09	Yes	4.8	3.9	4.7	4.9	3.9	4.7	4.9	0.0	0.0	0.0
OSCEOLA-10	Yes	4.8	3.9	4.7	4.9	3.9	4.7	4.9	0.0	0.0	0.0
EDGWDW-15	Yes	5.8	5.4	5.6	5.7	3.2	5.0	5.5	-2.2	-0.6	-0.1
OSCEOLA-07	Yes	5.1	4.0	4.7	5.0	4.0	4.7	4.9	0.0	0.0	0.0
OSCEOLA-08	Yes	5.1	4.0	4.7	4.9	4.0	4.7	4.9	0.0	0.0	0.0
OSCEOLA-15	Yes	5.2	3.8	4.6	4.9	3.8	4.6	4.9	0.0	0.0	0.0
EDGWDW-08	Yes	5.7	4.1	4.8	5.0	4.1	4.8	4.9	0.0	0.0	0.0
EDGWDW-01	Yes	9.0	4.1	4.8	5.1	4.1	4.8	5.1	0.0	0.0	0.0
EDGWDW-02	Yes	12.7	4.1	4.8	5.0	4.1	4.8	4.9	0.0	0.0	0.0

Table 7D-4a. Edgewood West Alternative No. 2 Model Results - Exfiltration

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2 Exfiltration (K_s=5x10^{-4}) Peak Stages (ft NGVD)			Delta (Alt. 2 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDW-03	Yes	13.0	4.1	4.8	5.0	4.1	4.8	4.9	0.0	0.0	0.0
EDGWDW-04	Yes	13.0	4.1	4.8	5.0	4.1	4.8	4.9	0.0	0.0	0.0
OSCEOLA-30	--	--	3.8	4.6	4.9	3.8	4.5	4.8	0.0	0.0	0.0
OSCEOLA-35	--	--	3.7	4.5	4.8	3.7	4.5	4.8	0.0	0.0	0.0
								Maximum:	**0.0**	**0.0**	**0.0**
								Minimum:	**-3.8**	**-3.4**	**-2.0**

Table 7D-4b. Edgewood West Alternative No. 2 Model Results - Exfiltration

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2 Exfiltration (K_s=5x10^{-4}) Peak Stages (ft NGVD)		Delta (Alt. 2 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDW-11	No	3.5	6.3	6.9	6.2	6.9	0.0	0.0
EDGWDW-07	No	4.0	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-05	No	4.0	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-20	No	3.8	6.2	6.9	6.2	6.8	0.0	0.0
OSCEOLA-25	No	3.8	6.2	6.9	6.2	6.8	0.0	0.0
EDGWDW-17	No	5.5	6.4	6.9	6.3	6.9	-0.1	0.0
EDGWDW-21	No	5.8	6.8	6.9	6.6	6.9	-0.2	0.0
EDGWDW-23	No	6.5	7.1	7.2	7.0	7.1	-0.1	-0.1
EDGWDW-12	No	5.6	6.3	6.9	6.2	6.9	0.0	0.0
EDGWDW-16	No	5.8	6.4	6.9	6.3	6.9	-0.1	0.0
EDGWDW-10	No	4.4	6.3	6.9	6.2	6.9	0.0	-0.1
EDGWDW-19	No	4.5	6.2	6.9	6.2	6.9	0.0	0.0
EDGWDW-20	No	5.3	6.2	6.9	6.2	6.9	0.0	0.0
EDGWDW-09	Yes	5.7	6.3	6.9	6.3	6.9	0.0	0.0
EDGWDW-22	Yes	6.4	6.8	6.9	6.6	6.9	-0.2	0.0
EDGWDW-24	Yes	6.4	6.8	6.9	6.6	6.9	-0.2	0.0
EDGWDW-14	Yes	4.6	6.3	6.9	6.2	6.9	0.0	-0.1
EDGWDW-25	Yes	7.0	7.0	7.0	6.9	7.0	-0.1	0.0
OSCEOLA-09	Yes	4.8	6.3	6.9	6.2	6.9	0.0	-0.1
OSCEOLA-10	Yes	4.8	6.3	6.9	6.2	6.9	0.0	-0.1
EDGWDW-15	Yes	5.8	6.3	6.9	6.2	6.9	0.0	-0.1
OSCEOLA-07	Yes	5.1	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-08	Yes	5.1	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-15	Yes	5.2	6.3	6.9	6.2	6.9	0.0	-0.1
EDGWDW-08	Yes	5.7	6.3	6.9	6.3	6.9	0.0	0.0
EDGWDW-01	Yes	9.0	6.3	6.9	6.2	6.9	0.0	0.0
EDGWDW-02	Yes	12.7	6.3	6.9	6.2	6.9	0.0	-0.1

Table 7D-4b. Edgewood West Alternative No. 2 Model Results - Exfiltration

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2 Exfiltration (K_s=5x10^{-4}) Peak Stages (ft NGVD)		Delta (Alt. 2 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDW-03	Yes	13.0	6.3	6.9	6.3	6.9	0.0	0.0
EDGWDW-04	Yes	13.0	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-30	--	--	6.1	6.5	6.1	6.5	0.0	0.0
OSCEOLA-35	--	--	5.9	6.3	5.9	6.3	0.0	0.0
						Maximum:	**0.0**	**0.0**
						Minimum:	**-0.2**	**-0.1**

Table 7D-5a. Edgewood West Alternative No. 4 Model Results - Storage

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 4 Storage Peak Stages (ft NGVD)			Delta (Alt. 4 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDW-11	No	3.5	4.2	4.8	5.0	4.2	4.8	5.0	0.0	0.0	0.0
EDGWDW-07	No	4.0	4.2	4.8	5.0	4.2	4.8	5.0	0.0	0.0	0.0
OSCEOLA-05	No	4.0	4.1	4.8	5.0	4.1	4.8	5.0	0.0	0.0	0.0
OSCEOLA-20	No	3.8	3.8	4.6	4.9	3.8	4.5	4.9	0.0	0.0	0.0
OSCEOLA-25	No	3.8	3.8	4.6	4.9	3.8	4.5	4.9	0.0	0.0	0.0
EDGWDW-17	No	5.5	6.0	6.1	6.1	5.7	6.0	6.1	-0.3	-0.1	0.0
EDGWDW-21	No	5.8	6.1	6.3	6.3	5.6	5.9	6.0	-0.5	-0.4	-0.3
EDGWDW-23	No	6.5	6.8	6.9	7.0	5.8	6.4	6.6	-1.0	-0.5	-0.4
EDGWDW-12	No	5.6	5.8	5.9	6.0	5.7	5.9	5.9	-0.2	-0.1	0.0
EDGWDW-16	No	5.8	6.0	6.1	6.1	5.8	6.0	6.1	-0.2	-0.1	0.0
EDGWDW-10	No	4.4	3.8	4.7	4.9	3.8	4.6	4.9	0.0	0.0	0.0
EDGWDW-19	No	4.5	4.6	4.8	4.9	4.6	4.7	4.9	0.0	0.0	0.0
EDGWDW-20	No	5.3	5.4	5.6	5.6	5.4	5.5	5.6	0.0	0.0	0.0
EDGWDW-09	Yes	5.7	5.6	5.8	5.9	5.5	5.7	5.8	0.0	-0.1	-0.1
EDGWDW-22	Yes	6.4	6.4	6.5	6.5	5.9	6.3	6.4	-0.6	-0.2	-0.1
EDGWDW-24	Yes	6.4	6.3	6.4	6.4	4.1	5.2	5.7	-2.2	-1.2	-0.8
EDGWDW-14	Yes	4.6	3.8	4.6	4.9	3.8	4.6	4.9	0.0	0.0	0.0
EDGWDW-25	Yes	7.0	6.9	6.9	6.9	4.9	6.3	6.7	-2.0	-0.6	-0.2
OSCEOLA-09	Yes	4.8	3.9	4.7	4.9	3.9	4.7	4.9	0.0	0.0	0.0
OSCEOLA-10	Yes	4.8	3.9	4.7	4.9	3.9	4.7	4.9	0.0	0.0	0.0
EDGWDW-15	Yes	5.8	5.4	5.6	5.7	5.4	5.6	5.6	0.0	0.0	0.0
OSCEOLA-07	Yes	5.1	4.0	4.7	5.0	4.0	4.7	4.9	0.0	0.0	0.0
OSCEOLA-08	Yes	5.1	4.0	4.7	4.9	4.0	4.7	4.9	0.0	0.0	0.0
OSCEOLA-15	Yes	5.2	3.8	4.6	4.9	3.8	4.6	4.9	0.0	0.0	0.0
EDGWDW-08	Yes	5.7	4.1	4.8	5.0	4.1	4.8	5.0	0.0	0.0	0.0
EDGWDW-01	Yes	9.0	4.1	4.8	5.1	4.1	4.8	5.1	0.0	0.0	0.0
EDGWDW-02	Yes	12.7	4.1	4.8	5.0	4.1	4.8	4.9	0.0	0.0	0.0

Table 7D-5a. Edgewood West Alternative No. 4 Model Results - Storage

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 4 Storage Peak Stages (ft NGVD)			Delta (Alt. 4 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDW-03	Yes	13.0	4.1	4.8	5.0	4.1	4.8	5.0	0.0	0.0	0.0
EDGWDW-04	Yes	13.0	4.1	4.8	5.0	4.1	4.8	5.0	0.0	0.0	0.0
OSCEOLA-30	--	--	3.8	4.6	4.9	3.8	4.5	4.8	0.0	0.0	0.0
OSCEOLA-35	--	--	3.7	4.5	4.8	3.7	4.5	4.8	0.0	0.0	0.0
								Maximum:	**0.0**	**0.0**	**0.0**
								Minimum:	**-2.2**	**-1.2**	**-0.8**

Table 7D-5b. Edgewood West Alternative No. 4 Model Results - Storage

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 4 Storage Peak Stages (ft NGVD)		Delta (Alt. 4 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDW-11	No	3.5	6.3	6.9	6.2	6.9	0.0	0.0
EDGWDW-07	No	4.0	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-05	No	4.0	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-20	No	3.8	6.2	6.9	6.2	6.9	0.0	0.0
OSCEOLA-25	No	3.8	6.2	6.9	6.2	6.9	0.0	0.0
EDGWDW-17	No	5.5	6.4	6.9	6.4	6.9	0.0	0.0
EDGWDW-21	No	5.8	6.8	6.9	6.5	6.9	-0.3	0.0
EDGWDW-23	No	6.5	7.1	7.2	7.0	7.1	-0.1	0.0
EDGWDW-12	No	5.6	6.3	6.9	6.3	6.9	0.0	0.0
EDGWDW-16	No	5.8	6.4	6.9	6.4	6.9	0.0	0.0
EDGWDW-10	No	4.4	6.3	6.9	6.2	6.9	0.0	0.0
EDGWDW-19	No	4.5	6.2	6.9	6.2	6.9	0.0	0.0
EDGWDW-20	No	5.3	6.2	6.9	6.2	6.9	0.0	0.0
EDGWDW-09	Yes	5.7	6.3	6.9	6.3	6.9	0.0	0.0
EDGWDW-22	Yes	6.4	6.8	6.9	6.6	6.9	-0.2	0.0
EDGWDW-24	Yes	6.4	6.8	6.9	6.5	6.9	-0.3	0.0
EDGWDW-14	Yes	4.6	6.3	6.9	6.2	6.9	0.0	0.0
EDGWDW-25	Yes	7.0	7.0	7.0	7.0	7.0	0.0	0.0
OSCEOLA-09	Yes	4.8	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-10	Yes	4.8	6.3	6.9	6.2	6.9	0.0	0.0
EDGWDW-15	Yes	5.8	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-07	Yes	5.1	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-08	Yes	5.1	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-15	Yes	5.2	6.3	6.9	6.2	6.9	0.0	0.0
EDGWDW-08	Yes	5.7	6.3	6.9	6.3	6.9	0.0	0.0
EDGWDW-01	Yes	9.0	6.3	6.9	6.3	6.9	0.0	0.0
EDGWDW-02	Yes	12.7	6.3	6.9	6.2	6.9	0.0	0.0

Table 7D-5b. Edgewood West Alternative No. 4 Model Results - Storage

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 4 Storage Peak Stages (ft NGVD)		Delta (Alt. 4 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDW-03	Yes	13.0	6.3	6.9	6.3	6.9	0.0	0.0
EDGWDW-04	Yes	13.0	6.3	6.9	6.2	6.9	0.0	0.0
OSCEOLA-30	--	--	6.1	6.5	6.1	6.5	0.0	0.0
OSCEOLA-35	--	--	5.9	6.3	5.9	6.3	0.0	0.0
						Maximum:	**0.0**	**0.0**
						Minimum:	**-0.3**	**0.0**

Table 7D-6a. Edgewood West Alternative No. 4 Model Results - Storage - 2 Ponds

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 4 Storage Peak Stages (ft NGVD)			Delta (Alt. 4 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDW-11	No	3.5	4.2	4.8	5.0	4.2	4.7	4.9	0.0	0.0	0.0
EDGWDW-07	No	4.0	4.2	4.8	5.0	4.3	4.7	4.9	0.0	0.0	0.0
OSCEOLA-05	No	4.0	4.1	4.8	5.0	4.1	4.7	4.9	0.0	0.0	0.0
OSCEOLA-20	No	3.8	3.8	4.6	4.9	3.8	4.5	4.9	0.0	0.0	0.0
OSCEOLA-25	No	3.8	3.8	4.6	4.9	3.8	4.5	4.9	0.0	0.0	0.0
EDGWDW-17	No	5.5	6.0	6.1	6.1	5.2	5.6	5.8	-0.8	-0.5	-0.3
EDGWDW-21	No	5.8	6.1	6.3	6.3	4.5	5.0	5.6	-1.6	-1.2	-0.7
EDGWDW-23	No	6.5	6.8	6.9	7.0	5.4	6.2	6.4	-1.4	-0.7	-0.5
EDGWDW-12	No	5.6	5.8	5.9	6.0	5.2	5.6	5.8	-0.6	-0.3	-0.2
EDGWDW-16	No	5.8	6.0	6.1	6.1	5.2	5.6	5.8	-0.8	-0.5	-0.3
EDGWDW-10	No	4.4	3.8	4.7	4.9	3.8	4.6	4.9	0.0	-0.1	0.0
EDGWDW-19	No	4.5	4.6	4.8	4.9	4.6	4.7	4.9	-0.1	-0.1	0.0
EDGWDW-20	No	5.3	5.4	5.6	5.6	5.2	5.4	5.5	-0.2	-0.1	-0.1
EDGWDW-09	Yes	5.7	5.6	5.8	5.9	5.0	5.5	5.6	-0.5	-0.3	-0.3
EDGWDW-22	Yes	6.4	6.4	6.5	6.5	4.7	5.1	5.6	-1.7	-1.4	-0.9
EDGWDW-24	Yes	6.4	6.3	6.4	6.4	3.9	5.0	5.6	-2.4	-1.4	-0.8
EDGWDW-14	Yes	4.6	3.8	4.6	4.9	3.8	4.5	4.9	0.0	0.0	0.0
EDGWDW-25	Yes	7.0	6.9	6.9	6.9	4.6	5.0	5.6	-2.3	-1.9	-1.3
OSCEOLA-09	Yes	4.8	3.9	4.7	4.9	3.9	4.6	4.9	0.0	0.0	0.0
OSCEOLA-10	Yes	4.8	3.9	4.7	4.9	3.9	4.6	4.9	0.0	0.0	0.0
EDGWDW-15	Yes	5.8	5.4	5.6	5.7	5.0	5.4	5.5	-0.4	-0.2	-0.1
OSCEOLA-07	Yes	5.1	4.0	4.7	5.0	4.0	4.7	4.9	0.0	0.0	0.0
OSCEOLA-08	Yes	5.1	4.0	4.7	4.9	4.0	4.7	4.9	0.0	0.0	0.0
OSCEOLA-15	Yes	5.2	3.8	4.6	4.9	3.8	4.5	4.9	0.0	0.0	0.0
EDGWDW-08	Yes	5.7	4.1	4.8	5.0	4.1	4.7	4.9	0.0	0.0	0.0
EDGWDW-01	Yes	9.0	4.1	4.8	5.1	4.1	4.8	5.1	0.0	0.0	0.0
EDGWDW-02	Yes	12.7	4.1	4.8	5.0	4.1	4.7	4.9	0.0	0.0	0.0

Table 7D-6a. Edgewood West Alternative No. 4 Model Results - Storage - 2 Ponds

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 4 Storage Peak Stages (ft NGVD)			Delta (Alt. 4 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDW-03	Yes	13.0	4.1	4.8	5.0	4.1	4.7	4.9	0.0	0.0	0.0
EDGWDW-04	Yes	13.0	4.1	4.8	5.0	4.1	4.7	4.9	0.0	0.0	0.0
OSCEOLA-30	--	--	3.8	4.6	4.9	3.8	4.5	4.8	0.0	0.0	0.0
OSCEOLA-35	--	--	3.7	4.5	4.8	3.7	4.5	4.8	0.0	0.0	0.0
								Maximum:	**0.0**	**0.0**	**0.0**
								Minimum:	**-2.4**	**-1.9**	**-1.3**

Table 7D-6b. Edgewood West Alternative No. 4 Model Results - Storage - 2 Ponds

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 4 Storage Peak Stages (ft NGVD)		Delta (Alt. 4 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDW-11	No	3.5	6.3	6.9	6.2	6.8	0.0	-0.1
EDGWDW-07	No	4.0	6.3	6.9	6.2	6.8	0.0	-0.1
OSCEOLA-05	No	4.0	6.3	6.9	6.2	6.8	0.0	-0.1
OSCEOLA-20	No	3.8	6.2	6.9	6.2	6.8	0.0	-0.1
OSCEOLA-25	No	3.8	6.2	6.9	6.2	6.8	0.0	-0.1
EDGWDW-17	No	5.5	6.4	6.9	6.3	6.8	-0.1	-0.1
EDGWDW-21	No	5.8	6.8	6.9	6.4	6.8	-0.4	0.0
EDGWDW-23	No	6.5	7.1	7.2	6.9	7.1	-0.2	-0.1
EDGWDW-12	No	5.6	6.3	6.9	6.2	6.8	0.0	-0.1
EDGWDW-16	No	5.8	6.4	6.9	6.3	6.8	-0.1	-0.1
EDGWDW-10	No	4.4	6.3	6.9	6.2	6.8	0.0	-0.1
EDGWDW-19	No	4.5	6.2	6.9	6.2	6.8	0.0	-0.1
EDGWDW-20	No	5.3	6.2	6.9	6.2	6.8	0.0	-0.1
EDGWDW-09	Yes	5.7	6.3	6.9	6.3	6.9	0.0	-0.1
EDGWDW-22	Yes	6.4	6.8	6.9	6.5	6.8	-0.2	0.0
EDGWDW-24	Yes	6.4	6.8	6.9	6.4	6.8	-0.4	0.0
EDGWDW-14	Yes	4.6	6.3	6.9	6.2	6.8	0.0	-0.1
EDGWDW-25	Yes	7.0	7.0	7.0	6.6	6.9	-0.4	-0.2
OSCEOLA-09	Yes	4.8	6.3	6.9	6.2	6.8	0.0	-0.1
OSCEOLA-10	Yes	4.8	6.3	6.9	6.2	6.8	0.0	-0.1
EDGWDW-15	Yes	5.8	6.3	6.9	6.2	6.8	0.0	-0.1
OSCEOLA-07	Yes	5.1	6.3	6.9	6.2	6.8	0.0	-0.1
OSCEOLA-08	Yes	5.1	6.3	6.9	6.2	6.8	0.0	-0.1
OSCEOLA-15	Yes	5.2	6.3	6.9	6.2	6.8	0.0	-0.1
EDGWDW-08	Yes	5.7	6.3	6.9	6.3	6.9	0.0	-0.1
EDGWDW-01	Yes	9.0	6.3	6.9	6.3	6.9	0.0	-0.1
EDGWDW-02	Yes	12.7	6.3	6.9	6.2	6.8	0.0	-0.1

Table 7D-6b. Edgewood West Alternative No. 4 Model Results - Storage - 2 Ponds

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 4 Storage Peak Stages (ft NGVD)		Delta (Alt. 4 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDW-03	Yes	13.0	6.3	6.9	6.3	6.9	0.0	-0.1
EDGWDW-04	Yes	13.0	6.3	6.9	6.2	6.8	0.0	-0.1
OSCEOLA-30	--	--	6.1	6.5	6.1	6.5	0.0	0.0
OSCEOLA-35	--	--	5.9	6.3	5.9	6.3	0.0	0.0
						Maximum:	**0.0**	**0.0**
						Minimum:	**-0.4**	**-0.2**

Table 7D-7a. Edgewood West Alternative No. 5 Model Results - Storage & Exfiltration

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 5 Storage & Exfil Peak Stages (ft NGVD)			Delta (Alt. 5 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDW-11	No	3.5	4.2	4.8	5.0	4.2	4.7	4.9	0.0	-0.1	-0.1
EDGWDW-07	No	4.0	4.2	4.8	5.0	4.2	4.7	4.9	0.0	-0.1	-0.1
OSCEOLA-05	No	4.0	4.1	4.8	5.0	4.0	4.7	4.9	-0.1	-0.1	-0.1
OSCEOLA-20	No	3.8	3.8	4.6	4.9	3.8	4.5	4.8	0.0	0.0	0.0
OSCEOLA-25	No	3.8	3.8	4.6	4.9	3.8	4.5	4.8	0.0	0.0	0.0
EDGWDW-17	No	5.5	6.0	6.1	6.1	3.8	5.2	5.5	-2.2	-0.9	-0.6
EDGWDW-21	No	5.8	6.1	6.3	6.3	5.1	5.7	5.9	-1.0	-0.5	-0.5
EDGWDW-23	No	6.5	6.8	6.9	7.0	3.8	5.9	6.3	-3.0	-1.0	-0.7
EDGWDW-12	No	5.6	5.8	5.9	6.0	4.7	5.3	5.6	-1.1	-0.7	-0.4
EDGWDW-16	No	5.8	6.0	6.1	6.1	3.7	5.2	5.5	-2.3	-0.9	-0.6
EDGWDW-10	No	4.4	3.8	4.7	4.9	3.8	4.6	4.9	0.0	-0.1	0.0
EDGWDW-19	No	4.5	4.6	4.8	4.9	4.6	4.7	4.8	0.0	-0.1	0.0
EDGWDW-20	No	5.3	5.4	5.6	5.6	5.3	5.5	5.5	-0.1	-0.1	-0.1
EDGWDW-09	Yes	5.7	5.6	5.8	5.9	4.8	5.3	5.5	-0.8	-0.5	-0.4
EDGWDW-22	Yes	6.4	6.4	6.5	6.5	3.6	5.1	5.5	-2.8	-1.4	-1.0
EDGWDW-24	Yes	6.4	6.3	6.4	6.4	5.7	5.9	6.0	-0.6	-0.5	-0.5
EDGWDW-14	Yes	4.6	3.8	4.6	4.9	3.8	4.5	4.9	0.0	0.0	0.0
EDGWDW-25	Yes	7.0	6.9	6.9	6.9	3.0	4.8	5.4	-3.8	-2.1	-1.5
OSCEOLA-09	Yes	4.8	3.9	4.7	4.9	3.9	4.6	4.9	0.0	-0.1	-0.1
OSCEOLA-10	Yes	4.8	3.9	4.7	4.9	3.9	4.6	4.9	0.0	-0.1	0.0
EDGWDW-15	Yes	5.8	5.4	5.6	5.7	3.8	5.5	5.5	-1.7	-0.1	-0.1
OSCEOLA-07	Yes	5.1	4.0	4.7	5.0	3.9	4.7	4.9	-0.1	-0.1	-0.1
OSCEOLA-08	Yes	5.1	4.0	4.7	4.9	3.9	4.6	4.9	-0.1	-0.1	-0.1
OSCEOLA-15	Yes	5.2	3.8	4.6	4.9	3.8	4.5	4.9	0.0	0.0	0.0
EDGWDW-08	Yes	5.7	4.1	4.8	5.0	4.0	4.7	4.9	-0.1	-0.1	-0.1
EDGWDW-01	Yes	9.0	4.1	4.8	5.1	4.1	4.8	5.1	0.0	0.0	0.0
EDGWDW-02	Yes	12.7	4.1	4.8	5.0	4.1	4.7	4.9	0.0	-0.1	-0.1

Table 7D-7a. Edgewood West Alternative No. 5 Model Results - Storage & Exfiltration

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 5 Storage & Exfil Peak Stages (ft NGVD)			Delta (Alt. 5 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
EDGWDW-03	Yes	13.0	4.1	4.8	5.0	4.0	4.7	4.9	-0.1	-0.1	-0.1
EDGWDW-04	Yes	13.0	4.1	4.8	5.0	4.0	4.7	4.9	-0.1	-0.1	-0.1
OSCEOLA-30	--	--	3.8	4.6	4.9	3.8	4.5	4.8	0.0	0.0	0.0
OSCEOLA-35	--	--	3.7	4.5	4.8	3.7	4.5	4.8	0.0	0.0	0.0
								Maximum:	**0.0**	**0.0**	**0.0**
								Minimum:	**-3.8**	**-2.1**	**-1.5**

Table 7D-7b. Edgewood West Alternative No. 5 Model Results - Storage & Exfiltration

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 5 Storage & Exfil Peak Stages (ft NGVD)		Delta (Alt. 5 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDW-11	No	3.5	6.3	6.9	6.2	6.8	-0.1	-0.1
EDGWDW-07	No	4.0	6.3	6.9	6.2	6.8	-0.1	-0.1
OSCEOLA-05	No	4.0	6.3	6.9	6.2	6.8	-0.1	-0.1
OSCEOLA-20	No	3.8	6.2	6.9	6.2	6.8	-0.1	-0.1
OSCEOLA-25	No	3.8	6.2	6.9	6.2	6.8	-0.1	-0.1
EDGWDW-17	No	5.5	6.4	6.9	6.3	6.8	-0.1	-0.1
EDGWDW-21	No	5.8	6.8	6.9	6.5	6.8	-0.3	-0.1
EDGWDW-23	No	6.5	7.1	7.2	7.0	7.1	-0.1	-0.1
EDGWDW-12	No	5.6	6.3	6.9	6.2	6.8	-0.1	-0.1
EDGWDW-16	No	5.8	6.4	6.9	6.3	6.8	-0.1	-0.1
EDGWDW-10	No	4.4	6.3	6.9	6.2	6.8	-0.1	-0.1
EDGWDW-19	No	4.5	6.2	6.9	6.2	6.8	-0.1	-0.1
EDGWDW-20	No	5.3	6.2	6.9	6.2	6.8	-0.1	-0.1
EDGWDW-09	Yes	5.7	6.3	6.9	6.2	6.8	0.0	-0.1
EDGWDW-22	Yes	6.4	6.8	6.9	6.5	6.8	-0.3	-0.1
EDGWDW-24	Yes	6.4	6.8	6.9	6.6	6.8	-0.2	-0.1
EDGWDW-14	Yes	4.6	6.3	6.9	6.2	6.8	-0.1	-0.1
EDGWDW-25	Yes	7.0	7.0	7.0	6.9	7.0	-0.1	0.0
OSCEOLA-09	Yes	4.8	6.3	6.9	6.2	6.8	-0.1	-0.1
OSCEOLA-10	Yes	4.8	6.3	6.9	6.2	6.8	-0.1	-0.1
EDGWDW-15	Yes	5.8	6.3	6.9	6.2	6.8	-0.1	-0.1
OSCEOLA-07	Yes	5.1	6.3	6.9	6.2	6.8	-0.1	-0.1
OSCEOLA-08	Yes	5.1	6.3	6.9	6.2	6.8	-0.1	-0.1
OSCEOLA-15	Yes	5.2	6.3	6.9	6.2	6.8	-0.1	-0.1
EDGWDW-08	Yes	5.7	6.3	6.9	6.2	6.8	-0.1	-0.1
EDGWDW-01	Yes	9.0	6.3	6.9	6.2	6.8	-0.1	-0.1
EDGWDW-02	Yes	12.7	6.3	6.9	6.2	6.8	-0.1	-0.1

Table 7D-7b. Edgewood West Alternative No. 5 Model Results - Storage & Exfiltration

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 5 Storage & Exfil Peak Stages (ft NGVD)		Delta (Alt. 5 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
EDGWDW-03	Yes	13.0	6.3	6.9	6.2	6.8	-0.1	-0.1
EDGWDW-04	Yes	13.0	6.3	6.9	6.2	6.8	-0.1	-0.1
OSCEOLA-30	--	--	6.1	6.5	6.0	6.4	0.0	0.0
OSCEOLA-35	--	--	5.9	6.3	5.9	6.3	0.0	0.0
						Maximum:	**0.0**	**0.0**
						Minimum:	**-0.3**	**-0.1**

Appendix 7E
Surface Water Management Model Results

The following tables present the base model and alternative results for simulations of the City of Fort Lauderdale EPA SWMM for the Progresso Project.

Table 7E-1. Progresso Base Model Results

Model Node	Description	5-Yr LOS Goal Met	Reference Elevation (ft NGVD)	Design Storm Peak Stages (ft NGVD)				
				2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
BRO-OF1	Located at HMMARSHEE ST and SW 5TH AVE	Yes	4.9	3.8	4.7	5.0	5.7	6.1
ESUNR-10	Located at E SUNRISE BLVD and NE 4TH AVE	Yes	7.3	6.6	7.0	7.1	7.2	7.3
NANDAV1-2	Located at NE 8TH ST and PROGRESSO DR	No	6.4	6.8	7.0	7.1	7.2	7.3
NANDAV1-4	Located at N ANDREWS AVE and NW 8TH ST	No	6.2	4.1	6.8	6.9	7.2	7.3
NANDAV1-6	Located at NE 1ST AVE and NE 8TH ST	Yes	6.8	5.1	6.8	6.9	7.2	7.3
NANDAV2-2	Located at NE 1ST AVE and NE 9TH ST	Yes	6.6	6.7	6.8	6.9	7.2	7.3
NANDAV2-4	Located at NE 9TH ST and N ANDREWS AVE	No	6.4	4.9	6.8	6.9	7.2	7.3
NANDAV2-6	Located at NW 1ST AVE and NW 9TH ST	No	6.3	5.4	6.8	6.9	7.2	7.3
NE2AV1-2	Located at NE 2ND AVE and NE 9TH ST	Yes	7.0	4.6	5.8	6.2	6.8	7.0
NE3AV1-2	Located at NE 3RD AVE and NE 9TH ST	Yes	5.9	5.6	6.1	6.3	6.8	7.0
NE4A-15	Located at NE 11TH ST and NE 4TH AVE - Boundary Condition	N/A	N/A	6.8	7.0	7.1	7.2	7.3
NE4AV1-2	Located at NE 9TH ST and PROGRESSO DR	Yes	6.4	6.3	6.5	6.5	6.8	7.0
NESUN-2	Located at E SUNRISE BLVD and NE 5TH AVE - Boundary Condition	No	7.0	7.0	7.3	7.4	7.6	7.8
NEW-2	Located at NW 5TH ST and NW 4TH AVE	Yes	9.0	5.4	6.6	6.7	7.1	7.2
NFNR020	Located at SW 5TH AVE and SW 4TH AVE	N/A	N/A	3.3	3.9	4.1	4.8	5.2
NFNR020OL	Located at SW 4TH PLACE and SW 7TH AVE - Boundary Condition	N/A	N/A	3.3	3.9	4.1	5.0	5.2
NW10TR1-2	Located at NW 10TH TER and NW 7TH ST	Yes	6.7	4.9	6.0	6.3	6.9	7.0
NW10TR2-2	Located at NW 10TH AVE and NW 8TH ST	No	5.9	6.4	6.7	6.7	6.9	7.0
NW10TR3-2	Located at W SUNRISE BLVD and NW 10TH TER	Yes	7.5	7.3	7.6	7.7	8.0	8.2
NW10TR3-4	Located at NW 9TH ST and NW 10TH TER	No	6.4	6.4	6.7	6.7	6.9	7.0
NW15A-15	Located at NW 3RD ST and NW 11TH AVE - Boundary Condition	N/A	N/A	5.9	6.3	6.5	6.6	6.9
NW2AV1-2	Located at NW 5TH ST and NW 2ND AVE	Yes	7.2	5.3	6.8	6.9	7.2	7.3
NW2AV1-4	Located at NW 2ND TER and NW 5TH ST	No	6.7	5.7	7.0	7.1	7.6	7.7
NW2AV2-2	Located at NW 2ND AVE and NW 6TH ST	No	6.4	5.6	6.8	6.9	7.2	7.3
NW2AV2-4	Located at NW 3RD AVE and NW 6TH ST	No	6.4	6.4	6.8	6.9	7.2	7.3

Table 7E-1. Progresso Base Model Results

Model Node	Description	5-Yr LOS Goal Met	Reference Elevation (ft NGVD)	Design Storm Peak Stages (ft NGVD)				
				2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
NW2AV3-2	Located at NW 3RD AVE and NW 7TH ST	No	6.2	6.0	6.8	6.9	7.2	7.3
NW2AV3-4	Located at NW 1ST AVE and NW 7TH ST	Yes	6.6	5.5	6.8	6.9	7.2	7.3
NW2AV4-3	Located at NW 2ND AVE and NW 8TH ST	No	6.2	6.1	6.8	6.9	7.2	7.3
NW2AV4-4	Located at NW 1ST AVE and NW 8TH ST	No	6.2	5.9	6.8	6.9	7.2	7.3
NW2AV5-2	Located at NW 2ND AVE and NW 9TH ST	No	6.0	5.8	6.8	6.9	7.2	7.3
NW2AV5-6	Located at NW 9TH ST and NW 3RD AVE	No	6.0	6.2	6.8	6.9	7.2	7.3
NW4AV1-2	Located at NW 3RD AVE and NW 2ND ST	Yes	7.0	6.4	6.7	6.8	7.0	7.2
NW4AV1-6	Located at NW 2ND ST and NW 2ND AVE	No	5.9	6.5	6.8	6.9	7.1	7.2
NW4AV2-2	Located at NW 4TH PL and NW 4TH AVE	Yes	6.8	5.4	6.6	6.8	7.2	7.4
NW4AV2-4	Located at CITY VIEW DR and NW 4TH ST	Yes	6.9	5.3	6.6	6.8	7.2	7.4
NW4AV3-2	Located at NW 6TH ST and NW 4TH AVE	No	6.0	5.7	6.8	6.9	7.2	7.3
NW4AV3-4	Located at NW 4TH AVE and NW 6TH ST	Yes	6.6	5.5	6.8	6.9	7.2	7.3
NW4AV3-6	Located at NW 5TH LN and NW 4TH AVE	No	6.4	5.4	6.7	6.8	7.1	7.3
NW4AV4-2	Located at NW 4TH AVE and NW 8TH ST	No	4.9	6.0	6.8	6.9	7.2	7.3
NW4AV4-4	Located at NW 4TH AVE and NW 7TH ST	No	6.0	5.9	6.8	6.9	7.2	7.3
NW4AV4-6	Located at NW 5TH AVE and NW 7TH ST	No	6.0	5.8	6.8	6.9	7.2	7.3
NW4AV4-8	Located at NW 6TH AVE and NW 7TH ST	No	5.9	6.1	6.8	6.9	7.2	7.3
NW4AV5-2	Located at NW 4TH AVE and NW 8TH ST	No	5.8	6.0	6.8	6.9	7.2	7.3
NW4AV5-4	Located at NW 3RD AVE and NW 8TH ST	No	5.6	6.2	6.8	6.9	7.2	7.3
NW4AV6-2	Located at NW 4TH AVE and NW 9TH ST	No	5.6	6.2	6.9	6.9	7.2	7.3
NW4AV6-6	Located at NW 9TH ST and NW 5TH AVE	No	5.6	6.2	6.8	6.9	7.2	7.3
NW4AV6-8	Located at NW 9TH ST and NW 6TH AVE	No	6.1	6.2	6.9	6.9	7.2	7.3
NW5A-05	Located at NW 11TH ST and NW 5TH AVE - Boundary Condition	N/A	N/A	6.4	6.9	7.0	7.2	7.3
NW5A-05OL	Located at NW 11TH ST and NW 4TH AVE - Boundary Condition	N/A	N/A	6.4	6.9	7.0	7.2	7.3
NW5AV1-2	Located at NW 4TH ST and NW 5TH AVE	Yes	7.3	5.0	6.3	6.6	7.0	7.2
NW5AV1-6	Located at NW 2ND ST and NW 5TH AVE	Yes	6.8	4.3	5.2	5.5	6.2	6.5
NW5AV1-8	Located at BROWARD BLVD and NW 4TH AVE	Yes	5.9	3.8	4.9	5.4	6.1	6.3

Table 7E-1. Progresso Base Model Results

Model Node	Description	5-Yr LOS Goal Met	Reference Elevation (ft NGVD)	Design Storm Peak Stages (ft NGVD)				
				2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
NW5AV1-9	Located at W BROWARD BLVD and NW 5TH AVE	Yes	5.9	3.9	4.8	5.1	5.9	6.3
NW5AV2-2	Located at NW 5TH ST and NW 6TH AVE	Yes	7.3	6.8	7.0	7.0	7.2	7.3
NW5AV2-6	Located at NW 5TH ST and NW 5TH AVE	No	6.7	6.7	7.1	7.2	7.5	7.6
NW5AV3-2	Located at SISTRUNK BLVD and NW 6TH AVE	Yes	6.7	5.4	6.8	6.9	7.2	7.3
NW5AV4-2	Located at NW 6TH AVE and NW 8TH ST	No	6.4	6.6	6.9	6.9	7.2	7.3
NW5AV4-4	Located at NW 8TH ST and NW 5TH AVE	No	6.4	6.2	6.8	6.9	7.2	7.3
NW5AV4-6	Located at NW 8TH ST and NW 5TH AVE	No	5.4	6.2	6.8	6.9	7.2	7.3
NW6AV1-2	Located at NW 6TH AVE and NW 2ND ST	Yes	6.5	4.4	5.5	5.8	6.5	6.7
NW7AV1-2	Located at NW 7TH AVE and NW 2ND ST	Yes	6.1	4.6	5.5	5.8	6.6	6.8
NW7AV1-4	Located at NW 8TH AVE and NW 1ST ST	Yes	6.4	4.5	5.7	6.1	6.7	6.9
NW7AV1-6	Located at NW 1ST ST and NW 7TH AVE	Yes	6.5	4.6	5.5	5.8	6.5	6.7
NW7AV1-8	Located at NW 1ST ST and NW 8TH AVE	Yes	6.4	4.5	5.5	5.8	7.1	7.4
NW7AV2-2	Located at NW 4TH ST and NW 7TH AVE	Yes	6.7	4.8	5.8	6.1	6.7	6.9
NW7AV2-4	Located at NW 4TH ST and NW 7TH TER	Yes	6.8	6.9	7.1	7.1	7.2	7.3
NW7AV3-2	Located at NW 5TH ST and NW 7TH AVE	Yes	6.2	5.2	6.3	6.6	7.0	7.2
NW7AV3-4	Located at NW 5TH ST and NW 8TH AVE	Yes	7.1	5.4	6.4	6.7	7.1	7.3
NW7AV4-2	Located at NW 6TH ST and NW 7TH AVE	Yes	7.1	5.4	6.6	6.8	7.0	7.2
NW7AV4-4	Located at NW 6TH ST and NW 7TH TER	No	6.6	6.7	6.9	7.0	7.3	7.5
NW7AV5-2	Located at NW 7TH AVE and NW 77TH ST	No	6.0	5.7	6.7	6.8	7.0	7.2
NW7AV5-4	Located at NW 7TH AVE and NW 7TH ST	No	6.3	5.6	6.8	6.9	7.1	7.3
NW7AV6-2	Located at NW 7TH AVE and NW 8TH ST	No	6.2	5.9	6.7	6.8	7.0	7.2
NW7AV7-2	Located at NW 7TH TER and NW 9TH ST	No	6.3	6.0	6.7	6.8	7.0	7.2
NW7AV7-4	Located at NW 9TH ST and NW 7TH AVE	Yes	6.7	6.0	6.7	6.8	7.0	7.2
NW7AV7-6	Located at NW 9TH ST and NW 7TH AVE	Yes	6.5	6.0	6.7	6.8	7.0	7.2
NW7TR1-2	Located at NW 7TH ST and NW 7TH TER	No	6.4	6.3	6.7	6.8	7.0	7.2
NW7TR1-4	Located at NW 8TH AVE and NW 7TH ST	No	6.0	6.0	6.7	6.8	7.0	7.2
NW8AV1-2	Located at NW 9TH ST and NW 8TH AVE	No	6.4	6.3	6.7	6.8	7.0	7.2
NW8AV2-2	Located at N POWERLINE RD and SISTRUNK BLVD	Yes	7.1	6.1	6.9	7.0	7.3	7.5

Table 7E-1. Progresso Base Model Results

Model Node	Description	5-Yr LOS Goal Met	Reference Elevation (ft NGVD)	Design Storm Peak Stages (ft NGVD)				
				2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
NW8ST-10	Located at NW 13TH TER and NW 8TH ST - Boundary Condition	N/A	N/A	6.4	6.7	6.7	6.9	7.0
NW9AV1-2	Located at NW 9TH AVE and POWERLINE RD	Yes	7.2	4.6	5.7	6.0	7.2	7.4
NW9AV1-4	Located at NW 1ST ST and NW 10TH AVE	Yes	6.5	4.7	5.8	6.2	7.2	7.4
NW9AV2-2	Located at NW 2ND ST and NW 9TH AVE	Yes	6.5	4.6	5.7	6.1	7.1	7.4
NW9AV3-2	Located at NW 5TH ST and N POWERLINE RD	Yes	7.3	5.4	6.5	6.7	7.1	7.3
NW9AV3-4	Located at NW 10TH AVE and NW 5TH ST	Yes	7.3	6.8	6.9	6.9	7.0	7.1
NW9AV4-2	Located at NW 5TH CT and NW 9TH AVE	Yes	7.2	5.5	6.5	6.7	7.1	7.3
NW9AV4-4	Located at NW 11TH AVE and NW 5TH CT	Yes	7.4	5.1	6.2	6.5	7.0	7.3
NW9AV5-2	Located at NW 9TH AVE and NW 7TH ST	No	6.4	5.9	6.7	6.7	7.0	7.1
NW9AV5-4	Located at NW 10TH AVE and NW 7TH ST	Yes	6.5	5.1	6.6	6.7	6.9	7.0
NW9AV5-6	Located at NW 9TH AVE and N POWERLINE RD	Yes	6.9	5.7	6.6	6.7	7.0	7.2
NW9AV5-8	Located at NW 6TH ST and NW 9TH AVE	Yes	7.0	5.6	6.6	6.7	7.1	7.3
NW9AV6-2	Located at NW 8TH AVE and NW 8TH ST	No	5.5	6.0	6.7	6.8	7.0	7.2
NW9AV6-4	Located at NW 9TH AVE and NW 8TH ST	No	6.2	6.4	6.7	6.7	7.0	7.1
NW9AV6-6	Located at N POWERLINE RD and NW 9TH ST	Yes	6.7	6.6	6.9	6.9	7.1	7.1
NW9AV7-2	Located at NW 9TH ST and N POWERLINE RD	Yes	7.1	6.8	7.0	7.0	7.1	7.2
NW9AV7-4	Located at NW 9TH ST and NW 10TH AVE	Yes	7.0	6.8	7.1	7.1	7.2	7.3
REGALS-2	Located at CITY VIEW DR and CITYVIEW DR	No	7.4	7.3	7.7	7.8	8.0	8.2
REGALS-4	Located at CITY VIEW DR and CITY VIEW DR	Yes	8.0	7.5	7.9	8.0	8.2	8.4
WSUNR-05	Located at W SUNRISE BLVD and NW 5TH AVE	Yes	7.7	6.3	6.9	7.0	7.2	7.3

Table 7E-2a. Progresso Alternative No. 1, 10% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 Peak Stages (ft NGVD)			Delta (Alt. 1 [10%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
BRO-OF1	Yes	4.9	3.8	4.7	5.0	3.8	4.7	5.0	0.0	0.1	0.0
ESUNR-10	Yes	7.3	6.6	7.0	7.1	6.7	7.0	7.1	0.1	0.0	0.0
NANDAV1-2	No	6.4	6.8	7.0	7.1	6.8	7.0	7.1	0.0	0.0	0.0
NANDAV1-4	No	6.2	4.1	6.8	6.9	3.8	6.8	6.9	-0.3	0.0	0.0
NANDAV1-6	Yes	6.8	5.1	6.8	6.9	5.1	6.8	6.9	0.0	0.0	0.0
NANDAV2-2	No	6.6	6.7	6.8	6.9	6.7	6.9	6.9	0.0	0.0	0.0
NANDAV2-4	No	6.4	4.9	6.8	6.9	4.9	6.8	6.9	0.1	0.0	0.0
NANDAV2-6	No	6.3	5.4	6.8	6.9	5.9	6.8	6.9	0.5	0.0	0.0
NE2AV1-2	Yes	7.0	4.6	5.8	6.2	4.4	5.5	5.8	-0.1	-0.4	-0.4
NE3AV1-2	Yes	5.9	5.6	6.1	6.3	5.6	6.1	6.3	0.0	0.0	0.0
NE4A-15	N/A	N/A	6.8	7.0	7.1	6.8	7.0	7.1	0.0	0.0	0.0
NE4AV1-2	Yes	6.4	6.3	6.5	6.5	6.2	6.5	6.5	0.0	0.0	0.0
NESUN-2	No	7.0	7.0	7.3	7.4	7.1	7.4	7.5	0.1	0.1	0.1
NEW-2	Yes	9.0	5.4	6.6	6.7	5.8	6.8	6.9	0.4	0.2	0.2
NFNR020	N/A	N/A	3.3	3.9	4.1	3.3	3.9	4.1	0.0	0.0	0.0
NFNR020OL	N/A	N/A	3.3	3.9	4.1	3.3	3.9	4.1	0.0	0.0	0.0
NW10TR1-2	Yes	6.7	4.9	6.0	6.3	4.9	5.9	6.2	-0.1	-0.1	-0.2
NW10TR2-2	No	5.9	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW10TR3-2	Yes	7.5	7.3	7.6	7.7	7.4	7.7	7.8	0.1	0.1	0.1
NW10TR3-4	No	6.4	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW15A-15	N/A	N/A	5.9	6.3	6.5	5.9	6.3	6.5	0.0	0.0	0.0
NW2AV1-2	Yes	7.2	5.3	6.8	6.9	5.6	6.8	6.9	0.3	0.0	0.0
NW2AV1-4	No	6.7	5.7	7.0	7.1	6.1	7.1	7.3	0.4	0.1	0.1
NW2AV2-2	No	6.4	5.6	6.8	6.9	5.8	6.8	6.9	0.2	0.0	0.0
NW2AV2-4	No	6.4	6.4	6.8	6.9	6.5	6.8	6.9	0.1	0.0	0.0
NW2AV3-2	No	6.2	6.0	6.8	6.9	6.1	6.8	6.9	0.1	0.0	0.0
NW2AV3-4	Yes	6.6	5.5	6.8	6.9	5.7	6.8	6.9	0.2	0.0	0.0
NW2AV4-3	No	6.2	6.1	6.8	6.9	6.1	6.8	6.9	0.1	0.0	0.0
NW2AV4-4	No	6.2	5.9	6.8	6.9	5.9	6.8	6.9	0.0	0.0	0.0
NW2AV5-2	No	6.0	5.8	6.8	6.9	6.1	6.8	6.9	0.3	0.0	0.0
NW2AV5-6	No	6.0	6.2	6.8	6.9	6.2	6.9	6.9	0.0	0.0	0.0
NW4AV1-2	Yes	7.0	6.4	6.7	6.8	6.5	6.8	6.8	0.1	0.1	0.0
NW4AV1-6	No	5.9	6.5	6.8	6.9	6.6	6.8	6.9	0.0	0.0	0.1

Table 7E-2a. Progresso Alternative No. 1, 10% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 Peak Stages (ft NGVD)			Delta (Alt. 1 [10%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NW4AV2-2	Yes	6.8	5.4	6.6	6.8	5.7	6.8	7.0	0.4	0.2	0.2
NW4AV2-4	Yes	6.9	5.3	6.6	6.8	5.7	6.8	7.0	0.4	0.2	0.2
NW4AV3-2	No	6.0	5.7	6.8	6.9	5.9	6.8	6.9	0.2	0.0	0.0
NW4AV3-4	Yes	6.6	5.5	6.8	6.9	5.8	6.8	6.9	0.3	0.0	0.0
NW4AV3-6	No	6.4	5.4	6.7	6.8	5.8	6.7	6.9	0.4	0.0	0.0
NW4AV4-2	No	4.9	6.0	6.8	6.9	6.1	6.8	6.9	0.2	0.0	0.0
NW4AV4-4	No	6.0	5.9	6.8	6.9	6.1	6.8	6.9	0.2	0.0	0.0
NW4AV4-6	No	6.0	5.8	6.8	6.9	6.0	6.8	6.9	0.2	0.0	0.0
NW4AV4-8	No	5.9	6.1	6.8	6.9	6.1	6.8	6.9	0.0	0.0	0.0
NW4AV5-2	No	5.8	6.0	6.8	6.9	6.1	6.8	6.9	0.2	0.0	0.0
NW4AV5-4	No	5.6	6.2	6.8	6.9	6.2	6.8	6.9	0.0	0.0	0.0
NW4AV6-2	No	5.6	6.2	6.9	6.9	6.2	6.9	7.0	0.0	0.0	0.0
NW4AV6-6	No	5.6	6.2	6.8	6.9	6.2	6.9	6.9	0.0	0.0	0.0
NW4AV6-8	No	6.1	6.2	6.9	6.9	6.3	6.9	6.9	0.0	0.0	0.0
NW5A-05	N/A	N/A	6.4	6.9	7.0	6.4	6.9	7.0	0.0	0.0	0.0
NW5A-05OL	N/A	N/A	6.4	6.9	7.0	6.4	6.9	7.0	0.0	0.0	0.0
NW5AV1-2	Yes	7.3	5.0	6.3	6.6	5.4	6.6	6.8	0.4	0.3	0.2
NW5AV1-6	Yes	6.8	4.3	5.2	5.5	4.5	5.4	5.7	0.2	0.2	0.1
NW5AV1-8	Yes	5.9	3.8	4.9	5.4	3.7	5.0	5.5	0.0	0.0	0.0
NW5AV1-9	Yes	5.9	3.9	4.8	5.1	3.9	4.9	5.2	0.1	0.1	0.1
NW5AV2-2	Yes	7.3	6.8	7.0	7.0	6.9	7.0	7.1	0.0	0.0	0.0
NW5AV2-6	No	6.7	6.7	7.1	7.2	6.8	7.1	7.3	0.1	0.1	0.1
NW5AV3-2	Yes	6.7	5.4	6.8	6.9	6.0	6.8	6.9	0.6	0.0	0.0
NW5AV4-2	No	6.4	6.6	6.9	6.9	6.6	6.9	6.9	0.0	0.0	0.0
NW5AV4-4	No	6.4	6.2	6.8	6.9	6.2	6.8	6.9	0.1	0.0	0.0
NW5AV4-6	No	5.4	6.2	6.8	6.9	6.2	6.9	6.9	0.0	0.0	0.0
NW6AV1-2	Yes	6.5	4.4	5.5	5.8	4.6	5.7	5.9	0.2	0.2	0.1
NW7AV1-2	Yes	6.1	4.6	5.5	5.8	4.7	5.7	5.9	0.2	0.2	0.1
NW7AV1-4	Yes	6.4	4.5	5.7	6.1	4.7	5.9	6.3	0.1	0.3	0.2
NW7AV1-6	Yes	6.5	4.6	5.5	5.8	4.7	5.6	5.9	0.2	0.1	0.1
NW7AV1-8	Yes	6.4	4.5	5.5	5.8	4.7	5.6	5.9	0.2	0.1	0.1
NW7AV2-2	Yes	6.7	4.8	5.8	6.1	5.0	5.9	6.3	0.2	0.1	0.2

Table 7E-2a. Progresso Alternative No. 1, 10% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 Peak Stages (ft NGVD)			Delta (Alt. 1 [10%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NW7AV2-4	No	6.8	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
NW7AV3-2	Yes	6.2	5.2	6.3	6.6	5.5	6.4	6.7	0.2	0.2	0.1
NW7AV3-4	Yes	7.1	5.4	6.4	6.7	5.6	6.5	6.7	0.3	0.1	0.1
NW7AV4-2	Yes	7.1	5.4	6.6	6.8	5.7	6.7	6.8	0.4	0.1	0.0
NW7AV4-4	No	6.6	6.7	6.9	7.0	6.8	7.0	7.1	0.0	0.1	0.1
NW7AV5-2	No	6.0	5.7	6.7	6.8	6.1	6.7	6.8	0.4	0.0	0.0
NW7AV5-4	No	6.3	5.6	6.8	6.9	6.0	6.8	6.9	0.4	0.0	0.0
NW7AV6-2	No	6.2	5.9	6.7	6.8	6.1	6.7	6.8	0.2	0.0	0.0
NW7AV7-2	No	6.3	6.0	6.7	6.8	6.1	6.7	6.8	0.1	0.0	0.0
NW7AV7-4	Yes	6.7	6.0	6.7	6.8	6.1	6.7	6.8	0.1	0.0	0.0
NW7AV7-6	Yes	6.5	6.0	6.7	6.8	6.1	6.7	6.8	0.1	0.0	0.0
NW7TR1-2	No	6.4	6.3	6.7	6.8	6.3	6.7	6.8	0.0	0.0	0.0
NW7TR1-4	No	6.0	6.0	6.7	6.8	6.1	6.7	6.8	0.1	0.0	0.0
NW8AV1-2	No	6.4	6.3	6.7	6.8	6.3	6.7	6.8	0.0	0.0	0.0
NW8AV2-2	Yes	7.1	6.1	6.9	7.0	6.4	7.0	7.1	0.3	0.1	0.1
NW8ST-10	N/A	N/A	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW9AV1-2	Yes	7.2	4.6	5.7	6.0	4.8	5.8	6.2	0.1	0.2	0.1
NW9AV1-4	Yes	6.5	4.7	5.8	6.2	4.8	5.9	6.3	0.1	0.2	0.2
NW9AV2-2	Yes	6.5	4.6	5.7	6.1	4.8	5.9	6.2	0.2	0.1	0.1
NW9AV3-2	Yes	7.3	5.4	6.5	6.7	5.7	6.6	6.7	0.3	0.1	0.1
NW9AV3-4	Yes	7.3	6.8	6.9	6.9	6.8	6.9	6.9	0.0	0.0	0.0
NW9AV4-2	Yes	7.2	5.5	6.5	6.7	5.7	6.6	6.8	0.3	0.1	0.1
NW9AV4-4	Yes	7.4	5.1	6.2	6.5	5.2	6.2	6.6	0.1	0.0	0.0
NW9AV5-2	No	6.4	5.9	6.7	6.7	6.1	6.7	6.7	0.1	0.0	0.0
NW9AV5-4	Yes	6.5	5.1	6.6	6.7	5.2	6.6	6.7	0.0	0.0	0.0
NW9AV5-6	Yes	6.9	5.7	6.6	6.7	5.9	6.6	6.8	0.2	0.0	0.0
NW9AV5-8	Yes	7.0	5.6	6.6	6.7	5.8	6.6	6.8	0.3	0.1	0.0
NW9AV6-2	No	5.5	6.0	6.7	6.8	6.1	6.7	6.8	0.1	0.0	0.0
NW9AV6-4	No	6.2	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW9AV6-6	Yes	6.7	6.6	6.9	6.9	6.7	6.9	6.9	0.1	0.0	0.0
NW9AV7-2	Yes	7.1	6.8	7.0	7.0	6.8	7.0	7.1	0.1	0.0	0.0
NW9AV7-4	Yes	7.0	6.8	7.1	7.1	6.8	7.1	7.1	0.1	0.0	0.0

Table 7E-2a. Progresso Alternative No. 1, 10% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 Peak Stages (ft NGVD)			Delta (Alt. 1 [10%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
REGALS-2	No	7.4	7.3	7.7	7.8	7.4	7.7	7.9	0.1	0.1	0.1
REGALS-4	Yes	8.0	7.5	7.9	8.0	7.6	8.0	8.1	0.1	0.1	0.1
WSUNR-05	Yes	7.7	6.3	6.9	7.0	6.3	6.9	7.0	0.0	0.0	0.0
								Maximum:	0.6	0.3	0.2
								Minimum:	-0.3	-0.4	-0.4

Table 7E-2b. Progresso Alternative No. 1, 10% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 Peak Stages (ft NGVD)		Delta (Alt. 1 [10%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
BRO-OF1	No	4.9	5.7	6.1	5.8	6.2	0.0	0.1
ESUNR-10	Yes	7.3	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-2	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-4	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-6	No	6.8	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV2-2	No	6.6	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV2-4	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV2-6	No	6.3	7.2	7.3	7.2	7.3	0.0	0.0
NE2AV1-2	Yes	7.0	6.8	7.0	6.7	7.0	0.0	0.0
NE3AV1-2	No	5.9	6.8	7.0	6.7	7.0	0.0	0.0
NE4A-15	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NE4AV1-2	No	6.4	6.8	7.0	6.7	7.0	0.0	0.0
NESUN-2	No	7.0	7.6	7.8	7.7	7.8	0.1	0.1
NEW-2	Yes	9.0	7.1	7.2	7.2	7.3	0.1	0.1
NFNR020	N/A	N/A	4.8	5.2	4.8	5.2	0.0	0.0
NFNR020OL	N/A	N/A	5.0	5.2	5.0	5.2	0.1	0.0
NW10TR1-2	No	6.7	6.9	7.0	6.9	7.0	0.0	0.0
NW10TR2-2	No	5.9	6.9	7.0	6.9	7.0	0.0	0.0
NW10TR3-2	No	7.5	8.0	8.2	8.1	8.3	0.1	0.1
NW10TR3-4	No	6.4	6.9	7.0	6.9	7.0	0.0	0.0
NW15A-15	N/A	N/A	6.6	6.9	6.6	6.9	0.0	0.0
NW2AV1-2	Yes	7.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV1-4	No	6.7	7.6	7.7	7.7	7.8	0.1	0.1
NW2AV2-2	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV2-4	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV3-2	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV3-4	No	6.6	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV4-3	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV4-4	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV5-2	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV5-6	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV1-2	No	7.0	7.0	7.2	7.1	7.2	0.1	0.1
NW4AV1-6	No	5.9	7.1	7.2	7.1	7.2	0.0	0.1

Table 7E-2b. Progresso Alternative No. 1, 10% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 Peak Stages (ft NGVD)		Delta (Alt. 1 [10%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NW4AV2-2	No	6.8	7.2	7.4	7.3	7.5	0.1	0.1
NW4AV2-4	No	6.9	7.2	7.4	7.3	7.4	0.1	0.1
NW4AV3-2	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV3-4	No	6.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV3-6	No	6.4	7.1	7.3	7.2	7.3	0.0	0.0
NW4AV4-2	No	4.9	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV4-4	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV4-6	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV4-8	No	5.9	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV5-2	No	5.8	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV5-4	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-2	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-6	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-8	No	6.1	7.2	7.3	7.2	7.3	0.0	0.0
NW5A-05	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NW5A-05OL	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV1-2	Yes	7.3	7.0	7.2	7.1	7.3	0.1	0.1
NW5AV1-6	Yes	6.8	6.2	6.5	6.3	6.6	0.1	0.1
NW5AV1-8	No	5.9	6.1	6.3	6.1	6.4	0.0	0.1
NW5AV1-9	No	5.9	5.9	6.3	5.9	6.4	0.1	0.1
NW5AV2-2	Yes	7.3	7.2	7.3	7.2	7.3	0.0	0.1
NW5AV2-6	No	6.7	7.5	7.6	7.5	7.7	0.1	0.1
NW5AV3-2	No	6.7	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV4-2	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV4-4	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV4-6	No	5.4	7.2	7.3	7.2	7.3	0.0	0.0
NW6AV1-2	No	6.5	6.5	6.7	6.6	6.8	0.1	0.1
NW7AV1-2	No	6.1	6.6	6.8	6.7	6.8	0.1	0.1
NW7AV1-4	No	6.4	6.7	6.9	6.8	6.9	0.1	0.0
NW7AV1-6	Yes	6.5	6.5	6.7	6.6	6.8	0.1	0.0
NW7AV1-8	No	6.4	7.1	7.4	7.3	7.5	0.2	0.1
NW7AV2-2	Yes	6.7	6.7	6.9	6.8	6.9	0.1	0.0

Table 7E-2b. Progresso Alternative No. 1, 10% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 Peak Stages (ft NGVD)		Delta (Alt. 1 [10%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NW7AV2-4	No	6.8	7.2	7.3	7.2	7.3	0.0	0.0
NW7AV3-2	No	6.2	7.0	7.2	7.0	7.2	0.0	0.1
NW7AV3-4	No	7.1	7.1	7.3	7.2	7.4	0.1	0.1
NW7AV4-2	Yes	7.1	7.0	7.2	7.0	7.2	0.0	0.0
NW7AV4-4	No	6.6	7.3	7.5	7.4	7.6	0.1	0.1
NW7AV5-2	No	6.0	7.0	7.2	7.1	7.3	0.1	0.0
NW7AV5-4	No	6.3	7.1	7.3	7.1	7.3	0.0	0.0
NW7AV6-2	No	6.2	7.0	7.2	7.1	7.3	0.1	0.0
NW7AV7-2	No	6.3	7.0	7.2	7.1	7.3	0.1	0.0
NW7AV7-4	No	6.7	7.0	7.2	7.1	7.3	0.1	0.0
NW7AV7-6	No	6.5	7.0	7.2	7.1	7.3	0.1	0.0
NW7TR1-2	No	6.4	7.0	7.2	7.1	7.3	0.1	0.0
NW7TR1-4	No	6.0	7.0	7.2	7.1	7.3	0.1	0.0
NW8AV1-2	No	6.4	7.0	7.2	7.1	7.3	0.1	0.0
NW8AV2-2	No	7.1	7.3	7.5	7.4	7.6	0.1	0.1
NW8ST-10	N/A	N/A	6.9	7.0	6.9	7.0	0.0	0.0
NW9AV1-2	No	7.2	7.2	7.4	7.3	7.5	0.1	0.1
NW9AV1-4	No	6.5	7.2	7.4	7.2	7.5	0.1	0.2
NW9AV2-2	No	6.5	7.1	7.4	7.3	7.5	0.2	0.1
NW9AV3-2	Yes	7.3	7.1	7.3	7.2	7.4	0.1	0.1
NW9AV3-4	Yes	7.3	7.0	7.1	7.0	7.1	0.0	0.0
NW9AV4-2	No	7.2	7.1	7.3	7.2	7.4	0.1	0.1
NW9AV4-4	Yes	7.4	7.0	7.3	7.1	7.3	0.1	0.1
NW9AV5-2	No	6.4	7.0	7.1	7.0	7.1	0.0	0.0
NW9AV5-4	No	6.5	6.9	7.0	6.9	7.0	0.0	0.0
NW9AV5-6	No	6.9	7.0	7.2	7.1	7.2	0.0	0.0
NW9AV5-8	No	7.0	7.1	7.3	7.1	7.3	0.0	0.0
NW9AV6-2	No	5.5	7.0	7.2	7.1	7.3	0.1	0.0
NW9AV6-4	No	6.2	7.0	7.1	7.0	7.1	0.0	0.0
NW9AV6-6	No	6.7	7.1	7.1	7.1	7.2	0.0	0.0
NW9AV7-2	Yes	7.1	7.1	7.2	7.1	7.2	0.0	0.0
NW9AV7-4	No	7.0	7.2	7.3	7.3	7.3	0.0	0.0

Table 7E-2b. Progresso Alternative No. 1, 10% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 Peak Stages (ft NGVD)		Delta (Alt. 1 [10%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
REGALS-2	No	7.4	8.0	8.2	8.1	8.3	0.1	0.1
REGALS-4	No	8.0	8.2	8.4	8.3	8.5	0.1	0.1
WSUNR-05	Yes	7.7	7.2	7.3	7.2	7.3	0.0	0.0
						Maximum:	0.2	0.2
						Minimum:	0.0	0.0

Table 7E-3a. Progresso Alternative No. 1, 20% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 Peak Stages (ft NGVD)			Delta (Alt. 1 [10%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
BRO-OF1	Yes	4.9	3.8	4.7	5.0	3.9	4.8	5.1	0.1	0.1	0.1
ESUNR-10	Yes	7.3	6.6	7.0	7.1	6.8	7.0	7.1	0.2	0.0	0.0
NANDAV1-2	No	6.4	6.8	7.0	7.1	6.9	7.1	7.1	0.1	0.1	0.1
NANDAV1-4	No	6.2	4.1	6.8	6.9	3.5	6.8	6.9	-0.6	0.0	0.0
NANDAV1-6	Yes	6.8	5.1	6.8	6.9	5.1	6.8	6.9	0.0	0.0	0.0
NANDAV2-2	No	6.6	6.7	6.8	6.9	6.8	6.9	6.9	0.1	0.0	0.0
NANDAV2-4	No	6.4	4.9	6.8	6.9	5.0	6.8	6.9	0.1	0.0	0.0
NANDAV2-6	No	6.3	5.4	6.8	6.9	6.1	6.8	6.9	0.7	0.0	0.0
NE2AV1-2	Yes	7.0	4.6	5.8	6.2	4.4	5.5	5.7	-0.1	-0.4	-0.5
NE3AV1-2	Yes	5.9	5.6	6.1	6.3	5.6	6.2	6.3	0.0	0.0	0.0
NE4A-15	N/A	N/A	6.8	7.0	7.1	6.8	7.0	7.1	0.0	0.0	0.0
NE4AV1-2	Yes	6.4	6.3	6.5	6.5	6.2	6.4	6.5	0.0	0.0	0.0
NESUN-2	No	7.0	7.0	7.3	7.4	7.2	7.5	7.6	0.2	0.1	0.1
NEW-2	Yes	9.0	5.4	6.6	6.7	6.1	6.9	7.0	0.7	0.3	0.3
NFNR020	N/A	N/A	3.3	3.9	4.1	3.3	3.9	4.1	0.0	0.0	0.0
NFNR020OL	N/A	N/A	3.3	3.9	4.1	3.3	3.9	4.1	0.0	0.0	0.0
NW10TR1-2	Yes	6.7	4.9	6.0	6.3	4.8	5.7	6.0	-0.1	-0.3	-0.3
NW10TR2-2	No	5.9	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW10TR3-2	Yes	7.5	7.3	7.6	7.7	7.5	7.8	7.9	0.1	0.1	0.1
NW10TR3-4	No	6.4	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW15A-15	N/A	N/A	5.9	6.3	6.5	5.9	6.3	6.5	0.0	0.0	0.0
NW2AV1-2	Yes	7.2	5.3	6.8	6.9	5.8	6.8	6.9	0.5	0.0	0.0
NW2AV1-4	No	6.7	5.7	7.0	7.1	6.4	7.2	7.4	0.8	0.3	0.2
NW2AV2-2	No	6.4	5.6	6.8	6.9	5.9	6.8	6.9	0.2	0.0	0.0
NW2AV2-4	No	6.4	6.4	6.8	6.9	6.5	6.8	6.9	0.1	0.0	0.0
NW2AV3-2	No	6.2	6.0	6.8	6.9	6.2	6.8	6.9	0.2	0.0	0.0
NW2AV3-4	Yes	6.6	5.5	6.8	6.9	5.8	6.8	6.9	0.4	0.0	0.0
NW2AV4-3	No	6.2	6.1	6.8	6.9	6.2	6.8	6.9	0.2	0.0	0.0
NW2AV4-4	No	6.2	5.9	6.8	6.9	5.9	6.8	6.9	0.0	0.0	0.0
NW2AV5-2	No	6.0	5.8	6.8	6.9	6.2	6.8	6.9	0.4	0.0	0.0
NW2AV5-6	No	6.0	6.2	6.8	6.9	6.3	6.9	6.9	0.1	0.0	0.0
NW4AV1-2	Yes	7.0	6.4	6.7	6.8	6.6	6.8	6.9	0.1	0.1	0.1
NW4AV1-6	No	5.9	6.5	6.8	6.9	6.6	6.9	7.0	0.1	0.1	0.1

Table 7E-3a. Progresso Alternative No. 1, 20% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 Peak Stages (ft NGVD)			Delta (Alt. 1 [10%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NW4AV2-2	Yes	6.8	5.4	6.6	6.8	6.2	7.0	7.1	0.8	0.4	0.3
NW4AV2-4	Yes	6.9	5.3	6.6	6.8	6.2	7.0	7.1	0.9	0.4	0.3
NW4AV3-2	No	6.0	5.7	6.8	6.9	6.1	6.8	6.9	0.4	0.0	0.0
NW4AV3-4	Yes	6.6	5.5	6.8	6.9	6.1	6.8	6.9	0.6	0.0	0.0
NW4AV3-6	No	6.4	5.4	6.7	6.8	6.1	6.8	6.9	0.7	0.1	0.1
NW4AV4-2	No	4.9	6.0	6.8	6.9	6.2	6.8	6.9	0.2	0.0	0.0
NW4AV4-4	No	6.0	5.9	6.8	6.9	6.2	6.8	6.9	0.3	0.0	0.0
NW4AV4-6	No	6.0	5.8	6.8	6.9	6.1	6.8	6.9	0.3	0.0	0.0
NW4AV4-8	No	5.9	6.1	6.8	6.9	6.1	6.8	6.9	0.1	0.0	0.0
NW4AV5-2	No	5.8	6.0	6.8	6.9	6.2	6.9	6.9	0.2	0.0	0.0
NW4AV5-4	No	5.6	6.2	6.8	6.9	6.2	6.9	6.9	0.1	0.0	0.0
NW4AV6-2	No	5.6	6.2	6.9	6.9	6.3	6.9	7.0	0.1	0.0	0.0
NW4AV6-6	No	5.6	6.2	6.8	6.9	6.3	6.9	7.0	0.1	0.0	0.0
NW4AV6-8	No	6.1	6.2	6.9	6.9	6.3	6.9	7.0	0.1	0.0	0.0
NW5A-05	N/A	N/A	6.4	6.9	7.0	6.4	6.9	7.0	0.0	0.0	0.0
NW5A-05OL	N/A	N/A	6.4	6.9	7.0	6.4	6.9	7.0	0.0	0.0	0.0
NW5AV1-2	Yes	7.3	5.0	6.3	6.6	5.9	6.8	6.9	0.9	0.4	0.4
NW5AV1-6	Yes	6.8	4.3	5.2	5.5	4.6	5.6	5.8	0.3	0.3	0.2
NW5AV1-8	Yes	5.9	3.8	4.9	5.4	3.7	5.0	5.5	0.0	0.0	0.0
NW5AV1-9	Yes	5.9	3.9	4.8	5.1	4.0	5.0	5.3	0.2	0.2	0.2
NW5AV2-2	Yes	7.3	6.8	7.0	7.0	6.9	7.0	7.1	0.1	0.0	0.0
NW5AV2-6	No	6.7	6.7	7.1	7.2	6.8	7.2	7.3	0.1	0.2	0.1
NW5AV3-2	Yes	6.7	5.4	6.8	6.9	6.1	6.8	6.9	0.7	0.0	0.0
NW5AV4-2	No	6.4	6.6	6.9	6.9	6.6	6.9	7.0	0.0	0.0	0.0
NW5AV4-4	No	6.4	6.2	6.8	6.9	6.2	6.9	6.9	0.1	0.0	0.0
NW5AV4-6	No	5.4	6.2	6.8	6.9	6.3	6.9	6.9	0.0	0.0	0.0
NW6AV1-2	Yes	6.5	4.4	5.5	5.8	4.8	5.8	6.0	0.4	0.3	0.3
NW7AV1-2	Yes	6.1	4.6	5.5	5.8	4.9	5.8	6.0	0.3	0.3	0.3
NW7AV1-4	Yes	6.4	4.5	5.7	6.1	4.8	6.1	6.4	0.3	0.4	0.3
NW7AV1-6	Yes	6.5	4.6	5.5	5.8	4.9	5.8	6.0	0.4	0.3	0.3
NW7AV1-8	Yes	6.4	4.5	5.5	5.8	4.9	5.8	6.2	0.4	0.3	0.4
NW7AV2-2	Yes	6.7	4.8	5.8	6.1	5.2	6.1	6.4	0.4	0.3	0.3

Table 7E-3a. Progresso Alternative No. 1, 20% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 Peak Stages (ft NGVD)			Delta (Alt. 1 [10%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NW7AV2-4	No	6.8	6.9	7.1	7.1	6.9	7.1	7.2	0.1	0.0	0.0
NW7AV3-2	No	6.2	5.2	6.3	6.6	5.7	6.6	6.8	0.4	0.3	0.2
NW7AV3-4	Yes	7.1	5.4	6.4	6.7	5.8	6.6	6.8	0.4	0.2	0.1
NW7AV4-2	Yes	7.1	5.4	6.6	6.8	5.9	6.7	6.8	0.6	0.1	0.0
NW7AV4-4	No	6.6	6.7	6.9	7.0	6.8	7.1	7.2	0.1	0.1	0.1
NW7AV5-2	No	6.0	5.7	6.7	6.8	6.3	6.7	6.8	0.6	0.0	0.0
NW7AV5-4	No	6.3	5.6	6.8	6.9	6.2	6.8	6.9	0.6	0.0	0.0
NW7AV6-2	No	6.2	5.9	6.7	6.8	6.3	6.7	6.8	0.4	0.0	0.0
NW7AV7-2	No	6.3	6.0	6.7	6.8	6.3	6.7	6.8	0.2	0.0	0.0
NW7AV7-4	Yes	6.7	6.0	6.7	6.8	6.3	6.7	6.8	0.2	0.0	0.0
NW7AV7-6	Yes	6.5	6.0	6.7	6.8	6.3	6.7	6.8	0.3	0.0	0.0
NW7TR1-2	No	6.4	6.3	6.7	6.8	6.3	6.7	6.8	0.0	0.0	0.0
NW7TR1-4	No	6.0	6.0	6.7	6.8	6.3	6.7	6.8	0.3	0.0	0.0
NW8AV1-2	No	6.4	6.3	6.7	6.8	6.4	6.7	6.8	0.1	0.0	0.0
NW8AV2-2	Yes	7.1	6.1	6.9	7.0	6.7	7.1	7.2	0.6	0.1	0.1
NW8ST-10	N/A	N/A	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW9AV1-2	Yes	7.2	4.6	5.7	6.0	5.0	6.1	6.5	0.4	0.4	0.5
NW9AV1-4	Yes	6.5	4.7	5.8	6.2	5.0	6.2	6.6	0.4	0.4	0.5
NW9AV2-2	Yes	6.5	4.6	5.7	6.1	4.3	5.3	5.7	-0.3	-0.4	-0.3
NW9AV3-2	Yes	7.3	5.4	6.5	6.7	5.9	6.6	6.8	0.4	0.2	0.1
NW9AV3-4	Yes	7.3	6.8	6.9	6.9	6.8	6.9	7.0	0.0	0.0	0.0
NW9AV4-2	Yes	7.2	5.5	6.5	6.7	6.0	6.7	6.8	0.5	0.2	0.1
NW9AV4-4	Yes	7.4	5.1	6.2	6.5	5.2	6.2	6.6	0.1	0.0	0.0
NW9AV5-2	No	6.4	5.9	6.7	6.7	6.2	6.7	6.7	0.3	0.0	0.0
NW9AV5-4	Yes	6.5	5.1	6.6	6.7	5.2	6.6	6.7	0.0	0.0	0.0
NW9AV5-6	Yes	6.9	5.7	6.6	6.7	6.1	6.7	6.8	0.4	0.1	0.1
NW9AV5-8	Yes	7.0	5.6	6.6	6.7	6.1	6.7	6.8	0.6	0.1	0.1
NW9AV6-2	No	5.5	6.0	6.7	6.8	6.3	6.7	6.8	0.3	0.0	0.0
NW9AV6-4	No	6.2	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW9AV6-6	Yes	6.7	6.6	6.9	6.9	6.7	6.9	7.0	0.2	0.0	0.0
NW9AV7-2	Yes	7.1	6.8	7.0	7.0	6.9	7.0	7.1	0.1	0.0	0.0
NW9AV7-4	Yes	7.0	6.8	7.1	7.1	6.9	7.1	7.2	0.1	0.0	0.0

Table 7E-3a. Progresso Alternative No. 1, 20% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 Peak Stages (ft NGVD)			Delta (Alt. 1 [10%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
REGALS-2	No	7.4	7.3	7.7	7.8	7.5	7.8	7.9	0.1	0.1	0.1
REGALS-4	Yes	8.0	7.5	7.9	8.0	7.6	8.0	8.1	0.1	0.1	0.1
WSUNR-05	Yes	7.7	6.3	6.9	7.0	6.3	6.9	7.0	0.0	0.0	0.0
								Maximum:	0.9	0.4	0.5
								Minimum:	-0.4	-0.5	0.0

Table 7E-3b. Progresso Alternative No. 1, 20% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 Peak Stages (ft NGVD)		Delta (Alt. 1 [10%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
BRO-OF1	No	4.9	5.7	6.1	5.9	6.3	0.2	0.2
ESUNR-10	Yes	7.3	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-2	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-4	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-6	No	6.8	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV2-2	No	6.6	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV2-4	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV2-6	No	6.3	7.2	7.3	7.2	7.3	0.0	0.0
NE2AV1-2	Yes	7.0	6.8	7.0	6.7	7.0	0.0	0.0
NE3AV1-2	No	5.9	6.8	7.0	6.7	7.0	0.0	0.0
NE4A-15	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NE4AV1-2	No	6.4	6.8	7.0	6.7	7.0	0.0	0.0
NESUN-2	No	7.0	7.6	7.8	7.8	7.9	0.1	0.1
NEW-2	Yes	9.0	7.1	7.2	7.3	7.4	0.2	0.2
NFNR020	N/A	N/A	4.8	5.2	4.8	5.2	0.0	0.0
NFNR020OL	N/A	N/A	5.0	5.2	5.1	5.2	0.1	0.0
NW10TR1-2	No	6.7	6.9	7.0	6.9	7.0	0.0	0.0
NW10TR2-2	No	5.9	6.9	7.0	6.9	7.0	0.0	0.0
NW10TR3-2	No	7.5	8.0	8.2	8.1	8.3	0.1	0.1
NW10TR3-4	No	6.4	6.9	7.0	6.9	7.0	0.0	0.0
NW15A-15	N/A	N/A	6.6	6.9	6.7	6.9	0.0	0.0
NW2AV1-2	Yes	7.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV1-4	No	6.7	7.6	7.7	7.7	7.9	0.2	0.1
NW2AV2-2	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV2-4	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV3-2	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV3-4	No	6.6	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV4-3	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV4-4	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV5-2	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV5-6	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV1-2	No	7.0	7.0	7.2	7.1	7.3	0.1	0.1
NW4AV1-6	No	5.9	7.1	7.2	7.1	7.3	0.1	0.1

Table 7E-3b. Progresso Alternative No. 1, 20% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 Peak Stages (ft NGVD)		Delta (Alt. 1 [10%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NW4AV2-2	No	6.8	7.2	7.4	7.4	7.6	0.2	0.2
NW4AV2-4	No	6.9	7.2	7.4	7.4	7.5	0.2	0.1
NW4AV3-2	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV3-4	No	6.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV3-6	No	6.4	7.1	7.3	7.2	7.3	0.0	0.0
NW4AV4-2	No	4.9	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV4-4	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV4-6	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV4-8	No	5.9	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV5-2	No	5.8	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV5-4	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-2	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-6	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-8	No	6.1	7.2	7.3	7.2	7.3	0.0	0.0
NW5A-05	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NW5A-05OL	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV1-2	Yes	7.3	7.0	7.2	7.2	7.4	0.2	0.2
NW5AV1-6	Yes	6.8	6.2	6.5	6.5	6.7	0.3	0.2
NW5AV1-8	No	5.9	6.1	6.3	6.2	6.5	0.0	0.2
NW5AV1-9	No	5.9	5.9	6.3	6.1	6.5	0.3	0.2
NW5AV2-2	Yes	7.3	7.2	7.3	7.2	7.4	0.1	0.1
NW5AV2-6	No	6.7	7.5	7.6	7.6	7.8	0.1	0.2
NW5AV3-2	No	6.7	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV4-2	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV4-4	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV4-6	No	5.4	7.2	7.3	7.2	7.3	0.0	0.0
NW6AV1-2	No	6.5	6.5	6.7	6.7	6.9	0.2	0.1
NW7AV1-2	No	6.1	6.6	6.8	6.7	6.9	0.2	0.1
NW7AV1-4	No	6.4	6.7	6.9	6.8	7.0	0.1	0.1
NW7AV1-6	No	6.5	6.5	6.7	6.7	6.8	0.2	0.1
NW7AV1-8	No	6.4	7.1	7.4	7.4	7.6	0.3	0.2
NW7AV2-2	No	6.7	6.7	6.9	6.8	7.0	0.1	0.1

Table 7E-3b. Progresso Alternative No. 1, 20% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 Peak Stages (ft NGVD)		Delta (Alt. 1 [10%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NW7AV2-4	No	6.8	7.2	7.3	7.3	7.3	0.0	0.0
NW7AV3-2	No	6.2	7.0	7.2	7.0	7.3	0.1	0.1
NW7AV3-4	No	7.1	7.1	7.3	7.3	7.5	0.2	0.2
NW7AV4-2	Yes	7.1	7.0	7.2	7.1	7.3	0.0	0.1
NW7AV4-4	No	6.6	7.3	7.5	7.4	7.6	0.1	0.1
NW7AV5-2	No	6.0	7.0	7.2	7.1	7.3	0.1	0.1
NW7AV5-4	No	6.3	7.1	7.3	7.1	7.3	0.0	0.0
NW7AV6-2	No	6.2	7.0	7.2	7.1	7.3	0.1	0.1
NW7AV7-2	No	6.3	7.0	7.2	7.1	7.3	0.1	0.1
NW7AV7-4	No	6.7	7.0	7.2	7.1	7.3	0.1	0.1
NW7AV7-6	No	6.5	7.0	7.2	7.1	7.3	0.1	0.1
NW7TR1-2	No	6.4	7.0	7.2	7.1	7.3	0.1	0.1
NW7TR1-4	No	6.0	7.0	7.2	7.1	7.3	0.1	0.1
NW8AV1-2	No	6.4	7.0	7.2	7.1	7.3	0.1	0.1
NW8AV2-2	No	7.1	7.3	7.5	7.4	7.6	0.1	0.1
NW8ST-10	N/A	N/A	6.9	7.0	6.9	7.0	0.0	0.0
NW9AV1-2	No	7.2	7.2	7.4	7.4	7.6	0.2	0.2
NW9AV1-4	No	6.5	7.2	7.4	7.3	7.6	0.2	0.3
NW9AV2-2	No	6.5	7.1	7.4	7.3	7.6	0.2	0.3
NW9AV3-2	Yes	7.3	7.1	7.3	7.3	7.5	0.2	0.2
NW9AV3-4	Yes	7.3	7.0	7.1	7.0	7.1	0.0	0.0
NW9AV4-2	No	7.2	7.1	7.3	7.3	7.5	0.2	0.2
NW9AV4-4	Yes	7.4	7.0	7.3	7.2	7.4	0.2	0.2
NW9AV5-2	No	6.4	7.0	7.1	7.0	7.2	0.1	0.1
NW9AV5-4	No	6.5	6.9	7.0	6.9	7.0	0.0	0.0
NW9AV5-6	No	6.9	7.0	7.2	7.1	7.3	0.1	0.0
NW9AV5-8	No	7.0	7.1	7.3	7.2	7.3	0.1	0.0
NW9AV6-2	No	5.5	7.0	7.2	7.1	7.3	0.1	0.1
NW9AV6-4	No	6.2	7.0	7.1	7.0	7.2	0.1	0.1
NW9AV6-6	No	6.7	7.1	7.1	7.1	7.2	0.0	0.1
NW9AV7-2	Yes	7.1	7.1	7.2	7.1	7.2	0.0	0.0
NW9AV7-4	No	7.0	7.2	7.3	7.3	7.3	0.0	0.0

Table 7E-3b. Progresso Alternative No. 1, 20% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 Peak Stages (ft NGVD)		Delta (Alt. 1 [10%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
REGALS-2	No	7.4	8.0	8.2	8.2	8.4	0.1	0.2
REGALS-4	No	8.0	8.2	8.4	8.4	8.6	0.2	0.2
WSUNR-05	Yes	7.7	7.2	7.3	7.2	7.3	0.0	0.0

Table 7E-4a. Progresso Alternative No. 1, 30% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 Peak Stages (ft NGVD)			Delta (Alt. 1 [10%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
BRO-OF1	Yes	4.9	3.8	4.7	5.0	3.9	4.9	5.2	0.2	0.2	0.2
ESUNR-10	Yes	7.3	6.6	7.0	7.1	6.8	7.0	7.1	0.2	0.0	0.0
NANDAV1-2	No	6.4	6.8	7.0	7.1	6.9	7.1	7.2	0.1	0.1	0.1
NANDAV1-4	No	6.2	4.1	6.8	6.9	3.2	6.8	6.9	-0.9	0.0	0.0
NANDAV1-6	Yes	6.8	5.1	6.8	6.9	5.1	6.8	6.9	0.0	0.0	0.0
NANDAV2-2	No	6.6	6.7	6.8	6.9	6.8	6.9	6.9	0.1	0.1	0.0
NANDAV2-4	No	6.4	4.9	6.8	6.9	5.0	6.8	6.9	0.1	0.0	0.0
NANDAV2-6	No	6.3	5.4	6.8	6.9	6.2	6.8	6.9	0.8	0.0	0.0
NE2AV1-2	Yes	7.0	4.6	5.8	6.2	4.5	5.4	5.7	-0.1	-0.4	-0.5
NE3AV1-2	Yes	5.9	5.6	6.1	6.3	5.6	6.2	6.3	0.0	0.0	0.0
NE4A-15	N/A	N/A	6.8	7.0	7.1	6.8	7.0	7.1	0.0	0.0	0.0
NE4AV1-2	Yes	6.4	6.3	6.5	6.5	6.2	6.4	6.5	0.0	-0.1	-0.1
NESUN-2	No	7.0	7.0	7.3	7.4	7.3	7.5	7.6	0.3	0.2	0.2
NEW-2	Yes	9.0	5.4	6.6	6.7	6.5	7.0	7.1	1.1	0.4	0.4
NFNR020	N/A	N/A	3.3	3.9	4.1	3.3	3.9	4.1	0.0	0.0	0.0
NFNR020OL	N/A	N/A	3.3	3.9	4.1	3.3	3.9	4.1	0.0	0.0	0.0
NW10TR1-2	Yes	6.7	4.9	6.0	6.3	4.7	5.6	5.8	-0.2	-0.5	-0.5
NW10TR2-2	No	5.9	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW10TR3-2	No	7.5	7.3	7.6	7.7	7.5	7.8	7.9	0.2	0.2	0.2
NW10TR3-4	No	6.4	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW15A-15	N/A	N/A	5.9	6.3	6.5	5.9	6.3	6.5	0.0	0.0	0.0
NW2AV1-2	Yes	7.2	5.3	6.8	6.9	6.1	6.8	6.9	0.7	0.0	0.0
NW2AV1-4	No	6.7	5.7	7.0	7.1	6.7	7.3	7.5	1.1	0.4	0.3
NW2AV2-2	No	6.4	5.6	6.8	6.9	5.9	6.8	6.9	0.3	0.0	0.0
NW2AV2-4	No	6.4	6.4	6.8	6.9	6.6	6.8	6.9	0.2	0.0	0.0
NW2AV3-2	No	6.2	6.0	6.8	6.9	6.2	6.8	6.9	0.2	0.0	0.0
NW2AV3-4	Yes	6.6	5.5	6.8	6.9	5.9	6.8	6.9	0.5	0.0	0.0
NW2AV4-3	No	6.2	6.1	6.8	6.9	6.3	6.8	6.9	0.2	0.0	0.0
NW2AV4-4	No	6.2	5.9	6.8	6.9	5.9	6.8	6.9	0.0	0.0	0.0
NW2AV5-2	No	6.0	5.8	6.8	6.9	6.3	6.8	6.9	0.5	0.0	0.0
NW2AV5-6	No	6.0	6.2	6.8	6.9	6.3	6.9	6.9	0.1	0.0	0.0
NW4AV1-2	Yes	7.0	6.4	6.7	6.8	6.6	6.9	7.0	0.2	0.2	0.2
NW4AV1-6	No	5.9	6.5	6.8	6.9	6.7	7.0	7.0	0.2	0.2	0.1

Table 7E-4a. Progresso Alternative No. 1, 30% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 Peak Stages (ft NGVD)			Delta (Alt. 1 [10%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NW4AV2-2	No	6.8	5.4	6.6	6.8	6.6	7.1	7.2	1.3	0.5	0.4
NW4AV2-4	Yes	6.9	5.3	6.6	6.8	6.6	7.1	7.2	1.4	0.6	0.5
NW4AV3-2	No	6.0	5.7	6.8	6.9	6.2	6.8	6.9	0.5	0.0	0.0
NW4AV3-4	Yes	6.6	5.5	6.8	6.9	6.2	6.8	6.9	0.7	0.0	0.0
NW4AV3-6	No	6.4	5.4	6.7	6.8	6.4	6.9	6.9	1.0	0.2	0.1
NW4AV4-2	No	4.9	6.0	6.8	6.9	6.2	6.9	6.9	0.3	0.0	0.0
NW4AV4-4	No	6.0	5.9	6.8	6.9	6.2	6.8	6.9	0.3	0.0	0.0
NW4AV4-6	No	6.0	5.8	6.8	6.9	6.2	6.8	6.9	0.3	0.0	0.0
NW4AV4-8	No	5.9	6.1	6.8	6.9	6.2	6.8	6.9	0.1	0.0	0.0
NW4AV5-2	No	5.8	6.0	6.8	6.9	6.2	6.9	6.9	0.2	0.0	0.0
NW4AV5-4	No	5.6	6.2	6.8	6.9	6.3	6.9	6.9	0.1	0.0	0.0
NW4AV6-2	No	5.6	6.2	6.9	6.9	6.3	6.9	7.0	0.1	0.0	0.0
NW4AV6-6	No	5.6	6.2	6.8	6.9	6.3	6.9	7.0	0.1	0.0	0.0
NW4AV6-8	No	6.1	6.2	6.9	6.9	6.3	6.9	7.0	0.1	0.0	0.0
NW5A-05	N/A	N/A	6.4	6.9	7.0	6.4	6.9	7.0	0.0	0.0	0.0
NW5A-05OL	N/A	N/A	6.4	6.9	7.0	6.4	6.9	7.0	0.0	0.0	0.0
NW5AV1-2	Yes	7.3	5.0	6.3	6.6	6.4	6.9	7.0	1.4	0.6	0.5
NW5AV1-6	Yes	6.8	4.3	5.2	5.5	4.8	5.7	5.9	0.5	0.5	0.4
NW5AV1-8	Yes	5.9	3.8	4.9	5.4	3.7	5.0	5.5	0.0	0.0	0.0
NW5AV1-9	Yes	5.9	3.9	4.8	5.1	4.1	5.1	5.4	0.3	0.3	0.3
NW5AV2-2	Yes	7.3	6.8	7.0	7.0	6.9	7.0	7.1	0.1	0.0	0.0
NW5AV2-6	No	6.7	6.7	7.1	7.2	6.9	7.3	7.4	0.2	0.2	0.2
NW5AV3-2	Yes	6.7	5.4	6.8	6.9	6.2	6.8	6.9	0.8	0.0	0.0
NW5AV4-2	No	6.4	6.6	6.9	6.9	6.6	6.9	7.0	0.0	0.0	0.0
NW5AV4-4	No	6.4	6.2	6.8	6.9	6.2	6.9	6.9	0.1	0.0	0.0
NW5AV4-6	No	5.4	6.2	6.8	6.9	6.3	6.9	7.0	0.1	0.0	0.0
NW6AV1-2	Yes	6.5	4.4	5.5	5.8	5.0	5.9	6.2	0.6	0.4	0.4
NW7AV1-2	Yes	6.1	4.6	5.5	5.8	5.0	5.9	6.2	0.5	0.4	0.4
NW7AV1-4	Yes	6.4	4.5	5.7	6.1	4.8	6.3	6.5	0.3	0.6	0.4
NW7AV1-6	Yes	6.5	4.6	5.5	5.8	5.0	5.9	6.2	0.5	0.4	0.4
NW7AV1-8	Yes	6.4	4.5	5.5	5.8	5.0	5.9	6.2	0.4	0.4	0.5
NW7AV2-2	Yes	6.7	4.8	5.8	6.1	5.3	6.3	6.5	0.5	0.4	0.4

Table 7E-4a. Progresso Alternative No. 1, 30% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 Peak Stages (ft NGVD)			Delta (Alt. 1 [10%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NW7AV2-4	No	6.8	6.9	7.1	7.1	7.0	7.1	7.2	0.1	0.0	0.0
NW7AV3-2	No	6.2	5.2	6.3	6.6	5.8	6.7	6.8	0.6	0.4	0.2
NW7AV3-4	Yes	7.1	5.4	6.4	6.7	6.0	6.7	6.9	0.6	0.3	0.2
NW7AV4-2	Yes	7.1	5.4	6.6	6.8	6.1	6.8	6.9	0.7	0.1	0.0
NW7AV4-4	No	6.6	6.7	6.9	7.0	6.8	7.1	7.2	0.1	0.2	0.2
NW7AV5-2	No	6.0	5.7	6.7	6.8	6.4	6.7	6.8	0.7	0.0	0.0
NW7AV5-4	No	6.3	5.6	6.8	6.9	6.3	6.8	6.9	0.7	0.0	0.0
NW7AV6-2	No	6.2	5.9	6.7	6.8	6.4	6.7	6.8	0.5	0.0	0.0
NW7AV7-2	No	6.3	6.0	6.7	6.8	6.4	6.7	6.8	0.3	0.0	0.0
NW7AV7-4	Yes	6.7	6.0	6.7	6.8	6.4	6.7	6.8	0.3	0.0	0.0
NW7AV7-6	Yes	6.5	6.0	6.7	6.8	6.4	6.7	6.8	0.4	0.0	0.0
NW7TR1-2	No	6.4	6.3	6.7	6.8	6.4	6.7	6.8	0.1	0.0	0.0
NW7TR1-4	No	6.0	6.0	6.7	6.8	6.4	6.7	6.8	0.4	0.0	0.0
NW8AV1-2	No	6.4	6.3	6.7	6.8	6.4	6.7	6.8	0.1	0.0	0.0
NW8AV2-2	Yes	7.1	6.1	6.9	7.0	6.8	7.1	7.2	0.7	0.2	0.2
NW8ST-10	N/A	N/A	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW9AV1-2	Yes	7.2	4.6	5.7	6.0	5.0	5.9	6.4	0.3	0.3	0.3
NW9AV1-4	Yes	6.5	4.7	5.8	6.2	5.0	6.1	6.6	0.3	0.4	0.4
NW9AV2-2	Yes	6.5	4.6	5.7	6.1	4.8	5.9	6.3	0.2	0.2	0.2
NW9AV3-2	Yes	7.3	5.4	6.5	6.7	6.0	6.7	6.9	0.6	0.3	0.2
NW9AV3-4	Yes	7.3	6.8	6.9	6.9	6.8	6.9	7.0	0.0	0.0	0.0
NW9AV4-2	Yes	7.2	5.5	6.5	6.7	6.2	6.8	6.9	0.8	0.3	0.3
NW9AV4-4	Yes	7.4	5.1	6.2	6.5	5.1	6.1	6.5	0.1	-0.1	-0.1
NW9AV5-2	No	6.4	5.9	6.7	6.7	6.3	6.7	6.8	0.4	0.0	0.0
NW9AV5-4	Yes	6.5	5.1	6.6	6.7	5.1	6.6	6.7	0.0	0.0	0.0
NW9AV5-6	Yes	6.9	5.7	6.6	6.7	6.3	6.8	6.9	0.6	0.2	0.2
NW9AV5-8	Yes	7.0	5.6	6.6	6.7	6.3	6.8	6.9	0.8	0.2	0.2
NW9AV6-2	No	5.5	6.0	6.7	6.8	6.4	6.7	6.8	0.4	0.0	0.0
NW9AV6-4	No	6.2	6.4	6.7	6.7	6.4	6.7	6.8	0.0	0.0	0.0
NW9AV6-6	Yes	6.7	6.6	6.9	6.9	6.7	6.9	7.0	0.2	0.1	0.0
NW9AV7-2	Yes	7.1	6.8	7.0	7.0	6.9	7.0	7.1	0.1	0.0	0.0
NW9AV7-4	Yes	7.0	6.8	7.1	7.1	6.9	7.1	7.2	0.1	0.1	0.1

Table 7E-4a. Progresso Alternative No. 1, 30% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 Peak Stages (ft NGVD)			Delta (Alt. 1 [10%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
REGALS-2	No	7.4	7.3	7.7	7.8	7.5	7.9	8.0	0.2	0.2	0.2
REGALS-4	Yes	8.0	7.5	7.9	8.0	7.7	8.1	8.2	0.2	0.2	0.2
WSUNR-05	Yes	7.7	6.3	6.9	7.0	6.3	6.9	7.0	0.0	0.0	0.0
								Maximum:	1.4	0.6	0.5
								Minimum:	-0.9	-0.5	-0.5

Table 7E-4b. Progresso Alternative No. 1, 30% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 Peak Stages (ft NGVD)		Delta (Alt. 1 [10%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
BRO-OF1	No	4.9	5.7	6.1	6.1	6.4	0.3	0.3
ESUNR-10	Yes	7.3	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-2	No	6.4	7.2	7.3	7.3	7.3	0.1	0.0
NANDAV1-4	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-6	No	6.8	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV2-2	No	6.6	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV2-4	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV2-6	No	6.3	7.2	7.3	7.2	7.3	0.0	0.0
NE2AV1-2	Yes	7.0	6.8	7.0	6.7	7.1	0.0	0.0
NE3AV1-2	No	5.9	6.8	7.0	6.7	7.1	0.0	0.0
NE4A-15	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NE4AV1-2	No	6.4	6.8	7.0	6.7	7.1	0.0	0.0
NESUN-2	No	7.0	7.6	7.8	7.8	8.0	0.2	0.2
NEW-2	Yes	9.0	7.1	7.2	7.4	7.6	0.3	0.4
NFNR020	N/A	N/A	4.8	5.2	4.8	5.2	0.0	0.0
NFNR020OL	N/A	N/A	5.0	5.2	5.1	5.2	0.1	0.0
NW10TR1-2	No	6.7	6.9	7.0	6.9	7.0	0.0	0.0
NW10TR2-2	No	5.9	6.9	7.0	6.9	7.0	0.0	0.0
NW10TR3-2	No	7.5	8.0	8.2	8.2	8.4	0.2	0.2
NW10TR3-4	No	6.4	6.9	7.0	6.9	7.0	0.0	0.0
NW15A-15	N/A	N/A	6.6	6.9	6.7	6.9	0.0	0.0
NW2AV1-2	Yes	7.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV1-4	No	6.7	7.6	7.7	7.8	7.9	0.2	0.1
NW2AV2-2	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV2-4	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV3-2	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV3-4	No	6.6	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV4-3	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV4-4	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV5-2	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV5-6	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV1-2	No	7.0	7.0	7.2	7.2	7.4	0.2	0.2
NW4AV1-6	No	5.9	7.1	7.2	7.2	7.4	0.2	0.2

Table 7E-4b. Progresso Alternative No. 1, 30% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 Peak Stages (ft NGVD)		Delta (Alt. 1 [10%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NW4AV2-2	No	6.8	7.2	7.4	7.5	7.7	0.3	0.3
NW4AV2-4	No	6.9	7.2	7.4	7.5	7.5	0.3	0.2
NW4AV3-2	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV3-4	No	6.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV3-6	No	6.4	7.1	7.3	7.2	7.3	0.0	0.0
NW4AV4-2	No	4.9	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV4-4	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV4-6	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV4-8	No	5.9	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV5-2	No	5.8	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV5-4	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-2	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-6	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-8	No	6.1	7.2	7.3	7.2	7.3	0.0	0.0
NW5A-05	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NW5A-05OL	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV1-2	Yes	7.3	7.0	7.2	7.3	7.5	0.3	0.3
NW5AV1-6	Yes	6.8	6.2	6.5	6.6	6.7	0.4	0.2
NW5AV1-8	No	5.9	6.1	6.3	6.3	6.6	0.1	0.4
NW5AV1-9	No	5.9	5.9	6.3	6.3	6.6	0.4	0.4
NW5AV2-2	Yes	7.3	7.2	7.3	7.3	7.4	0.1	0.1
NW5AV2-6	No	6.7	7.5	7.6	7.7	7.9	0.2	0.3
NW5AV3-2	No	6.7	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV4-2	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV4-4	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV4-6	No	5.4	7.2	7.3	7.2	7.3	0.0	0.0
NW6AV1-2	No	6.5	6.5	6.7	6.8	6.9	0.3	0.2
NW7AV1-2	No	6.1	6.6	6.8	6.8	6.9	0.2	0.2
NW7AV1-4	No	6.4	6.7	6.9	6.9	7.0	0.2	0.2
NW7AV1-6	No	6.5	6.5	6.7	6.8	6.9	0.2	0.1
NW7AV1-8	No	6.4	7.1	7.4	7.5	7.8	0.4	0.4
NW7AV2-2	No	6.7	6.7	6.9	6.9	7.0	0.2	0.2

Table 7E-4b. Progresso Alternative No. 1, 30% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 Peak Stages (ft NGVD)		Delta (Alt. 1 [10%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NW7AV2-4	No	6.8	7.2	7.3	7.3	7.3	0.0	0.0
NW7AV3-2	No	6.2	7.0	7.2	7.1	7.3	0.1	0.1
NW7AV3-4	No	7.1	7.1	7.3	7.4	7.5	0.3	0.2
NW7AV4-2	Yes	7.1	7.0	7.2	7.1	7.3	0.1	0.1
NW7AV4-4	No	6.6	7.3	7.5	7.5	7.7	0.2	0.2
NW7AV5-2	No	6.0	7.0	7.2	7.2	7.3	0.2	0.1
NW7AV5-4	No	6.3	7.1	7.3	7.1	7.3	0.0	0.0
NW7AV6-2	No	6.2	7.0	7.2	7.2	7.3	0.2	0.1
NW7AV7-2	No	6.3	7.0	7.2	7.2	7.3	0.2	0.1
NW7AV7-4	No	6.7	7.0	7.2	7.2	7.3	0.2	0.1
NW7AV7-6	No	6.5	7.0	7.2	7.2	7.3	0.2	0.1
NW7TR1-2	No	6.4	7.0	7.2	7.2	7.3	0.2	0.1
NW7TR1-4	No	6.0	7.0	7.2	7.2	7.3	0.2	0.1
NW8AV1-2	No	6.4	7.0	7.2	7.2	7.3	0.2	0.1
NW8AV2-2	No	7.1	7.3	7.5	7.5	7.7	0.2	0.2
NW8ST-10	N/A	N/A	6.9	7.0	6.9	7.0	0.0	0.0
NW9AV1-2	No	7.2	7.2	7.4	7.5	7.8	0.3	0.4
NW9AV1-4	No	6.5	7.2	7.4	7.5	7.8	0.3	0.4
NW9AV2-2	No	6.5	7.1	7.4	7.5	7.8	0.4	0.4
NW9AV3-2	Yes	7.3	7.1	7.3	7.4	7.5	0.3	0.2
NW9AV3-4	Yes	7.3	7.0	7.1	7.1	7.1	0.0	0.0
NW9AV4-2	No	7.2	7.1	7.3	7.4	7.6	0.3	0.2
NW9AV4-4	Yes	7.4	7.0	7.3	7.3	7.5	0.2	0.2
NW9AV5-2	No	6.4	7.0	7.1	7.1	7.2	0.1	0.1
NW9AV5-4	No	6.5	6.9	7.0	6.9	7.0	0.0	0.0
NW9AV5-6	No	6.9	7.0	7.2	7.1	7.3	0.1	0.1
NW9AV5-8	No	7.0	7.1	7.3	7.2	7.3	0.1	0.1
NW9AV6-2	No	5.5	7.0	7.2	7.2	7.3	0.2	0.1
NW9AV6-4	No	6.2	7.0	7.1	7.1	7.2	0.1	0.1
NW9AV6-6	No	6.7	7.1	7.1	7.1	7.2	0.1	0.1
NW9AV7-2	Yes	7.1	7.1	7.2	7.1	7.2	0.0	0.1
NW9AV7-4	No	7.0	7.2	7.3	7.3	7.4	0.0	0.0

Table 7E-4b. Progresso Alternative No. 1, 30% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 Peak Stages (ft NGVD)		Delta (Alt. 1 [10%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
REGALS-2	No	7.4	8.0	8.2	8.3	8.5	0.3	0.3
REGALS-4	No	8.0	8.2	8.4	8.5	8.8	0.3	0.4
WSUNR-05	Yes	7.7	7.2	7.3	7.2	7.3	0.0	0.0
						Maximum:	0.4	0.4
						Minimum:	0.0	0.0

Table 7E-5a. Progresso Alternative No. 2, Exfiltration with Ks = 1 x 10-4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2 [K = 1 x 10-4] Peak Stages (ft NGVD)			Delta (Alt. 2 [K = 1 x 10-4] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
BRO-OF1	Yes	4.9	3.8	4.7	5.0	3.8	4.7	5.0	0.0	0.0	0.0
ESUNR-10	Yes	7.3	6.6	7.0	7.1	6.6	7.0	7.1	0.0	0.0	0.0
NANDAV1-2	No	6.4	6.8	7.0	7.1	6.7	7.0	7.0	0.0	0.0	0.0
NANDAV1-4	No	6.2	4.1	6.8	6.9	5.7	6.8	7.0	1.6	0.1	0.0
NANDAV1-6	Yes	6.8	5.1	6.8	6.9	5.8	6.8	7.0	0.7	0.1	0.0
NANDAV2-2	Yes	6.6	6.7	6.8	6.9	6.7	6.8	7.0	0.0	0.0	0.0
NANDAV2-4	No	6.4	4.9	6.8	6.9	5.8	6.8	7.0	0.9	0.1	0.0
NANDAV2-6	No	6.3	5.4	6.8	6.9	5.9	6.8	7.0	0.5	0.0	0.0
NE2AV1-2	Yes	7.0	4.6	5.8	6.2	5.4	6.7	6.8	0.8	0.9	0.6
NE3AV1-2	No	5.9	5.6	6.1	6.3	6.3	6.7	6.8	0.7	0.6	0.6
NE4A-15	N/A	N/A	6.8	7.0	7.1	6.8	7.0	7.1	0.0	0.0	0.0
NE4AV1-2	No	6.4	6.3	6.5	6.5	6.3	6.7	6.8	0.0	0.2	0.3
NESUN-2	No	7.0	7.0	7.3	7.4	7.0	7.3	7.4	0.0	0.0	0.0
NEW-2	Yes	9.0	5.4	6.6	6.7	5.5	6.6	6.7	0.0	0.0	0.0
NFNR020	N/A	N/A	3.3	3.9	4.1	3.3	3.9	4.1	0.0	0.0	0.0
NFNR020OL	N/A	N/A	3.3	3.9	4.1	3.3	3.9	4.1	0.0	0.0	0.0
NW10TR1-2	Yes	6.7	4.9	6.0	6.3	5.0	6.0	6.3	0.1	0.0	0.0
NW10TR2-2	No	5.9	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW10TR3-2	Yes	7.5	7.3	7.6	7.7	7.3	7.6	7.7	0.0	0.0	0.0
NW10TR3-4	No	6.4	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW15A-15	N/A	N/A	5.9	6.3	6.5	5.9	6.3	6.5	0.0	0.0	0.0
NW2AV1-2	Yes	7.2	5.3	6.8	6.9	5.0	6.8	7.0	-0.3	0.0	0.0
NW2AV1-4	Yes	6.7	5.7	7.0	7.1	5.5	6.9	7.1	-0.1	-0.1	-0.1
NW2AV2-2	No	6.4	5.6	6.8	6.9	5.2	6.8	7.0	-0.5	0.0	0.0
NW2AV2-4	No	6.4	6.4	6.8	6.9	6.3	6.8	7.0	0.0	0.0	0.0
NW2AV3-2	No	6.2	6.0	6.8	6.9	5.4	6.8	6.9	-0.6	0.0	0.0
NW2AV3-4	Yes	6.6	5.5	6.8	6.9	5.3	6.8	7.0	-0.2	0.0	0.0
NW2AV4-3	No	6.2	6.1	6.8	6.9	6.0	6.8	6.9	0.0	0.0	0.0
NW2AV4-4	No	6.2	5.9	6.8	6.9	5.8	6.8	7.0	-0.1	0.0	0.0
NW2AV5-2	No	6.0	5.8	6.8	6.9	6.0	6.8	6.9	0.2	0.0	0.0
NW2AV5-6	No	6.0	6.2	6.8	6.9	6.2	6.8	6.9	0.0	0.0	0.0
NW4AV1-2	Yes	7.0	6.4	6.7	6.8	6.4	6.6	6.7	0.0	-0.1	0.0
NW4AV1-6	No	5.9	6.5	6.8	6.9	6.4	6.7	6.7	-0.1	-0.1	-0.1

Table 7E-5a. Progresso Alternative No. 2, Exfiltration with Ks = 1 x 10-4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2 [K = 1 x 10-4] Peak Stages (ft NGVD)			Delta (Alt. 2 [K = 1 x 10-4] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NW4AV2-2	Yes	6.8	5.4	6.6	6.8	5.4	6.6	6.8	0.0	0.0	0.0
NW4AV2-4	Yes	6.9	5.3	6.6	6.8	5.3	6.6	6.8	0.0	0.0	0.0
NW4AV3-2	No	6.0	5.7	6.8	6.9	5.4	6.8	6.9	-0.3	0.0	0.0
NW4AV3-4	Yes	6.6	5.5	6.8	6.9	5.5	6.8	6.9	-0.1	0.0	0.0
NW4AV3-6	No	6.4	5.4	6.7	6.8	5.5	6.7	6.8	0.0	0.0	0.0
NW4AV4-2	No	4.9	6.0	6.8	6.9	5.7	6.8	6.9	-0.2	0.0	0.0
NW4AV4-4	No	6.0	5.9	6.8	6.9	5.4	6.8	6.9	-0.6	0.0	0.0
NW4AV4-6	No	6.0	5.8	6.8	6.9	5.3	6.8	6.9	-0.5	0.0	0.0
NW4AV4-8	No	5.9	6.1	6.8	6.9	6.0	6.8	6.9	0.0	0.0	0.0
NW4AV5-2	No	5.8	6.0	6.8	6.9	5.8	6.8	6.9	-0.2	0.0	0.0
NW4AV5-4	No	5.6	6.2	6.8	6.9	6.1	6.8	6.9	0.0	0.0	0.0
NW4AV6-2	No	5.6	6.2	6.9	6.9	6.2	6.8	6.9	0.0	0.0	0.0
NW4AV6-6	No	5.6	6.2	6.8	6.9	6.2	6.8	6.9	0.0	0.0	0.0
NW4AV6-8	No	6.1	6.2	6.9	6.9	6.2	6.8	6.9	0.0	0.0	0.0
NW5A-05	N/A	N/A	6.4	6.9	7.0	6.4	6.9	7.0	0.0	0.0	0.0
NW5A-05OL	N/A	N/A	6.4	6.9	7.0	6.4	6.9	7.0	0.0	0.0	0.0
NW5AV1-2	Yes	7.3	5.0	6.3	6.6	5.0	6.3	6.5	0.0	0.0	0.0
NW5AV1-6	Yes	6.8	4.3	5.2	5.5	4.3	5.2	5.5	0.0	0.0	0.0
NW5AV1-8	Yes	5.9	3.8	4.9	5.4	4.8	5.9	6.0	1.0	0.9	0.6
NW5AV1-9	Yes	5.9	3.9	4.8	5.1	3.9	4.8	5.1	0.0	0.0	0.0
NW5AV2-2	Yes	7.3	6.8	7.0	7.0	6.7	7.0	7.0	-0.1	0.0	0.0
NW5AV2-6	Yes	6.7	6.7	7.1	7.2	6.3	6.8	6.9	-0.4	-0.3	-0.2
NW5AV3-2	Yes	6.7	5.4	6.8	6.9	5.3	6.8	6.9	-0.1	0.0	0.0
NW5AV4-2	No	6.4	6.6	6.9	6.9	6.2	6.8	6.9	-0.3	0.0	0.0
NW5AV4-4	No	6.4	6.2	6.8	6.9	5.8	6.8	6.9	-0.4	0.0	0.0
NW5AV4-6	No	5.4	6.2	6.8	6.9	6.2	6.8	6.9	0.0	0.0	0.0
NW6AV1-2	Yes	6.5	4.4	5.5	5.8	4.4	5.4	5.7	0.0	0.0	0.0
NW7AV1-2	Yes	6.1	4.6	5.5	5.8	4.5	5.5	5.7	0.0	0.0	0.0
NW7AV1-4	Yes	6.4	4.5	5.7	6.1	4.5	5.6	6.0	0.0	-0.1	0.0
NW7AV1-6	Yes	6.5	4.6	5.5	5.8	4.5	5.5	5.7	0.0	0.0	0.0
NW7AV1-8	Yes	6.4	4.5	5.5	5.8	4.5	5.5	5.8	0.0	0.0	0.0
NW7AV2-2	Yes	6.7	4.8	5.8	6.1	4.8	5.8	6.0	0.0	0.0	0.0

Table 7E-5a. Progresso Alternative No. 2, Exfiltration with Ks = 1 x 10-4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2 [K = 1 x 10-4] Peak Stages (ft NGVD)			Delta (Alt. 2 [K = 1 x 10-4] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NW7AV2-4	Yes	6.8	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
NW7AV3-2	Yes	6.2	5.2	6.3	6.6	5.2	6.2	6.5	0.0	0.0	0.0
NW7AV3-4	Yes	7.1	5.4	6.4	6.7	5.3	6.4	6.6	0.0	0.0	0.0
NW7AV4-2	Yes	7.1	5.4	6.6	6.8	5.3	6.6	6.8	-0.1	0.0	0.0
NW7AV4-4	No	6.6	6.7	6.9	7.0	6.7	6.9	7.0	0.0	0.0	0.0
NW7AV5-2	No	6.0	5.7	6.7	6.8	5.7	6.7	6.7	0.0	0.0	0.0
NW7AV5-4	No	6.3	5.6	6.8	6.9	5.6	6.8	6.9	0.0	0.0	0.0
NW7AV6-2	No	6.2	5.9	6.7	6.8	6.0	6.7	6.7	0.1	0.0	0.0
NW7AV7-2	No	6.3	6.0	6.7	6.8	6.1	6.7	6.7	0.0	0.0	0.0
NW7AV7-4	Yes	6.7	6.0	6.7	6.8	6.1	6.7	6.7	0.0	0.0	0.0
NW7AV7-6	Yes	6.5	6.0	6.7	6.8	6.0	6.7	6.7	0.0	0.0	0.0
NW7TR1-2	No	6.4	6.3	6.7	6.8	6.3	6.7	6.7	0.0	0.0	0.0
NW7TR1-4	No	6.0	6.0	6.7	6.8	6.0	6.7	6.7	0.0	0.0	0.0
NW8AV1-2	No	6.4	6.3	6.7	6.8	6.3	6.7	6.7	0.0	0.0	0.0
NW8AV2-2	Yes	7.1	6.1	6.9	7.0	6.0	6.9	7.0	-0.1	0.0	0.0
NW8ST-10	N/A	N/A	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW9AV1-2	Yes	7.2	4.6	5.7	6.0	4.6	5.7	6.0	0.0	0.0	0.0
NW9AV1-4	Yes	6.5	4.7	5.8	6.2	4.6	5.7	6.1	0.0	0.0	0.0
NW9AV2-2	Yes	6.5	4.6	5.7	6.1	4.6	5.7	6.0	0.0	0.0	0.0
NW9AV3-2	Yes	7.3	5.4	6.5	6.7	5.4	6.4	6.6	-0.1	0.0	0.0
NW9AV3-4	Yes	7.3	6.8	6.9	6.9	6.8	6.9	6.9	0.0	0.0	0.0
NW9AV4-2	Yes	7.2	5.5	6.5	6.7	5.4	6.5	6.7	-0.1	0.0	0.0
NW9AV4-4	Yes	7.4	5.1	6.2	6.5	5.1	6.1	6.5	0.0	-0.1	-0.1
NW9AV5-2	No	6.4	5.9	6.7	6.7	5.9	6.6	6.7	0.0	0.0	0.0
NW9AV5-4	Yes	6.5	5.1	6.6	6.7	5.2	6.6	6.7	0.0	0.0	0.0
NW9AV5-6	Yes	6.9	5.7	6.6	6.7	5.6	6.6	6.7	0.0	0.0	0.0
NW9AV5-8	Yes	7.0	5.6	6.6	6.7	5.5	6.5	6.7	-0.1	0.0	0.0
NW9AV6-2	No	5.5	6.0	6.7	6.8	6.0	6.7	6.7	0.0	0.0	0.0
NW9AV6-4	No	6.2	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW9AV6-6	Yes	6.7	6.6	6.9	6.9	6.4	6.8	6.9	-0.2	-0.1	0.0
NW9AV7-2	Yes	7.1	6.8	7.0	7.0	6.6	7.0	7.0	-0.2	0.0	0.0
NW9AV7-4	Yes	7.0	6.8	7.1	7.1	6.6	7.0	7.1	-0.2	-0.1	-0.1

Table 7E-5a. Progresso Alternative No. 2, Exfiltration with Ks = 1 x 10-4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2 [K = 1 x 10-4] Peak Stages (ft NGVD)			Delta (Alt. 2 [K = 1 x 10-4] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
REGALS-2	Yes	7.4	7.3	7.7	7.8	7.2	7.6	7.7	-0.1	-0.1	-0.1
REGALS-4	Yes	8.0	7.5	7.9	8.0	7.5	7.8	7.9	-0.1	0.0	-0.1
WSUNR-05	Yes	7.7	6.3	6.9	7.0	6.3	6.9	7.0	0.0	0.0	0.0
								Maximum:	1.6	0.9	0.6
								Minimum:	-0.3	-0.2	0.0

Table 7E-5b. Progresso Alternative No. 2, Exfiltration with Ks = 1 x 10-4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2 [K = 1 x 10-4] Peak Stages (ft NGVD)		Delta (Alt. 2 [K = 1 x 10-4] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
BRO-OF1	No	4.9	5.7	6.1	5.7	6.2	0.0	0.1
ESUNR-10	Yes	7.3	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-2	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-4	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-6	No	6.8	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV2-2	No	6.6	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV2-4	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV2-6	No	6.3	7.2	7.3	7.2	7.3	0.0	0.0
NE2AV1-2	Yes	7.0	6.8	7.0	7.1	7.3	0.3	0.3
NE3AV1-2	No	5.9	6.8	7.0	7.1	7.3	0.3	0.3
NE4A-15	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NE4AV1-2	No	6.4	6.8	7.0	7.1	7.3	0.3	0.3
NESUN-2	No	7.0	7.6	7.8	7.6	7.8	0.0	0.0
NEW-2	Yes	9.0	7.1	7.2	7.1	7.2	0.0	0.0
NFNR020	N/A	N/A	4.8	5.2	4.8	5.2	0.0	0.0
NFNR020OL	N/A	N/A	5.0	5.2	5.0	5.2	0.0	0.0
NW10TR1-2	No	6.7	6.9	7.0	6.8	7.0	-0.1	0.0
NW10TR2-2	No	5.9	6.9	7.0	6.9	7.0	0.0	0.0
NW10TR3-2	No	7.5	8.0	8.2	8.0	8.2	0.0	0.0
NW10TR3-4	No	6.4	6.9	7.0	6.9	7.0	0.0	0.0
NW15A-15	N/A	N/A	6.6	6.9	6.6	6.9	0.0	0.0
NW2AV1-2	Yes	7.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV1-4	No	6.7	7.6	7.7	7.5	7.7	-0.1	-0.1
NW2AV2-2	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV2-4	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV3-2	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV3-4	No	6.6	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV4-3	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV4-4	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV5-2	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV5-6	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV1-2	Yes	7.0	7.0	7.2	7.0	7.1	0.0	0.0
NW4AV1-6	No	5.9	7.1	7.2	7.0	7.1	-0.1	0.0

Table 7E-5b. Progresso Alternative No. 2, Exfiltration with Ks = 1 x 10-4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2 [K = 1 x 10-4] Peak Stages (ft NGVD)		Delta (Alt. 2 [K = 1 x 10-4] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NW4AV2-2	No	6.8	7.2	7.4	7.2	7.3	0.0	0.0
NW4AV2-4	No	6.9	7.2	7.4	7.2	7.3	0.0	0.0
NW4AV3-2	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV3-4	No	6.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV3-6	No	6.4	7.1	7.3	7.1	7.3	0.0	0.0
NW4AV4-2	No	4.9	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV4-4	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV4-6	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV4-8	No	5.9	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV5-2	No	5.8	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV5-4	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-2	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-6	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-8	No	6.1	7.2	7.3	7.2	7.3	0.0	0.0
NW5A-05	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NW5A-05OL	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV1-2	Yes	7.3	7.0	7.2	7.0	7.2	0.0	0.0
NW5AV1-6	Yes	6.8	6.2	6.5	6.2	6.5	0.0	0.0
NW5AV1-8	No	5.9	6.1	6.3	6.3	6.4	0.2	0.1
NW5AV1-9	No	5.9	5.9	6.3	5.9	6.3	0.0	0.1
NW5AV2-2	Yes	7.3	7.2	7.3	7.1	7.2	0.0	-0.1
NW5AV2-6	No	6.7	7.5	7.6	7.2	7.4	-0.2	-0.2
NW5AV3-2	No	6.7	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV4-2	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV4-4	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV4-6	No	5.4	7.2	7.3	7.2	7.3	0.0	0.0
NW6AV1-2	No	6.5	6.5	6.7	6.5	6.7	0.0	0.0
NW7AV1-2	No	6.1	6.6	6.8	6.5	6.7	0.0	0.0
NW7AV1-4	No	6.4	6.7	6.9	6.7	6.8	0.0	0.0
NW7AV1-6	Yes	6.5	6.5	6.7	6.5	6.7	0.0	0.0
NW7AV1-8	No	6.4	7.1	7.4	7.0	7.4	-0.1	0.0
NW7AV2-2	Yes	6.7	6.7	6.9	6.7	6.8	0.0	0.0

Table 7E-5b. Progresso Alternative No. 2, Exfiltration with Ks = 1 x 10-4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2 [K = 1 x 10-4] Peak Stages (ft NGVD)		Delta (Alt. 2 [K = 1 x 10-4] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NW7AV2-4	No	6.8	7.2	7.3	7.2	7.3	0.0	0.0
NW7AV3-2	No	6.2	7.0	7.2	6.9	7.1	0.0	0.0
NW7AV3-4	Yes	7.1	7.1	7.3	7.0	7.3	-0.1	0.0
NW7AV4-2	Yes	7.1	7.0	7.2	7.0	7.2	0.0	0.0
NW7AV4-4	No	6.6	7.3	7.5	7.3	7.5	0.0	0.0
NW7AV5-2	No	6.0	7.0	7.2	7.0	7.2	0.0	-0.1
NW7AV5-4	No	6.3	7.1	7.3	7.1	7.2	0.0	0.0
NW7AV6-2	No	6.2	7.0	7.2	7.0	7.2	0.0	-0.1
NW7AV7-2	No	6.3	7.0	7.2	7.0	7.2	0.0	-0.1
NW7AV7-4	No	6.7	7.0	7.2	7.0	7.2	0.0	-0.1
NW7AV7-6	No	6.5	7.0	7.2	7.0	7.2	0.0	-0.1
NW7TR1-2	No	6.4	7.0	7.2	7.0	7.2	0.0	-0.1
NW7TR1-4	No	6.0	7.0	7.2	7.0	7.2	0.0	-0.1
NW8AV1-2	No	6.4	7.0	7.2	7.0	7.2	0.0	-0.1
NW8AV2-2	No	7.1	7.3	7.5	7.3	7.5	0.0	0.0
NW8ST-10	N/A	N/A	6.9	7.0	6.9	7.0	0.0	0.0
NW9AV1-2	Yes	7.2	7.2	7.4	7.1	7.4	-0.1	0.0
NW9AV1-4	No	6.5	7.2	7.4	7.1	7.3	0.0	-0.1
NW9AV2-2	No	6.5	7.1	7.4	7.1	7.3	0.0	0.0
NW9AV3-2	Yes	7.3	7.1	7.3	7.0	7.3	-0.1	0.0
NW9AV3-4	Yes	7.3	7.0	7.1	7.0	7.1	0.0	0.0
NW9AV4-2	Yes	7.2	7.1	7.3	7.1	7.3	-0.1	0.0
NW9AV4-4	Yes	7.4	7.0	7.3	6.9	7.2	-0.1	-0.1
NW9AV5-2	No	6.4	7.0	7.1	6.9	7.1	0.0	0.0
NW9AV5-4	No	6.5	6.9	7.0	6.9	7.0	0.0	0.0
NW9AV5-6	No	6.9	7.0	7.2	7.0	7.2	0.0	0.0
NW9AV5-8	Yes	7.0	7.1	7.3	7.0	7.2	-0.1	0.0
NW9AV6-2	No	5.5	7.0	7.2	7.0	7.2	0.0	-0.1
NW9AV6-4	No	6.2	7.0	7.1	6.9	7.1	0.0	0.0
NW9AV6-6	No	6.7	7.1	7.1	7.0	7.1	0.0	0.0
NW9AV7-2	Yes	7.1	7.1	7.2	7.1	7.2	0.0	0.0
NW9AV7-4	No	7.0	7.2	7.3	7.2	7.3	0.0	0.0

Table 7E-5b. Progresso Alternative No. 2, Exfiltration with Ks = 1 x 10-4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2 [K = 1 x 10-4] Peak Stages (ft NGVD)		Delta (Alt. 2 [K = 1 x 10-4] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
REGALS-2	No	7.4	8.0	8.2	7.9	8.1	-0.1	-0.1
REGALS-4	No	8.0	8.2	8.4	8.2	8.3	0.0	-0.1
WSUNR-05	Yes	7.7	7.2	7.3	7.2	7.3	0.0	0.0
						Maximum:	0.3	0.3
						Minimum:	-0.2	0.0

Table 7E-6a. Progresso Alternative No. 2, Exfiltration with Ks = 5 x 10-4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2 [K = 5 x 10-4] Peak Stages (ft NGVD)			Delta (Alt. 2 [K = 5 x 10-4] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
BRO-OF1	Yes	4.9	3.8	4.7	5.0	3.7	4.6	4.9	0.0	-0.1	-0.1
ESUNR-10	Yes	7.3	6.6	7.0	7.1	6.6	7.0	7.1	0.0	0.0	0.0
NANDAV1-2	No	6.4	6.8	7.0	7.1	6.5	6.8	6.9	-0.3	-0.2	-0.2
NANDAV1-4	Yes	6.2	4.1	6.8	6.9	3.1	5.9	6.8	-1.0	-0.8	-0.1
NANDAV1-6	Yes	6.8	5.1	6.8	6.9	5.0	6.1	6.8	-0.2	-0.7	-0.1
NANDAV2-2	Yes	6.6	6.7	6.8	6.9	6.7	6.8	6.9	0.0	0.0	-0.1
NANDAV2-4	Yes	6.4	4.9	6.8	6.9	4.2	6.5	6.8	-0.7	-0.2	-0.1
NANDAV2-6	No	6.3	5.4	6.8	6.9	4.3	6.7	6.9	-1.1	-0.1	-0.1
NE2AV1-2	Yes	7.0	4.6	5.8	6.2	4.1	5.7	6.2	-0.4	-0.2	0.0
NE3AV1-2	Yes	5.9	5.6	6.1	6.3	5.6	6.1	6.3	0.0	0.0	0.0
NE4A-15	N/A	N/A	6.8	7.0	7.1	6.8	7.0	7.1	0.0	0.0	0.0
NE4AV1-2	Yes	6.4	6.3	6.5	6.5	6.3	6.5	6.5	0.0	0.0	0.0
NESUN-2	No	7.0	7.0	7.3	7.4	7.0	7.3	7.4	0.0	0.0	0.0
NEW-2	Yes	9.0	5.4	6.6	6.7	5.2	6.4	6.6	-0.2	-0.2	-0.1
NFNR020	N/A	N/A	3.3	3.9	4.1	3.3	3.9	4.1	0.0	0.0	0.0
NFNR020OL	N/A	N/A	3.3	3.9	4.1	3.3	3.9	4.1	0.0	0.0	0.0
NW10TR1-2	Yes	6.7	4.9	6.0	6.3	4.7	6.0	6.2	-0.2	-0.1	-0.1
NW10TR2-2	No	5.9	6.4	6.7	6.7	6.4	6.6	6.7	0.0	0.0	0.0
NW10TR3-2	Yes	7.5	7.3	7.6	7.7	7.3	7.6	7.7	0.0	-0.1	-0.1
NW10TR3-4	No	6.4	6.4	6.7	6.7	6.4	6.6	6.7	0.0	0.0	0.0
NW15A-15	N/A	N/A	5.9	6.3	6.5	5.9	6.3	6.5	0.0	0.0	0.0
NW2AV1-2	Yes	7.2	5.3	6.8	6.9	4.6	6.3	6.8	-0.8	-0.5	-0.1
NW2AV1-4	Yes	6.7	5.7	7.0	7.1	4.8	6.3	6.7	-0.9	-0.7	-0.4
NW2AV2-2	Yes	6.4	5.6	6.8	6.9	3.6	6.7	6.8	-2.0	-0.2	-0.1
NW2AV2-4	Yes	6.4	6.4	6.8	6.9	6.1	6.6	6.8	-0.3	-0.2	-0.1
NW2AV3-2	No	6.2	6.0	6.8	6.9	3.4	6.8	6.9	-2.6	0.0	0.0
NW2AV3-4	Yes	6.6	5.5	6.8	6.9	3.4	6.7	6.9	-2.1	-0.1	-0.1
NW2AV4-3	No	6.2	6.1	6.8	6.9	5.9	6.8	6.9	-0.1	-0.1	0.0
NW2AV4-4	No	6.2	5.9	6.8	6.9	3.7	6.7	6.9	-2.2	-0.1	-0.1
NW2AV5-2	No	6.0	5.8	6.8	6.9	4.6	6.7	6.9	-1.3	-0.1	-0.1
NW2AV5-6	No	6.0	6.2	6.8	6.9	5.0	6.8	6.9	-1.2	0.0	0.0
NW4AV1-2	Yes	7.0	6.4	6.7	6.8	6.3	6.6	6.6	-0.2	-0.1	-0.2
NW4AV1-6	No	5.9	6.5	6.8	6.9	6.0	6.3	6.4	-0.5	-0.5	-0.5

Table 7E-6a. Progresso Alternative No. 2, Exfiltration with Ks = 5 x 10-4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2 [K = 5 x 10-4] Peak Stages (ft NGVD)			Delta (Alt. 2 [K = 5 x 10-4] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NW4AV2-2	Yes	6.8	5.4	6.6	6.8	5.1	6.4	6.7	-0.2	-0.2	-0.1
NW4AV2-4	Yes	6.9	5.3	6.6	6.8	5.1	6.4	6.7	-0.2	-0.2	-0.1
NW4AV3-2	No	6.0	5.7	6.8	6.9	5.1	6.8	6.9	-0.6	0.0	0.0
NW4AV3-4	Yes	6.6	5.5	6.8	6.9	5.2	6.8	6.9	-0.3	-0.1	0.0
NW4AV3-6	Yes	6.4	5.4	6.7	6.8	5.2	6.5	6.7	-0.2	-0.2	-0.1
NW4AV4-2	No	4.9	6.0	6.8	6.9	4.9	6.8	6.9	-1.1	0.0	0.0
NW4AV4-4	No	6.0	5.9	6.8	6.9	5.0	6.8	6.9	-0.9	0.0	0.0
NW4AV4-6	No	6.0	5.8	6.8	6.9	3.6	6.8	6.9	-2.2	0.0	0.0
NW4AV4-8	No	5.9	6.1	6.8	6.9	5.8	6.8	6.9	-0.3	0.0	0.0
NW4AV5-2	No	5.8	6.0	6.8	6.9	4.5	6.8	6.9	-1.5	0.0	0.0
NW4AV5-4	No	5.6	6.2	6.8	6.9	4.6	6.8	6.9	-1.6	0.0	0.0
NW4AV6-2	No	5.6	6.2	6.9	6.9	5.6	6.8	6.9	-0.6	0.0	0.0
NW4AV6-6	No	5.6	6.2	6.8	6.9	5.3	6.8	6.9	-0.9	0.0	0.0
NW4AV6-8	No	6.1	6.2	6.9	6.9	5.3	6.8	6.9	-0.9	0.0	0.0
NW5A-05	N/A	N/A	6.4	6.9	7.0	6.4	6.9	7.0	0.0	0.0	0.0
NW5A-05OL	N/A	N/A	6.4	6.9	7.0	6.4	6.9	7.0	0.0	0.0	0.0
NW5AV1-2	Yes	7.3	5.0	6.3	6.6	4.8	6.1	6.4	-0.2	-0.2	-0.1
NW5AV1-6	Yes	6.8	4.3	5.2	5.5	4.2	5.1	5.4	-0.1	-0.1	-0.1
NW5AV1-8	Yes	5.9	3.8	4.9	5.4	3.7	4.9	5.4	0.0	-0.1	-0.1
NW5AV1-9	Yes	5.9	3.9	4.8	5.1	3.8	4.7	5.0	-0.1	-0.1	-0.1
NW5AV2-2	Yes	7.3	6.8	7.0	7.0	6.7	7.0	7.0	-0.1	0.0	0.0
NW5AV2-6	Yes	6.7	6.7	7.1	7.2	6.3	6.8	6.9	-0.4	-0.3	-0.3
NW5AV3-2	Yes	6.7	5.4	6.8	6.9	4.7	6.8	6.9	-0.7	0.0	0.0
NW5AV4-2	No	6.4	6.6	6.9	6.9	5.4	6.8	6.9	-1.2	0.0	0.0
NW5AV4-4	No	6.4	6.2	6.8	6.9	4.5	6.8	6.9	-1.7	0.0	0.0
NW5AV4-6	No	5.4	6.2	6.8	6.9	5.4	6.8	6.9	-0.8	0.0	0.0
NW6AV1-2	Yes	6.5	4.4	5.5	5.8	4.3	5.3	5.7	-0.1	-0.2	-0.1
NW7AV1-2	Yes	6.1	4.6	5.5	5.8	4.4	5.4	5.7	-0.1	-0.1	-0.1
NW7AV1-4	Yes	6.4	4.5	5.7	6.1	4.2	5.3	5.9	-0.3	-0.4	-0.2
NW7AV1-6	Yes	6.5	4.6	5.5	5.8	4.4	5.4	5.7	-0.2	-0.1	-0.1
NW7AV1-8	Yes	6.4	4.5	5.5	5.8	4.3	5.4	5.7	-0.2	-0.1	-0.1
NW7AV2-2	Yes	6.7	4.8	5.8	6.1	4.6	5.7	5.9	-0.2	-0.1	-0.2

Table 7E-6a. Progresso Alternative No. 2, Exfiltration with Ks = 5 x 10-4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2 [K = 5 x 10-4] Peak Stages (ft NGVD)			Delta (Alt. 2 [K = 5 x 10-4] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NW7AV2-4	Yes	6.8	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
NW7AV3-2	Yes	6.2	5.2	6.3	6.6	4.8	6.1	6.4	-0.4	-0.2	-0.2
NW7AV3-4	Yes	7.1	5.4	6.4	6.7	4.9	6.2	6.5	-0.5	-0.2	-0.2
NW7AV4-2	Yes	7.1	5.4	6.6	6.8	4.8	6.5	6.7	-0.5	-0.2	-0.1
NW7AV4-4	No	6.6	6.7	6.9	7.0	6.7	6.9	7.0	0.0	0.0	0.0
NW7AV5-2	No	6.0	5.7	6.7	6.8	4.9	6.7	6.7	-0.7	0.0	0.0
NW7AV5-4	No	6.3	5.6	6.8	6.9	4.9	6.8	6.9	-0.7	0.0	0.0
NW7AV6-2	No	6.2	5.9	6.7	6.8	5.2	6.7	6.7	-0.7	0.0	0.0
NW7AV7-2	No	6.3	6.0	6.7	6.8	5.7	6.7	6.7	-0.3	0.0	0.0
NW7AV7-4	Yes	6.7	6.0	6.7	6.8	5.5	6.7	6.7	-0.6	0.0	0.0
NW7AV7-6	Yes	6.5	6.0	6.7	6.8	5.2	6.7	6.7	-0.8	0.0	0.0
NW7TR1-2	No	6.4	6.3	6.7	6.8	6.3	6.7	6.7	0.0	0.0	0.0
NW7TR1-4	No	6.0	6.0	6.7	6.8	6.0	6.6	6.7	0.0	0.0	0.0
NW8AV1-2	No	6.4	6.3	6.7	6.8	6.3	6.7	6.7	0.0	0.0	0.0
NW8AV2-2	Yes	7.1	6.1	6.9	7.0	5.7	6.9	7.0	-0.4	-0.1	0.0
NW8ST-10	N/A	N/A	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW9AV1-2	Yes	7.2	4.6	5.7	6.0	4.4	5.6	6.0	-0.2	-0.1	-0.1
NW9AV1-4	Yes	6.5	4.7	5.8	6.2	4.5	5.7	6.1	-0.2	-0.1	-0.1
NW9AV2-2	Yes	6.5	4.6	5.7	6.1	4.4	5.6	6.0	-0.2	-0.1	-0.1
NW9AV3-2	Yes	7.3	5.4	6.5	6.7	4.9	6.3	6.5	-0.5	-0.2	-0.2
NW9AV3-4	Yes	7.3	6.8	6.9	6.9	6.8	6.9	6.9	0.0	0.0	0.0
NW9AV4-2	Yes	7.2	5.5	6.5	6.7	4.9	6.3	6.6	-0.6	-0.2	-0.1
NW9AV4-4	Yes	7.4	5.1	6.2	6.5	4.7	6.1	6.4	-0.4	-0.1	-0.1
NW9AV5-2	Yes	6.4	5.9	6.7	6.7	5.4	6.6	6.7	-0.5	0.0	0.0
NW9AV5-4	Yes	6.5	5.1	6.6	6.7	4.9	6.6	6.7	-0.3	0.0	0.0
NW9AV5-6	Yes	6.9	5.7	6.6	6.7	5.1	6.5	6.6	-0.6	-0.1	-0.1
NW9AV5-8	Yes	7.0	5.6	6.6	6.7	5.0	6.4	6.6	-0.6	-0.2	-0.1
NW9AV6-2	No	5.5	6.0	6.7	6.8	5.9	6.6	6.7	-0.1	0.0	0.0
NW9AV6-4	No	6.2	6.4	6.7	6.7	6.0	6.6	6.7	-0.4	0.0	0.0
NW9AV6-6	Yes	6.7	6.6	6.9	6.9	5.8	6.6	6.7	-0.7	-0.3	-0.2
NW9AV7-2	Yes	7.1	6.8	7.0	7.0	5.8	6.7	6.9	-1.0	-0.3	-0.2
NW9AV7-4	Yes	7.0	6.8	7.1	7.1	6.2	6.9	7.0	-0.6	-0.2	-0.1

Table 7E-6a. Progresso Alternative No. 2, Exfiltration with Ks = 5 x 10-4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2 [K = 5 x 10-4] Peak Stages (ft NGVD)			Delta (Alt. 2 [K = 5 x 10-4] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
REGALS-2	Yes	7.4	7.3	7.7	7.8	6.9	7.3	7.4	-0.5	-0.4	-0.4
REGALS-4	Yes	8.0	7.5	7.9	8.0	7.3	7.7	7.8	-0.3	-0.2	-0.2
WSUNR-05	Yes	7.7	6.3	6.9	7.0	6.3	6.8	6.9	0.0	0.0	0.0
								Maximum:	0.0	0.0	0.0
								Minimum:	-0.8	-0.5	0.0

Table 7E-6b. Progresso Alternative No. 2, Exfiltration with Ks = 5 x 10-4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2 [K = 5 x 10-4] Peak Stages (ft NGVD)		Delta (Alt. 2 [K = 5 x 10-4] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
BRO-OF1	No	4.9	5.7	6.1	5.7	6.0	-0.1	-0.1
ESUNR-10	Yes	7.3	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-2	No	6.4	7.2	7.3	7.1	7.3	-0.1	0.0
NANDAV1-4	No	6.2	7.2	7.3	7.1	7.3	0.0	0.0
NANDAV1-6	No	6.8	7.2	7.3	7.1	7.3	0.0	0.0
NANDAV2-2	No	6.6	7.2	7.3	7.1	7.3	0.0	0.0
NANDAV2-4	No	6.4	7.2	7.3	7.1	7.3	0.0	0.0
NANDAV2-6	No	6.3	7.2	7.3	7.1	7.3	0.0	0.0
NE2AV1-2	Yes	7.0	6.8	7.0	6.7	7.0	0.0	-0.1
NE3AV1-2	No	5.9	6.8	7.0	6.7	7.0	0.0	-0.1
NE4A-15	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NE4AV1-2	No	6.4	6.8	7.0	6.8	7.0	0.0	-0.1
NESUN-2	No	7.0	7.6	7.8	7.6	7.8	0.0	0.0
NEW-2	Yes	9.0	7.1	7.2	7.0	7.2	-0.1	0.0
NFNR020	N/A	N/A	4.8	5.2	4.8	5.2	0.0	0.0
NFNR020OL	N/A	N/A	5.0	5.2	4.9	5.2	-0.1	0.0
NW10TR1-2	No	6.7	6.9	7.0	6.7	7.0	-0.2	0.0
NW10TR2-2	No	5.9	6.9	7.0	6.9	7.0	0.0	0.0
NW10TR3-2	No	7.5	8.0	8.2	7.9	8.1	-0.1	-0.1
NW10TR3-4	No	6.4	6.9	7.0	6.9	7.0	0.0	0.0
NW15A-15	N/A	N/A	6.6	6.9	6.6	6.9	0.0	0.0
NW2AV1-2	Yes	7.2	7.2	7.3	7.1	7.3	0.0	0.0
NW2AV1-4	No	6.7	7.6	7.7	7.2	7.5	-0.3	-0.3
NW2AV2-2	No	6.4	7.2	7.3	7.1	7.3	0.0	0.0
NW2AV2-4	No	6.4	7.2	7.3	7.1	7.3	0.0	0.0
NW2AV3-2	No	6.2	7.2	7.3	7.1	7.3	0.0	0.0
NW2AV3-4	No	6.6	7.2	7.3	7.1	7.3	0.0	0.0
NW2AV4-3	No	6.2	7.2	7.3	7.1	7.3	0.0	0.0
NW2AV4-4	No	6.2	7.2	7.3	7.1	7.3	0.0	0.0
NW2AV5-2	No	6.0	7.2	7.3	7.1	7.3	0.0	0.0
NW2AV5-6	No	6.0	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV1-2	Yes	7.0	7.0	7.2	6.9	7.0	-0.1	-0.2
NW4AV1-6	No	5.9	7.1	7.2	6.8	6.9	-0.3	-0.2

Table 7E-6b. Progresso Alternative No. 2, Exfiltration with Ks = 5 x 10-4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2 [K = 5 x 10-4] Peak Stages (ft NGVD)		Delta (Alt. 2 [K = 5 x 10-4] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NW4AV2-2	No	6.8	7.2	7.4	7.1	7.3	-0.1	-0.1
NW4AV2-4	No	6.9	7.2	7.4	7.1	7.3	-0.1	-0.1
NW4AV3-2	No	6.0	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV3-4	No	6.6	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV3-6	No	6.4	7.1	7.3	7.1	7.3	0.0	0.0
NW4AV4-2	No	4.9	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV4-4	No	6.0	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV4-6	No	6.0	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV4-8	No	5.9	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV5-2	No	5.8	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV5-4	No	5.6	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV6-2	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-6	No	5.6	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV6-8	No	6.1	7.2	7.3	7.1	7.3	0.0	0.0
NW5A-05	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NW5A-05OL	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV1-2	Yes	7.3	7.0	7.2	6.9	7.1	-0.1	-0.1
NW5AV1-6	Yes	6.8	6.2	6.5	6.1	6.4	-0.1	-0.1
NW5AV1-8	No	5.9	6.1	6.3	6.1	6.3	0.0	0.0
NW5AV1-9	No	5.9	5.9	6.3	5.8	6.2	-0.1	-0.1
NW5AV2-2	Yes	7.3	7.2	7.3	7.1	7.2	0.0	-0.1
NW5AV2-6	No	6.7	7.5	7.6	7.2	7.4	-0.3	-0.3
NW5AV3-2	No	6.7	7.2	7.3	7.1	7.3	0.0	0.0
NW5AV4-2	No	6.4	7.2	7.3	7.1	7.3	0.0	0.0
NW5AV4-4	No	6.4	7.2	7.3	7.1	7.3	0.0	0.0
NW5AV4-6	No	5.4	7.2	7.3	7.1	7.3	0.0	0.0
NW6AV1-2	Yes	6.5	6.5	6.7	6.4	6.7	-0.2	-0.1
NW7AV1-2	No	6.1	6.6	6.8	6.4	6.7	-0.2	-0.1
NW7AV1-4	No	6.4	6.7	6.9	6.6	6.8	-0.1	-0.1
NW7AV1-6	Yes	6.5	6.5	6.7	6.4	6.6	-0.2	-0.1
NW7AV1-8	No	6.4	7.1	7.4	6.8	7.3	-0.3	-0.1
NW7AV2-2	Yes	6.7	6.7	6.9	6.6	6.8	-0.1	-0.1

Table 7E-6b. Progresso Alternative No. 2, Exfiltration with Ks = 5 x 10-4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2 [K = 5 x 10-4] Peak Stages (ft NGVD)		Delta (Alt. 2 [K = 5 x 10-4] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NW7AV2-4	No	6.8	7.2	7.3	7.2	7.3	0.0	0.0
NW7AV3-2	No	6.2	7.0	7.2	6.9	7.1	-0.1	-0.1
NW7AV3-4	Yes	7.1	7.1	7.3	6.9	7.2	-0.2	-0.1
NW7AV4-2	Yes	7.1	7.0	7.2	7.0	7.1	0.0	-0.1
NW7AV4-4	No	6.6	7.3	7.5	7.2	7.4	-0.1	-0.1
NW7AV5-2	No	6.0	7.0	7.2	6.9	7.1	-0.1	-0.1
NW7AV5-4	No	6.3	7.1	7.3	7.1	7.2	0.0	0.0
NW7AV6-2	No	6.2	7.0	7.2	6.9	7.1	-0.1	-0.1
NW7AV7-2	No	6.3	7.0	7.2	6.9	7.1	-0.1	-0.1
NW7AV7-4	No	6.7	7.0	7.2	6.9	7.1	-0.1	-0.1
NW7AV7-6	No	6.5	7.0	7.2	6.9	7.1	-0.1	-0.1
NW7TR1-2	No	6.4	7.0	7.2	6.9	7.1	-0.1	-0.1
NW7TR1-4	No	6.0	7.0	7.2	6.9	7.1	-0.1	-0.1
NW8AV1-2	No	6.4	7.0	7.2	6.9	7.1	-0.1	-0.1
NW8AV2-2	No	7.1	7.3	7.5	7.2	7.4	-0.1	-0.1
NW8ST-10	N/A	N/A	6.9	7.0	6.9	7.0	0.0	0.0
NW9AV1-2	Yes	7.2	7.2	7.4	7.1	7.4	-0.1	-0.1
NW9AV1-4	No	6.5	7.2	7.4	7.1	7.3	-0.1	-0.1
NW9AV2-2	No	6.5	7.1	7.4	7.0	7.3	-0.1	-0.1
NW9AV3-2	Yes	7.3	7.1	7.3	6.9	7.2	-0.2	-0.1
NW9AV3-4	Yes	7.3	7.0	7.1	7.0	7.1	0.0	0.0
NW9AV4-2	Yes	7.2	7.1	7.3	6.9	7.2	-0.2	-0.1
NW9AV4-4	Yes	7.4	7.0	7.3	6.8	7.0	-0.2	-0.2
NW9AV5-2	No	6.4	7.0	7.1	6.9	7.1	0.0	-0.1
NW9AV5-4	No	6.5	6.9	7.0	6.9	7.0	0.0	0.0
NW9AV5-6	No	6.9	7.0	7.2	6.9	7.1	-0.1	-0.1
NW9AV5-8	Yes	7.0	7.1	7.3	6.9	7.1	-0.1	-0.1
NW9AV6-2	No	5.5	7.0	7.2	6.9	7.1	-0.1	-0.1
NW9AV6-4	No	6.2	7.0	7.1	6.9	7.1	-0.1	0.0
NW9AV6-6	No	6.7	7.1	7.1	7.0	7.1	-0.1	-0.1
NW9AV7-2	Yes	7.1	7.1	7.2	7.0	7.1	-0.1	0.0
NW9AV7-4	No	7.0	7.2	7.3	7.2	7.3	-0.1	0.0

Table 7E-6b. Progresso Alternative No. 2, Exfiltration with Ks = 5 x 10-4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2 [K = 5 x 10-4] Peak Stages (ft NGVD)		Delta (Alt. 2 [K = 5 x 10-4] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
REGALS-2	No	7.4	8.0	8.2	7.7	7.9	-0.3	-0.3
REGALS-4	No	8.0	8.2	8.4	8.1	8.3	-0.1	-0.1
WSUNR-05	Yes	7.7	7.2	7.3	7.2	7.3	0.0	0.0
						Maximum:	0.0	0.0
						Minimum:	-0.3	0.0

Table 7E-7a. Progresso Alternative No. 3, Recharge Wells Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 3 Peak Stages (ft NGVD)			Delta (Alt. 3 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
BRO-OF1	Yes	4.9	3.8	4.7	5.0	3.8	4.6	5.0	0.0	0.0	0.0
ESUNR-10	Yes	7.3	6.6	7.0	7.1	6.6	7.0	7.1	0.0	0.0	0.0
NANDAV1-2	No	6.4	6.8	7.0	7.1	6.8	7.0	7.1	0.0	0.0	0.0
NANDAV1-4	No	6.2	4.1	6.8	6.9	3.4	6.7	6.9	-0.7	-0.1	0.0
NANDAV1-6	Yes	6.8	5.1	6.8	6.9	5.1	6.7	6.9	0.0	-0.1	0.0
NANDAV2-2	Yes	6.6	6.7	6.8	6.9	6.7	6.8	6.9	0.0	0.0	0.0
NANDAV2-4	No	6.4	4.9	6.8	6.9	4.7	6.7	6.9	-0.2	-0.1	0.0
NANDAV2-6	No	6.3	5.4	6.8	6.9	5.2	6.8	6.9	-0.2	0.0	0.0
NE2AV1-2	Yes	7.0	4.6	5.8	6.2	4.4	5.8	6.2	-0.1	0.0	0.0
NE3AV1-2	Yes	5.9	5.6	6.1	6.3	5.6	6.1	6.3	0.0	0.0	0.0
NE4A-15	N/A	N/A	6.8	7.0	7.1	6.8	7.0	7.1	0.0	0.0	0.0
NE4AV1-2	Yes	6.4	6.3	6.5	6.5	6.3	6.5	6.5	0.0	0.0	0.0
NESUN-2	No	7.0	7.0	7.3	7.4	7.0	7.3	7.4	0.0	0.0	0.0
NEW-2	Yes	9.0	5.4	6.6	6.7	5.3	6.5	6.7	-0.1	-0.1	0.0
NFNR020	N/A	N/A	3.3	3.9	4.1	3.3	3.9	4.1	0.0	0.0	0.0
NFNR020OL	N/A	N/A	3.3	3.9	4.1	3.3	3.9	4.1	0.0	0.0	0.0
NW10TR1-2	Yes	6.7	4.9	6.0	6.3	4.8	6.0	6.3	-0.1	0.0	0.0
NW10TR2-2	No	5.9	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW10TR3-2	Yes	7.5	7.3	7.6	7.7	7.3	7.6	7.7	0.0	0.0	0.0
NW10TR3-4	No	6.4	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW15A-15	N/A	N/A	5.9	6.3	6.5	5.9	6.3	6.5	0.0	0.0	0.0
NW2AV1-2	Yes	7.2	5.3	6.8	6.9	4.9	6.8	6.9	-0.5	0.0	0.0
NW2AV1-4	Yes	6.7	5.7	7.0	7.1	5.3	6.8	7.0	-0.3	-0.2	-0.1
NW2AV2-2	No	6.4	5.6	6.8	6.9	5.2	6.8	6.9	-0.4	0.0	0.0
NW2AV2-4	No	6.4	6.4	6.8	6.9	6.3	6.8	6.9	-0.1	0.0	0.0
NW2AV3-2	No	6.2	6.0	6.8	6.9	5.5	6.8	6.9	-0.5	0.0	0.0
NW2AV3-4	Yes	6.6	5.5	6.8	6.9	4.3	6.8	6.9	-1.2	0.0	0.0
NW2AV4-3	No	6.2	6.1	6.8	6.9	6.0	6.8	6.9	0.0	0.0	0.0
NW2AV4-4	No	6.2	5.9	6.8	6.9	5.9	6.8	6.9	0.0	0.0	0.0
NW2AV5-2	No	6.0	5.8	6.8	6.9	5.7	6.8	6.9	-0.2	0.0	0.0
NW2AV5-6	No	6.0	6.2	6.8	6.9	6.1	6.8	6.9	-0.1	0.0	0.0
NW4AV1-2	Yes	7.0	6.4	6.7	6.8	6.4	6.7	6.8	0.0	0.0	0.0
NW4AV1-6	No	5.9	6.5	6.8	6.9	6.3	6.5	6.6	-0.2	-0.2	-0.3

Table 7E-7a. Progresso Alternative No. 3, Recharge Wells Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 3 Peak Stages (ft NGVD)			Delta (Alt. 3 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NW4AV2-2	Yes	6.8	5.4	6.6	6.8	5.2	6.5	6.8	-0.1	-0.1	0.0
NW4AV2-4	Yes	6.9	5.3	6.6	6.8	5.2	6.5	6.7	-0.1	-0.1	0.0
NW4AV3-2	No	6.0	5.7	6.8	6.9	5.2	6.8	6.9	-0.5	0.0	0.0
NW4AV3-4	Yes	6.6	5.5	6.8	6.9	5.3	6.8	6.9	-0.2	0.0	0.0
NW4AV3-6	Yes	6.4	5.4	6.7	6.8	5.3	6.6	6.8	-0.1	0.0	0.0
NW4AV4-2	No	4.9	6.0	6.8	6.9	5.6	6.8	6.9	-0.4	0.0	0.0
NW4AV4-4	No	6.0	5.9	6.8	6.9	5.3	6.8	6.9	-0.6	0.0	0.0
NW4AV4-6	No	6.0	5.8	6.8	6.9	5.5	6.8	6.9	-0.4	0.0	0.0
NW4AV4-8	No	5.9	6.1	6.8	6.9	6.1	6.8	6.9	0.0	0.0	0.0
NW4AV5-2	No	5.8	6.0	6.8	6.9	5.7	6.8	6.9	-0.3	0.0	0.0
NW4AV5-4	No	5.6	6.2	6.8	6.9	6.1	6.8	6.9	-0.1	0.0	0.0
NW4AV6-2	No	5.6	6.2	6.9	6.9	6.1	6.8	6.9	-0.1	0.0	0.0
NW4AV6-6	No	5.6	6.2	6.8	6.9	6.2	6.8	6.9	0.0	0.0	0.0
NW4AV6-8	No	6.1	6.2	6.9	6.9	6.2	6.8	6.9	0.0	0.0	0.0
NW5A-05	N/A	N/A	6.4	6.9	7.0	6.4	6.9	7.0	0.0	0.0	0.0
NW5A-05OL	N/A	N/A	6.4	6.9	7.0	6.4	6.9	7.0	0.0	0.0	0.0
NW5AV1-2	Yes	7.3	5.0	6.3	6.6	4.9	6.2	6.5	-0.1	-0.1	0.0
NW5AV1-6	Yes	6.8	4.3	5.2	5.5	4.3	5.2	5.5	0.0	0.0	0.0
NW5AV1-8	Yes	5.9	3.8	4.9	5.4	3.7	4.9	5.4	0.0	0.0	0.0
NW5AV1-9	Yes	5.9	3.9	4.8	5.1	3.8	4.7	5.1	0.0	0.0	0.0
NW5AV2-2	Yes	7.3	6.8	7.0	7.0	6.8	7.0	7.0	0.0	0.0	0.0
NW5AV2-6	Yes	6.7	6.7	7.1	7.2	6.6	6.9	7.1	-0.1	-0.1	-0.1
NW5AV3-2	Yes	6.7	5.4	6.8	6.9	5.1	6.8	6.9	-0.4	0.0	0.0
NW5AV4-2	No	6.4	6.6	6.9	6.9	6.6	6.8	6.9	0.0	0.0	0.0
NW5AV4-4	No	6.4	6.2	6.8	6.9	6.0	6.8	6.9	-0.2	0.0	0.0
NW5AV4-6	No	5.4	6.2	6.8	6.9	6.2	6.8	6.9	0.0	0.0	0.0
NW6AV1-2	Yes	6.5	4.4	5.5	5.8	4.4	5.4	5.7	-0.1	-0.1	0.0
NW7AV1-2	Yes	6.1	4.6	5.5	5.8	4.5	5.5	5.7	-0.1	-0.1	0.0
NW7AV1-4	Yes	6.4	4.5	5.7	6.1	4.4	5.5	6.0	-0.1	-0.2	-0.1
NW7AV1-6	Yes	6.5	4.6	5.5	5.8	4.5	5.4	5.7	-0.1	0.0	0.0
NW7AV1-8	Yes	6.4	4.5	5.5	5.8	4.5	5.5	5.7	-0.1	0.0	0.0
NW7AV2-2	Yes	6.7	4.8	5.8	6.1	4.8	5.8	6.0	-0.1	-0.1	-0.1

Table 7E-7a. Progresso Alternative No. 3, Recharge Wells Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 3 Peak Stages (ft NGVD)			Delta (Alt. 3 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NW7AV2-4	Yes	6.8	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
NW7AV3-2	Yes	6.2	5.2	6.3	6.6	5.1	6.2	6.5	-0.1	-0.1	0.0
NW7AV3-4	Yes	7.1	5.4	6.4	6.7	5.2	6.4	6.6	-0.1	0.0	-0.1
NW7AV4-2	Yes	7.1	5.4	6.6	6.8	5.1	6.6	6.8	-0.2	0.0	0.0
NW7AV4-4	No	6.6	6.7	6.9	7.0	6.7	6.9	7.0	0.0	0.0	0.0
NW7AV5-2	No	6.0	5.7	6.7	6.8	5.2	6.7	6.7	-0.5	0.0	0.0
NW7AV5-4	No	6.3	5.6	6.8	6.9	5.1	6.8	6.9	-0.4	0.0	0.0
NW7AV6-2	No	6.2	5.9	6.7	6.8	5.8	6.7	6.7	-0.1	0.0	0.0
NW7AV7-2	No	6.3	6.0	6.7	6.8	5.9	6.7	6.7	-0.2	0.0	0.0
NW7AV7-4	Yes	6.7	6.0	6.7	6.8	5.7	6.7	6.7	-0.3	0.0	0.0
NW7AV7-6	Yes	6.5	6.0	6.7	6.8	5.6	6.7	6.7	-0.4	0.0	0.0
NW7TR1-2	No	6.4	6.3	6.7	6.8	6.3	6.7	6.7	0.0	0.0	0.0
NW7TR1-4	No	6.0	6.0	6.7	6.8	5.9	6.7	6.7	-0.1	0.0	0.0
NW8AV1-2	No	6.4	6.3	6.7	6.8	6.3	6.7	6.7	0.0	0.0	0.0
NW8AV2-2	Yes	7.1	6.1	6.9	7.0	6.0	6.9	7.0	-0.1	0.0	0.0
NW8ST-10	N/A	N/A	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW9AV1-2	Yes	7.2	4.6	5.7	6.0	4.5	5.6	6.0	-0.1	0.0	0.0
NW9AV1-4	Yes	6.5	4.7	5.8	6.2	4.6	5.7	6.1	-0.1	0.0	0.0
NW9AV2-2	Yes	6.5	4.6	5.7	6.1	4.6	5.7	6.0	-0.1	0.0	0.0
NW9AV3-2	Yes	7.3	5.4	6.5	6.7	5.3	6.4	6.6	-0.1	0.0	0.0
NW9AV3-4	Yes	7.3	6.8	6.9	6.9	6.8	6.9	6.9	0.0	0.0	0.0
NW9AV4-2	Yes	7.2	5.5	6.5	6.7	5.4	6.5	6.7	-0.1	0.0	0.0
NW9AV4-4	Yes	7.4	5.1	6.2	6.5	4.9	6.1	6.5	-0.2	-0.1	-0.1
NW9AV5-2	No	6.4	5.9	6.7	6.7	5.8	6.6	6.7	-0.1	0.0	0.0
NW9AV5-4	Yes	6.5	5.1	6.6	6.7	5.0	6.6	6.7	-0.1	0.0	0.0
NW9AV5-6	Yes	6.9	5.7	6.6	6.7	5.5	6.6	6.7	-0.1	0.0	0.0
NW9AV5-8	Yes	7.0	5.6	6.6	6.7	5.4	6.5	6.7	-0.1	0.0	0.0
NW9AV6-2	No	5.5	6.0	6.7	6.8	5.8	6.7	6.7	-0.2	0.0	0.0
NW9AV6-4	No	6.2	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW9AV6-6	Yes	6.7	6.6	6.9	6.9	6.5	6.9	6.9	0.0	0.0	0.0
NW9AV7-2	Yes	7.1	6.8	7.0	7.0	6.8	7.0	7.0	0.0	0.0	0.0
NW9AV7-4	Yes	7.0	6.8	7.1	7.1	6.8	7.0	7.1	0.0	0.0	0.0

Table 7E-7a. Progresso Alternative No. 3, Recharge Wells Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 3 Peak Stages (ft NGVD)			Delta (Alt. 3 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
REGALS-2	Yes	7.4	7.3	7.7	7.8	7.2	7.6	7.7	-0.1	-0.1	-0.1
REGALS-4	Yes	8.0	7.5	7.9	8.0	7.5	7.8	7.9	-0.1	-0.1	-0.1
WSUNR-05	Yes	7.7	6.3	6.9	7.0	6.3	6.9	7.0	0.0	0.0	0.0
								Maximum:	0.0	0.0	0.0
								Minimum:	-0.2	-0.3	0.0

Table 7E-7b. Progresso Alternative No. 3, Recharge Wells Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 3 Peak Stages (ft NGVD)		Delta (Alt. 3 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
BRO-OF1	No	4.9	5.7	6.1	5.7	6.2	0.0	0.0
ESUNR-10	Yes	7.3	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-2	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-4	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-6	No	6.8	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV2-2	No	6.6	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV2-4	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV2-6	No	6.3	7.2	7.3	7.2	7.3	0.0	0.0
NE2AV1-2	Yes	7.0	6.8	7.0	6.8	7.1	0.1	0.1
NE3AV1-2	No	5.9	6.8	7.0	6.8	7.1	0.1	0.1
NE4A-15	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NE4AV1-2	No	6.4	6.8	7.0	6.8	7.1	0.1	0.1
NESUN-2	No	7.0	7.6	7.8	7.6	7.8	0.0	0.0
NEW-2	Yes	9.0	7.1	7.2	7.1	7.2	0.0	0.0
NFNR020	N/A	N/A	4.8	5.2	4.8	5.2	0.0	0.0
NFNR020OL	N/A	N/A	5.0	5.2	4.9	5.2	0.0	0.0
NW10TR1-2	No	6.7	6.9	7.0	6.8	7.0	-0.1	0.0
NW10TR2-2	No	5.9	6.9	7.0	6.9	7.0	0.0	0.0
NW10TR3-2	No	7.5	8.0	8.2	8.0	8.2	0.0	0.0
NW10TR3-4	No	6.4	6.9	7.0	6.9	7.0	0.0	0.0
NW15A-15	N/A	N/A	6.6	6.9	6.6	6.9	0.0	0.0
NW2AV1-2	Yes	7.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV1-4	No	6.7	7.6	7.7	7.4	7.6	-0.2	-0.1
NW2AV2-2	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV2-4	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV3-2	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV3-4	No	6.6	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV4-3	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV4-4	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV5-2	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV5-6	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV1-2	Yes	7.0	7.0	7.2	7.0	7.1	0.0	-0.1
NW4AV1-6	No	5.9	7.1	7.2	6.8	7.0	-0.3	-0.1

Table 7E-7b. Progresso Alternative No. 3, Recharge Wells Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 3 Peak Stages (ft NGVD)		Delta (Alt. 3 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NW4AV2-2	No	6.8	7.2	7.4	7.1	7.3	0.0	0.0
NW4AV2-4	No	6.9	7.2	7.4	7.2	7.3	0.0	0.0
NW4AV3-2	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV3-4	No	6.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV3-6	No	6.4	7.1	7.3	7.1	7.3	0.0	0.0
NW4AV4-2	No	4.9	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV4-4	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV4-6	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV4-8	No	5.9	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV5-2	No	5.8	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV5-4	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-2	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-6	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-8	No	6.1	7.2	7.3	7.2	7.3	0.0	0.0
NW5A-05	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NW5A-05OL	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV1-2	Yes	7.3	7.0	7.2	7.0	7.2	0.0	0.0
NW5AV1-6	Yes	6.8	6.2	6.5	6.2	6.5	0.0	0.0
NW5AV1-8	No	5.9	6.1	6.3	6.3	6.4	0.1	0.1
NW5AV1-9	No	5.9	5.9	6.3	5.8	6.3	0.0	0.0
NW5AV2-2	Yes	7.3	7.2	7.3	7.1	7.2	0.0	0.0
NW5AV2-6	No	6.7	7.5	7.6	7.3	7.5	-0.1	-0.1
NW5AV3-2	No	6.7	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV4-2	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV4-4	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV4-6	No	5.4	7.2	7.3	7.2	7.3	0.0	0.0
NW6AV1-2	No	6.5	6.5	6.7	6.5	6.7	0.0	0.0
NW7AV1-2	No	6.1	6.6	6.8	6.5	6.7	0.0	0.0
NW7AV1-4	No	6.4	6.7	6.9	6.7	6.8	0.0	0.0
NW7AV1-6	Yes	6.5	6.5	6.7	6.5	6.7	0.0	0.0
NW7AV1-8	No	6.4	7.1	7.4	7.0	7.4	-0.1	0.0
NW7AV2-2	Yes	6.7	6.7	6.9	6.7	6.8	0.0	0.0

Table 7E-7b. Progresso Alternative No. 3, Recharge Wells Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 3 Peak Stages (ft NGVD)		Delta (Alt. 3 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NW7AV2-4	No	6.8	7.2	7.3	7.2	7.3	0.0	0.0
NW7AV3-2	No	6.2	7.0	7.2	6.9	7.1	0.0	0.0
NW7AV3-4	Yes	7.1	7.1	7.3	7.0	7.2	-0.1	0.0
NW7AV4-2	Yes	7.1	7.0	7.2	7.0	7.2	0.0	0.0
NW7AV4-4	No	6.6	7.3	7.5	7.3	7.5	0.0	0.0
NW7AV5-2	No	6.0	7.0	7.2	7.0	7.2	0.0	-0.1
NW7AV5-4	No	6.3	7.1	7.3	7.1	7.2	0.0	0.0
NW7AV6-2	No	6.2	7.0	7.2	7.0	7.2	0.0	-0.1
NW7AV7-2	No	6.3	7.0	7.2	7.0	7.2	0.0	-0.1
NW7AV7-4	No	6.7	7.0	7.2	7.0	7.2	0.0	-0.1
NW7AV7-6	No	6.5	7.0	7.2	7.0	7.2	0.0	-0.1
NW7TR1-2	No	6.4	7.0	7.2	7.0	7.2	0.0	-0.1
NW7TR1-4	No	6.0	7.0	7.2	7.0	7.2	0.0	-0.1
NW8AV1-2	No	6.4	7.0	7.2	7.0	7.2	0.0	-0.1
NW8AV2-2	No	7.1	7.3	7.5	7.3	7.5	0.0	0.0
NW8ST-10	N/A	N/A	6.9	7.0	6.9	7.0	0.0	0.0
NW9AV1-2	Yes	7.2	7.2	7.4	7.1	7.4	-0.1	0.0
NW9AV1-4	No	6.5	7.2	7.4	7.1	7.3	0.0	0.0
NW9AV2-2	No	6.5	7.1	7.4	7.1	7.3	0.0	0.0
NW9AV3-2	Yes	7.3	7.1	7.3	7.0	7.3	-0.1	0.0
NW9AV3-4	Yes	7.3	7.0	7.1	7.0	7.1	0.0	0.0
NW9AV4-2	Yes	7.2	7.1	7.3	7.1	7.3	-0.1	0.0
NW9AV4-4	Yes	7.4	7.0	7.3	7.0	7.2	-0.1	-0.1
NW9AV5-2	No	6.4	7.0	7.1	6.9	7.1	0.0	0.0
NW9AV5-4	No	6.5	6.9	7.0	6.9	7.0	0.0	0.0
NW9AV5-6	No	6.9	7.0	7.2	7.0	7.2	0.0	0.0
NW9AV5-8	Yes	7.0	7.1	7.3	7.0	7.2	-0.1	0.0
NW9AV6-2	No	5.5	7.0	7.2	7.0	7.2	0.0	-0.1
NW9AV6-4	No	6.2	7.0	7.1	6.9	7.1	0.0	0.0
NW9AV6-6	No	6.7	7.1	7.1	7.1	7.1	0.0	0.0
NW9AV7-2	Yes	7.1	7.1	7.2	7.1	7.2	0.0	0.0
NW9AV7-4	No	7.0	7.2	7.3	7.2	7.3	0.0	0.0

Table 7E-7b. Progresso Alternative No. 3, Recharge Wells Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 3 Peak Stages (ft NGVD)		Delta (Alt. 3 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
REGALS-2	No	7.4	8.0	8.2	7.9	8.1	-0.1	-0.1
REGALS-4	No	8.0	8.2	8.4	8.2	8.3	-0.1	-0.1
WSUNR-05	Yes	7.7	7.2	7.3	7.2	7.3	0.0	0.0
						Maximum:	0.1	0.1
						Minimum:	-0.1	0.0

Table 7E-8a. Progresso Alternative No. 4, Wet Detention Areas and Pipe Upgrades Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 4 Peak Stages (ft NGVD)			Delta (Alt. 4 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
BRO-OF1	Yes	4.9	3.8	4.7	5.0	3.7	4.6	5.0	0.0	0.0	0.0
ESUNR-10	Yes	7.3	6.6	7.0	7.1	6.6	7.0	7.1	0.0	0.0	0.0
NANDAV1-2	No	6.4	6.8	7.0	7.1	6.8	7.0	7.1	0.0	0.0	0.0
NANDAV1-4	No	6.2	4.1	6.8	6.9	3.0	6.6	6.9	-1.1	-0.2	-0.1
NANDAV1-6	Yes	6.8	5.1	6.8	6.9	5.1	6.6	6.9	0.0	-0.2	-0.1
NANDAV2-2	Yes	6.6	6.7	6.8	6.9	6.7	6.8	6.9	0.0	0.0	-0.1
NANDAV2-4	Yes	6.4	4.9	6.8	6.9	4.2	6.6	6.9	-0.7	-0.2	-0.1
NANDAV2-6	No	6.3	5.4	6.8	6.9	4.4	6.7	6.9	-1.0	-0.1	-0.1
NE2AV1-2	Yes	7.0	4.6	5.8	6.2	3.7	5.5	6.0	-0.9	-0.4	-0.2
NE3AV1-2	Yes	5.9	5.6	6.1	6.3	5.4	6.1	6.2	-0.2	0.0	0.0
NE4A-15	N/A	N/A	6.8	7.0	7.1	6.8	7.0	7.1	0.0	0.0	0.0
NE4AV1-2	Yes	6.4	6.3	6.5	6.5	6.3	6.5	6.5	0.0	0.0	0.0
NESUN-2	No	7.0	7.0	7.3	7.4	7.0	7.3	7.4	0.0	0.0	0.0
NEW-2	Yes	9.0	5.4	6.6	6.7	5.1	6.4	6.6	-0.3	-0.2	-0.2
NFNR020	N/A	N/A	3.3	3.9	4.1	3.3	3.9	4.1	0.0	0.0	0.0
NFNR020OL	N/A	N/A	3.3	3.9	4.1	3.3	3.9	4.1	0.0	0.0	0.0
NW10TR1-2	Yes	6.7	4.9	6.0	6.3	5.0	6.1	6.3	0.1	0.1	0.0
NW10TR2-2	No	5.9	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW10TR3-2	Yes	7.5	7.3	7.6	7.7	7.3	7.6	7.7	0.0	0.0	0.0
NW10TR3-4	No	6.4	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW15A-15	N/A	N/A	5.9	6.3	6.5	5.9	6.3	6.5	0.0	0.0	0.0
NW2AV1-2	Yes	7.2	5.3	6.8	6.9	5.1	6.7	6.9	-0.3	-0.1	-0.1
NW2AV1-4	No	6.7	5.7	7.0	7.1	5.5	6.9	7.1	-0.1	0.0	0.0
NW2AV2-2	No	6.4	5.6	6.8	6.9	4.6	6.7	6.9	-1.0	-0.1	-0.1
NW2AV2-4	No	6.4	6.4	6.8	6.9	6.2	6.7	6.9	-0.2	-0.1	-0.1
NW2AV3-2	No	6.2	6.0	6.8	6.9	4.4	6.8	6.9	-1.6	0.0	0.0
NW2AV3-4	Yes	6.6	5.5	6.8	6.9	4.1	6.7	6.9	-1.4	-0.1	-0.1
NW2AV4-3	No	6.2	6.1	6.8	6.9	5.1	6.8	6.9	-0.9	0.0	0.0
NW2AV4-4	No	6.2	5.9	6.8	6.9	5.0	6.7	6.9	-0.9	-0.1	-0.1
NW2AV5-2	No	6.0	5.8	6.8	6.9	5.3	6.7	6.9	-0.5	-0.1	0.0
NW2AV5-6	No	6.0	6.2	6.8	6.9	5.3	6.8	6.9	-0.9	0.0	0.0
NW4AV1-2	Yes	7.0	6.4	6.7	6.8	6.4	6.7	6.8	0.0	0.0	0.0
NW4AV1-6	No	5.9	6.5	6.8	6.9	6.5	6.8	6.9	0.0	0.0	0.0

Table 7E-8a. Progresso Alternative No. 4, Wet Detention Areas and Pipe Upgrades Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 4 Peak Stages (ft NGVD)			Delta (Alt. 4 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NW4AV2-2	Yes	6.8	5.4	6.6	6.8	5.1	6.3	6.7	-0.3	-0.3	-0.1
NW4AV2-4	Yes	6.9	5.3	6.6	6.8	5.0	6.3	6.7	-0.3	-0.2	-0.1
NW4AV3-2	No	6.0	5.7	6.8	6.9	4.7	6.8	6.9	-1.1	0.0	0.0
NW4AV3-4	Yes	6.6	5.5	6.8	6.9	4.6	6.8	6.9	-0.9	0.0	0.0
NW4AV3-6	Yes	6.4	5.4	6.7	6.8	5.1	6.5	6.7	-0.3	-0.2	-0.2
NW4AV4-2	No	4.9	6.0	6.8	6.9	4.8	6.8	6.9	-1.2	0.0	0.0
NW4AV4-4	No	6.0	5.9	6.8	6.9	4.7	6.8	6.9	-1.2	0.0	0.0
NW4AV4-6	No	6.0	5.8	6.8	6.9	4.7	6.8	6.9	-1.1	0.0	0.0
NW4AV4-8	No	5.9	6.1	6.8	6.9	6.0	6.8	6.9	0.0	0.0	0.0
NW4AV5-2	No	5.8	6.0	6.8	6.9	5.0	6.8	6.9	-1.0	0.0	0.0
NW4AV5-4	No	5.6	6.2	6.8	6.9	5.0	6.8	6.9	-1.2	0.0	0.0
NW4AV6-2	No	5.6	6.2	6.9	6.9	5.6	6.8	6.9	-0.6	0.0	0.0
NW4AV6-6	No	5.6	6.2	6.8	6.9	5.5	6.8	6.9	-0.7	0.0	0.0
NW4AV6-8	No	6.1	6.2	6.9	6.9	5.6	6.8	6.9	-0.7	0.0	0.0
NW5A-05	N/A	N/A	6.4	6.9	7.0	6.4	6.9	7.0	0.0	0.0	0.0
NW5A-05OL	N/A	N/A	6.4	6.9	7.0	6.4	6.9	7.0	0.0	0.0	0.0
NW5AV1-2	Yes	7.3	5.0	6.3	6.6	4.8	6.2	6.5	-0.2	-0.2	-0.1
NW5AV1-6	Yes	6.8	4.3	5.2	5.5	4.3	5.1	5.5	-0.1	-0.1	0.0
NW5AV1-8	Yes	5.9	3.8	4.9	5.4	3.7	4.9	5.4	0.0	0.0	0.0
NW5AV1-9	Yes	5.9	3.9	4.8	5.1	3.8	4.7	5.1	0.0	0.0	0.0
NW5AV2-2	Yes	7.3	6.8	7.0	7.0	7.2	7.3	7.3	0.3	0.3	0.2
NW5AV2-6	Yes	6.7	6.7	7.1	7.2	6.4	6.9	7.0	-0.3	-0.2	-0.2
NW5AV3-2	Yes	6.7	5.4	6.8	6.9	5.2	6.8	6.9	-0.2	0.0	0.0
NW5AV4-2	No	6.4	6.6	6.9	6.9	6.6	6.8	6.9	0.0	0.0	0.0
NW5AV4-4	No	6.4	6.2	6.8	6.9	5.2	6.8	6.9	-1.0	0.0	0.0
NW5AV4-6	No	5.4	6.2	6.8	6.9	5.5	6.8	6.9	-0.7	0.0	0.0
NW6AV1-2	Yes	6.5	4.4	5.5	5.8	4.4	5.4	5.7	-0.1	-0.1	0.0
NW7AV1-2	Yes	6.1	4.6	5.5	5.8	4.5	5.5	5.7	-0.1	-0.1	0.0
NW7AV1-4	Yes	6.4	4.5	5.7	6.1	4.5	5.7	6.1	0.0	0.1	0.0
NW7AV1-6	Yes	6.5	4.6	5.5	5.8	4.5	5.4	5.7	0.0	0.0	0.0
NW7AV1-8	Yes	6.4	4.5	5.5	5.8	4.5	5.5	5.8	0.0	0.0	0.0
NW7AV2-2	Yes	6.7	4.8	5.8	6.1	4.8	5.8	6.1	0.0	0.0	0.0

Table 7E-8a. Progresso Alternative No. 4, Wet Detention Areas and Pipe Upgrades Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 4 Peak Stages (ft NGVD)			Delta (Alt. 4 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NW7AV2-4	Yes	6.8	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
NW7AV3-2	No	6.2	5.2	6.3	6.6	5.3	6.5	6.7	0.1	0.2	0.1
NW7AV3-4	Yes	7.1	5.4	6.4	6.7	5.5	6.5	6.7	0.1	0.1	0.1
NW7AV4-2	Yes	7.1	5.4	6.6	6.8	5.4	6.7	6.8	0.0	0.0	0.0
NW7AV4-4	No	6.6	6.7	6.9	7.0	6.7	6.9	7.0	0.0	0.0	0.0
NW7AV5-2	No	6.0	5.7	6.7	6.8	5.7	6.7	6.8	0.0	0.0	0.0
NW7AV5-4	No	6.3	5.6	6.8	6.9	5.6	6.8	6.9	0.0	0.0	0.0
NW7AV6-2	No	6.2	5.9	6.7	6.8	5.9	6.7	6.8	0.0	0.0	0.0
NW7AV7-2	No	6.3	6.0	6.7	6.8	6.1	6.7	6.8	0.0	0.0	0.0
NW7AV7-4	Yes	6.7	6.0	6.7	6.8	6.0	6.7	6.8	0.0	0.0	0.0
NW7AV7-6	Yes	6.5	6.0	6.7	6.8	6.0	6.7	6.8	0.0	0.0	0.0
NW7TR1-2	No	6.4	6.3	6.7	6.8	6.3	6.7	6.8	0.0	0.0	0.0
NW7TR1-4	No	6.0	6.0	6.7	6.8	6.0	6.7	6.8	0.0	0.0	0.0
NW8AV1-2	No	6.4	6.3	6.7	6.8	6.3	6.7	6.8	0.0	0.0	0.0
NW8AV2-2	Yes	7.1	6.1	6.9	7.0	6.1	6.9	7.0	0.0	0.0	0.0
NW8ST-10	N/A	N/A	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW9AV1-2	Yes	7.2	4.6	5.7	6.0	4.6	5.7	6.0	0.0	0.0	0.0
NW9AV1-4	Yes	6.5	4.7	5.8	6.2	4.6	5.8	6.1	0.0	0.0	0.0
NW9AV2-2	Yes	6.5	4.6	5.7	6.1	4.6	5.7	6.1	0.0	0.0	0.0
NW9AV3-2	Yes	7.3	5.4	6.5	6.7	5.5	6.6	6.7	0.1	0.1	0.1
NW9AV3-4	Yes	7.3	6.8	6.9	6.9	6.8	6.9	6.9	0.0	0.0	0.0
NW9AV4-2	Yes	7.2	5.5	6.5	6.7	5.6	6.6	6.7	0.1	0.1	0.0
NW9AV4-4	Yes	7.4	5.1	6.2	6.5	5.2	6.4	6.6	0.1	0.2	0.1
NW9AV5-2	No	6.4	5.9	6.7	6.7	5.9	6.7	6.7	0.0	0.0	0.0
NW9AV5-4	Yes	6.5	5.1	6.6	6.7	5.2	6.6	6.7	0.1	0.0	0.0
NW9AV5-6	Yes	6.9	5.7	6.6	6.7	5.8	6.6	6.7	0.1	0.0	0.0
NW9AV5-8	Yes	7.0	5.6	6.6	6.7	5.6	6.6	6.7	0.1	0.1	0.0
NW9AV6-2	No	5.5	6.0	6.7	6.8	6.0	6.7	6.8	0.0	0.0	0.0
NW9AV6-4	No	6.2	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW9AV6-6	Yes	6.7	6.6	6.9	6.9	6.6	6.9	6.9	0.0	0.0	0.0
NW9AV7-2	Yes	7.1	6.8	7.0	7.0	6.8	7.0	7.0	0.0	0.0	0.0
NW9AV7-4	Yes	7.0	6.8	7.1	7.1	6.8	7.1	7.1	0.0	0.0	0.0

Table 7E-8a. Progresso Alternative No. 4, Wet Detention Areas and Pipe Upgrades Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 4 Peak Stages (ft NGVD)			Delta (Alt. 4 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
REGALS-2	No	7.4	7.3	7.7	7.8	7.3	7.7	7.8	0.0	0.0	0.0
REGALS-4	Yes	8.0	7.5	7.9	8.0	7.5	7.9	8.0	0.0	0.0	0.0
WSUNR-05	Yes	7.7	6.3	6.9	7.0	6.3	6.8	6.9	0.0	0.0	0.0
								Maximum:	0.3	0.3	0.2
								Minimum:	-0.4	-0.2	0.0

Table 7E-8b. Progresso Alternative No. 4, Wet Detention Areas and Pipe Upgrades Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 3 Peak Stages (ft NGVD)		Delta (Alt. 3 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
BRO-OF1	No	4.9	5.7	6.1	5.8	6.2	0.0	0.1
ESUNR-10	Yes	7.3	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-2	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-4	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-6	No	6.8	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV2-2	No	6.6	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV2-4	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV2-6	No	6.3	7.2	7.3	7.2	7.3	0.0	0.0
NE2AV1-2	Yes	7.0	6.8	7.0	6.8	7.1	0.0	0.1
NE3AV1-2	No	5.9	6.8	7.0	6.8	7.1	0.1	0.1
NE4A-15	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NE4AV1-2	No	6.4	6.8	7.0	6.8	7.1	0.1	0.1
NESUN-2	No	7.0	7.6	7.8	7.6	7.8	0.0	0.0
NEW-2	Yes	9.0	7.1	7.2	7.1	7.2	0.0	0.0
NFNR020	N/A	N/A	4.8	5.2	4.8	5.2	0.0	0.0
NFNR020OL	N/A	N/A	5.0	5.2	5.0	5.2	0.0	0.0
NW10TR1-2	No	6.7	6.9	7.0	6.9	7.0	0.0	0.0
NW10TR2-2	No	5.9	6.9	7.0	6.9	7.0	0.0	0.0
NW10TR3-2	No	7.5	8.0	8.2	8.0	8.2	0.0	0.0
NW10TR3-4	No	6.4	6.9	7.0	6.9	7.0	0.0	0.0
NW15A-15	N/A	N/A	6.6	6.9	6.6	6.9	0.0	0.0
NW2AV1-2	Yes	7.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV1-4	No	6.7	7.6	7.7	7.6	7.7	0.0	0.0
NW2AV2-2	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV2-4	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV3-2	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV3-4	No	6.6	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV4-3	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV4-4	No	6.2	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV5-2	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW2AV5-6	No	6.0	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV1-2	Yes	7.0	7.0	7.2	7.0	7.2	0.0	0.0
NW4AV1-6	No	5.9	7.1	7.2	7.1	7.2	0.0	0.0

Table 7E-8b. Progresso Alternative No. 4, Wet Detention Areas and Pipe Upgrades Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 3 Peak Stages (ft NGVD)		Delta (Alt. 3 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NW4AV2-2	No	6.8	7.2	7.4	7.1	7.3	0.0	0.0
NW4AV2-4	No	6.9	7.2	7.4	7.1	7.3	-0.1	0.0
NW4AV3-2	No	6.0	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV3-4	No	6.6	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV3-6	No	6.4	7.1	7.3	7.1	7.3	0.0	0.0
NW4AV4-2	No	4.9	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV4-4	No	6.0	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV4-6	No	6.0	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV4-8	No	5.9	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV5-2	No	5.8	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV5-4	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-2	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-6	No	5.6	7.2	7.3	7.2	7.3	0.0	0.0
NW4AV6-8	No	6.1	7.2	7.3	7.2	7.3	0.0	0.0
NW5A-05	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NW5A-05OL	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV1-2	Yes	7.3	7.0	7.2	7.0	7.2	0.0	0.0
NW5AV1-6	Yes	6.8	6.2	6.5	6.2	6.6	0.0	0.0
NW5AV1-8	No	5.9	6.1	6.3	6.3	6.4	0.2	0.1
NW5AV1-9	No	5.9	5.9	6.3	5.9	6.4	0.1	0.1
NW5AV2-2	No	7.3	7.2	7.3	7.5	7.6	0.4	0.4
NW5AV2-6	No	6.7	7.5	7.6	7.4	7.6	0.0	0.0
NW5AV3-2	No	6.7	7.2	7.3	7.1	7.3	0.0	0.0
NW5AV4-2	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV4-4	No	6.4	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV4-6	No	5.4	7.2	7.3	7.2	7.3	0.0	0.0
NW6AV1-2	No	6.5	6.5	6.7	6.6	6.8	0.1	0.0
NW7AV1-2	No	6.1	6.6	6.8	6.6	6.8	0.1	0.0
NW7AV1-4	No	6.4	6.7	6.9	6.8	6.9	0.0	0.0
NW7AV1-6	Yes	6.5	6.5	6.7	6.6	6.7	0.1	0.0
NW7AV1-8	No	6.4	7.1	7.4	7.2	7.4	0.0	0.0
NW7AV2-2	Yes	6.7	6.7	6.9	6.8	6.9	0.0	0.0

Table 7E-8b. Progresso Alternative No. 4, Wet Detention Areas and Pipe Upgrades Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 3 Peak Stages (ft NGVD)		Delta (Alt. 3 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NW7AV2-4	No	6.8	7.2	7.3	7.2	7.3	0.0	0.0
NW7AV3-2	No	6.2	7.0	7.2	7.0	7.3	0.1	0.1
NW7AV3-4	Yes	7.1	7.1	7.3	7.1	7.3	0.1	0.1
NW7AV4-2	Yes	7.1	7.0	7.2	7.1	7.3	0.0	0.1
NW7AV4-4	No	6.6	7.3	7.5	7.3	7.5	0.0	0.0
NW7AV5-2	No	6.0	7.0	7.2	7.0	7.3	0.0	0.0
NW7AV5-4	No	6.3	7.1	7.3	7.1	7.3	0.0	0.0
NW7AV6-2	No	6.2	7.0	7.2	7.0	7.3	0.0	0.0
NW7AV7-2	No	6.3	7.0	7.2	7.0	7.3	0.0	0.0
NW7AV7-4	No	6.7	7.0	7.2	7.0	7.3	0.0	0.0
NW7AV7-6	No	6.5	7.0	7.2	7.0	7.3	0.0	0.0
NW7TR1-2	No	6.4	7.0	7.2	7.0	7.3	0.0	0.0
NW7TR1-4	No	6.0	7.0	7.2	7.0	7.3	0.0	0.0
NW8AV1-2	No	6.4	7.0	7.2	7.0	7.3	0.0	0.0
NW8AV2-2	No	7.1	7.3	7.5	7.3	7.5	0.0	0.0
NW8ST-10	N/A	N/A	6.9	7.0	6.9	7.0	0.0	0.0
NW9AV1-2	No	7.2	7.2	7.4	7.2	7.4	0.0	0.0
NW9AV1-4	No	6.5	7.2	7.4	7.2	7.4	0.0	0.0
NW9AV2-2	No	6.5	7.1	7.4	7.1	7.4	0.0	0.0
NW9AV3-2	Yes	7.3	7.1	7.3	7.2	7.4	0.1	0.1
NW9AV3-4	Yes	7.3	7.0	7.1	7.0	7.1	0.0	0.0
NW9AV4-2	Yes	7.2	7.1	7.3	7.2	7.4	0.1	0.0
NW9AV4-4	Yes	7.4	7.0	7.3	7.1	7.3	0.0	0.0
NW9AV5-2	No	6.4	7.0	7.1	7.0	7.1	0.0	0.0
NW9AV5-4	No	6.5	6.9	7.0	6.9	7.0	0.0	0.0
NW9AV5-6	No	6.9	7.0	7.2	7.1	7.2	0.0	0.0
NW9AV5-8	No	7.0	7.1	7.3	7.1	7.3	0.0	0.0
NW9AV6-2	No	5.5	7.0	7.2	7.0	7.3	0.0	0.0
NW9AV6-4	No	6.2	7.0	7.1	7.0	7.1	0.0	0.0
NW9AV6-6	No	6.7	7.1	7.1	7.1	7.2	0.0	0.0
NW9AV7-2	Yes	7.1	7.1	7.2	7.1	7.2	0.0	0.0
NW9AV7-4	No	7.0	7.2	7.3	7.2	7.3	0.0	0.0

Table 7E-8b. Progresso Alternative No. 4, Wet Detention Areas and Pipe Upgrades Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 3 Peak Stages (ft NGVD)		Delta (Alt. 3 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
REGALS-2	No	7.4	8.0	8.2	8.0	8.2	0.0	0.0
REGALS-4	No	8.0	8.2	8.4	8.2	8.4	0.0	0.0
WSUNR-05	Yes	7.7	7.2	7.3	7.2	7.3	0.0	0.0
						Maximum:	0.4	0.4
						Minimum:	0.0	0.0

Table 7E-9a. Progresso Alternative No. 5, Combined Alternatives 2, 3, and 4 - Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 5 Peak Stages (ft NGVD)			Delta (Alt. 5 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
BRO-OF1	Yes	4.9	3.8	4.7	5.0	3.7	4.7	5.0	0.0	0.0	0.0
ESUNR-10	Yes	7.3	6.6	7.0	7.1	6.8	7.0	7.1	0.2	0.0	0.0
NANDAV1-2	No	6.4	6.8	7.0	7.1	6.6	6.8	6.9	-0.2	-0.2	-0.1
NANDAV1-4	Yes	6.2	4.1	6.8	6.9	3.0	3.1	5.5	-1.1	-3.7	-1.4
NANDAV1-6	Yes	6.8	5.1	6.8	6.9	5.0	6.2	6.5	-0.2	-0.6	-0.4
NANDAV2-2	No	6.6	6.7	6.8	6.9	6.8	6.9	6.9	0.1	0.0	0.0
NANDAV2-4	Yes	6.4	4.9	6.8	6.9	3.3	5.7	6.6	-1.6	-1.1	-0.4
NANDAV2-6	Yes	6.3	5.4	6.8	6.9	3.2	6.3	6.8	-2.3	-0.5	-0.2
NE2AV1-2	Yes	7.0	4.6	5.8	6.2	3.8	4.9	5.3	-0.8	-1.0	-0.9
NE3AV1-2	Yes	5.9	5.6	6.1	6.3	5.6	6.1	6.3	0.0	0.0	0.0
NE4A-15	N/A	N/A	6.8	7.0	7.1	6.8	7.0	7.1	0.0	0.0	0.0
NE4AV1-2	Yes	6.4	6.3	6.5	6.5	6.2	6.4	6.5	0.0	0.0	0.0
NESUN-2	No	7.0	7.0	7.3	7.4	7.2	7.5	7.6	0.2	0.1	0.1
NEW-2	Yes	9.0	5.4	6.6	6.7	5.0	6.5	6.8	-0.4	0.0	0.1
NFNR020	N/A	N/A	3.3	3.9	4.1	3.3	3.9	4.1	0.0	0.0	0.0
NFNR020OL	N/A	N/A	3.3	3.9	4.1	3.3	3.9	4.1	0.0	0.0	0.0
NW10TR1-2	Yes	6.7	4.9	6.0	6.3	4.6	5.7	6.0	-0.4	-0.3	-0.3
NW10TR2-2	No	5.9	6.4	6.7	6.7	6.4	6.6	6.7	0.0	0.0	0.0
NW10TR3-2	Yes	7.5	7.3	7.6	7.7	7.4	7.7	7.8	0.1	0.1	0.1
NW10TR3-4	No	6.4	6.4	6.7	6.7	6.4	6.6	6.7	0.0	0.0	0.0
NW15A-15	N/A	N/A	5.9	6.3	6.5	5.9	6.3	6.5	0.0	0.0	0.0
NW2AV1-2	Yes	7.2	5.3	6.8	6.9	4.4	5.6	6.0	-0.9	-1.3	-0.9
NW2AV1-4	Yes	6.7	5.7	7.0	7.1	4.4	5.9	6.5	-1.3	-1.0	-0.6
NW2AV2-2	Yes	6.4	5.6	6.8	6.9	3.2	4.8	6.7	-2.5	-2.0	-0.3
NW2AV2-4	Yes	6.4	6.4	6.8	6.9	5.3	6.4	6.5	-1.1	-0.4	-0.4
NW2AV3-2	No	6.2	6.0	6.8	6.9	3.1	6.8	6.9	-2.9	-0.1	0.0
NW2AV3-4	Yes	6.6	5.5	6.8	6.9	3.3	6.1	6.8	-2.2	-0.8	-0.2
NW2AV4-3	No	6.2	6.1	6.8	6.9	6.1	6.8	6.9	0.0	-0.1	-0.1
NW2AV4-4	Yes	6.2	5.9	6.8	6.9	3.5	6.2	6.8	-2.4	-0.6	-0.2
NW2AV5-2	No	6.0	5.8	6.8	6.9	6.1	6.7	6.8	0.3	-0.2	-0.1
NW2AV5-6	No	6.0	6.2	6.8	6.9	5.3	6.8	6.9	-0.9	0.0	0.0
NW4AV1-2	Yes	7.0	6.4	6.7	6.8	6.5	6.7	6.8	0.1	0.0	0.0
NW4AV1-6	Yes	5.9	6.5	6.8	6.9	3.0	5.4	5.8	-3.5	-1.4	-1.1

Table 7E-9a. Progresso Alternative No. 5, Combined Alternatives 2, 3, and 4 - Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 5 Peak Stages (ft NGVD)			Delta (Alt. 5 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NW4AV2-2	Yes	6.8	5.4	6.6	6.8	5.3	6.7	6.9	-0.1	0.1	0.1
NW4AV2-4	Yes	6.9	5.3	6.6	6.8	5.4	6.8	6.9	0.1	0.2	0.2
NW4AV3-2	No	6.0	5.7	6.8	6.9	3.1	6.8	6.9	-2.6	-0.1	0.0
NW4AV3-4	Yes	6.6	5.5	6.8	6.9	3.0	6.8	6.9	-2.5	-0.1	0.0
NW4AV3-6	Yes	6.4	5.4	6.7	6.8	5.0	6.6	6.8	-0.4	-0.1	0.0
NW4AV4-2	No	4.9	6.0	6.8	6.9	3.6	6.8	6.9	-2.4	-0.1	0.0
NW4AV4-4	No	6.0	5.9	6.8	6.9	3.3	6.8	6.9	-2.6	-0.1	0.0
NW4AV4-6	No	6.0	5.8	6.8	6.9	3.0	6.8	6.9	-2.8	-0.1	0.0
NW4AV4-8	No	5.9	6.1	6.8	6.9	5.9	6.8	6.9	-0.2	-0.1	0.0
NW4AV5-2	No	5.8	6.0	6.8	6.9	4.0	6.8	6.9	-2.0	0.0	0.0
NW4AV5-4	No	5.6	6.2	6.8	6.9	3.5	6.8	6.9	-2.7	0.0	0.0
NW4AV6-2	No	5.6	6.2	6.9	6.9	5.0	6.8	6.9	-1.2	0.0	0.0
NW4AV6-6	No	5.6	6.2	6.8	6.9	4.2	6.8	6.9	-2.0	0.0	0.0
NW4AV6-8	No	6.1	6.2	6.9	6.9	4.1	6.8	6.9	-2.1	-0.1	0.0
NW5A-05	N/A	N/A	6.4	6.9	7.0	6.4	6.9	7.0	0.0	0.0	0.0
NW5A-05OL	N/A	N/A	6.4	6.9	7.0	6.4	6.9	7.0	0.0	0.0	0.0
NW5AV1-2	Yes	7.3	5.0	6.3	6.6	5.3	6.6	6.8	0.3	0.3	0.2
NW5AV1-6	Yes	6.8	4.3	5.2	5.5	4.4	5.4	5.7	0.1	0.2	0.1
NW5AV1-8	Yes	5.9	3.8	4.9	5.4	3.7	4.9	5.4	0.0	0.0	0.0
NW5AV1-9	Yes	5.9	3.9	4.8	5.1	3.9	4.9	5.2	0.0	0.1	0.1
NW5AV2-2	Yes	7.3	6.8	7.0	7.0	7.4	7.4	7.4	0.5	0.4	0.4
NW5AV2-6	Yes	6.7	6.7	7.1	7.2	6.6	6.9	7.1	-0.1	-0.1	-0.1
NW5AV3-2	Yes	6.7	5.4	6.8	6.9	4.8	6.8	6.9	-0.6	-0.1	0.0
NW5AV4-2	No	6.4	6.6	6.9	6.9	6.4	6.8	6.9	-0.1	-0.1	0.0
NW5AV4-4	No	6.4	6.2	6.8	6.9	3.8	6.8	6.9	-2.4	0.0	0.0
NW5AV4-6	No	5.4	6.2	6.8	6.9	5.5	6.8	6.9	-0.7	0.0	0.0
NW6AV1-2	Yes	6.5	4.4	5.5	5.8	4.6	5.7	5.9	0.1	0.2	0.1
NW7AV1-2	Yes	6.1	4.6	5.5	5.8	4.6	5.7	5.9	0.1	0.2	0.1
NW7AV1-4	Yes	6.4	4.5	5.7	6.1	4.5	5.9	6.4	0.0	0.2	0.3
NW7AV1-6	Yes	6.5	4.6	5.5	5.8	4.7	5.7	5.9	0.1	0.2	0.1
NW7AV1-8	Yes	6.4	4.5	5.5	5.8	4.7	5.7	6.0	0.1	0.3	0.2
NW7AV2-2	Yes	6.7	4.8	5.8	6.1	4.9	5.9	6.4	0.0	0.1	0.3

Table 7E-9a. Progresso Alternative No. 5, Combined Alternatives 2, 3, and 4 - Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 5 Peak Stages (ft NGVD)			Delta (Alt. 5 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NW7AV2-4	No	6.8	6.9	7.1	7.1	6.9	7.1	7.2	0.1	0.0	0.0
NW7AV3-2	No	6.2	5.2	6.3	6.6	5.6	6.7	6.8	0.4	0.4	0.2
NW7AV3-4	Yes	7.1	5.4	6.4	6.7	5.7	6.7	6.8	0.3	0.3	0.2
NW7AV4-2	Yes	7.1	5.4	6.6	6.8	5.6	6.7	6.8	0.2	0.1	0.0
NW7AV4-4	No	6.6	6.7	6.9	7.0	6.8	7.0	7.1	0.1	0.1	0.1
NW7AV5-2	No	6.0	5.7	6.7	6.8	5.5	6.6	6.7	-0.1	0.0	-0.1
NW7AV5-4	No	6.3	5.6	6.8	6.9	5.5	6.8	6.9	0.0	0.0	0.0
NW7AV6-2	No	6.2	5.9	6.7	6.8	5.5	6.6	6.7	-0.4	0.0	-0.1
NW7AV7-2	No	6.3	6.0	6.7	6.8	6.0	6.6	6.7	-0.1	0.0	-0.1
NW7AV7-4	Yes	6.7	6.0	6.7	6.8	5.9	6.6	6.7	-0.2	0.0	-0.1
NW7AV7-6	Yes	6.5	6.0	6.7	6.8	5.8	6.6	6.7	-0.2	0.0	-0.1
NW7TR1-2	No	6.4	6.3	6.7	6.8	6.3	6.6	6.7	0.0	0.0	-0.1
NW7TR1-4	No	6.0	6.0	6.7	6.8	5.9	6.6	6.7	-0.1	0.0	0.0
NW8AV1-2	No	6.4	6.3	6.7	6.8	6.4	6.6	6.7	0.1	0.0	0.0
NW8AV2-2	Yes	7.1	6.1	6.9	7.0	6.5	7.0	7.1	0.4	0.1	0.1
NW8ST-10	N/A	N/A	6.4	6.7	6.7	6.4	6.7	6.7	0.0	0.0	0.0
NW9AV1-2	Yes	7.2	4.6	5.7	6.0	4.8	6.0	6.4	0.1	0.3	0.3
NW9AV1-4	Yes	6.5	4.7	5.8	6.2	4.9	6.1	6.6	0.2	0.4	0.4
NW9AV2-2	Yes	6.5	4.6	5.7	6.1	4.3	5.3	5.7	-0.3	-0.4	-0.4
NW9AV3-2	Yes	7.3	5.4	6.5	6.7	5.7	6.7	6.8	0.3	0.2	0.2
NW9AV3-4	Yes	7.3	6.8	6.9	6.9	6.8	6.9	7.0	0.0	0.0	0.0
NW9AV4-2	Yes	7.2	5.5	6.5	6.7	5.8	6.7	6.8	0.3	0.2	0.1
NW9AV4-4	Yes	7.4	5.1	6.2	6.5	5.1	6.3	6.6	0.0	0.1	0.0
NW9AV5-2	No	6.4	5.9	6.7	6.7	5.9	6.6	6.7	-0.1	0.0	0.0
NW9AV5-4	Yes	6.5	5.1	6.6	6.7	4.9	6.6	6.7	-0.2	0.0	0.0
NW9AV5-6	Yes	6.9	5.7	6.6	6.7	5.9	6.7	6.8	0.2	0.1	0.1
NW9AV5-8	Yes	7.0	5.6	6.6	6.7	6.0	6.7	6.8	0.4	0.1	0.1
NW9AV6-2	No	5.5	6.0	6.7	6.8	3.9	6.6	6.7	-2.1	0.0	0.0
NW9AV6-4	No	6.2	6.4	6.7	6.7	6.3	6.6	6.7	-0.1	0.0	0.0
NW9AV6-6	Yes	6.7	6.6	6.9	6.9	5.3	6.4	6.6	-1.2	-0.4	-0.3
NW9AV7-2	Yes	7.1	6.8	7.0	7.0	5.1	6.7	6.9	-1.7	-0.3	-0.2
NW9AV7-4	Yes	7.0	6.8	7.1	7.1	6.4	7.0	7.1	-0.3	-0.1	-0.1

Table 7E-9a. Progresso Alternative No. 5, Combined Alternatives 2, 3, and 4 - Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 5 Peak Stages (ft NGVD)			Delta (Alt. 5 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
REGALS-2	Yes	7.4	7.3	7.7	7.8	6.8	7.3	7.4	-0.5	-0.4	-0.4
REGALS-4	Yes	8.0	7.5	7.9	8.0	7.4	7.8	7.9	-0.2	-0.1	-0.1
WSUNR-05	Yes	7.7	6.3	6.9	7.0	6.3	6.8	6.9	0.0	0.0	0.0
								Maximum:	0.5	0.4	0.4
								Minimum:	-3.7	-1.4	0.0

Table 7E-9b. Progresso Alternative No. 5, Combined Alternatives 2, 3, and 4 - Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 5 Peak Stages (ft NGVD)		Delta (Alt. 5 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
BRO-OF1	No	4.9	5.7	6.1	5.8	6.2	0.0	0.1
ESUNR-10	Yes	7.3	7.2	7.3	7.2	7.3	0.0	0.0
NANDAV1-2	No	6.4	7.2	7.3	7.1	7.2	-0.1	-0.1
NANDAV1-4	No	6.2	7.2	7.3	7.1	7.2	-0.1	-0.1
NANDAV1-6	No	6.8	7.2	7.3	7.1	7.2	-0.1	-0.1
NANDAV2-2	No	6.6	7.2	7.3	7.1	7.2	-0.1	-0.1
NANDAV2-4	No	6.4	7.2	7.3	7.1	7.2	-0.1	-0.1
NANDAV2-6	No	6.3	7.2	7.3	7.1	7.2	-0.1	-0.1
NE2AV1-2	Yes	7.0	6.8	7.0	6.7	6.9	0.0	-0.1
NE3AV1-2	No	5.9	6.8	7.0	6.7	6.9	0.0	-0.1
NE4A-15	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NE4AV1-2	No	6.4	6.8	7.0	6.7	6.9	0.0	-0.1
NESUN-2	No	7.0	7.6	7.8	7.8	7.9	0.1	0.1
NEW-2	Yes	9.0	7.1	7.2	7.2	7.3	0.1	0.1
NFNR020	N/A	N/A	4.8	5.2	4.8	5.2	0.0	0.0
NFNR020OL	N/A	N/A	5.0	5.2	5.0	5.2	0.0	0.0
NW10TR1-2	No	6.7	6.9	7.0	6.7	7.0	-0.1	0.0
NW10TR2-2	No	5.9	6.9	7.0	6.9	7.0	0.0	0.0
NW10TR3-2	No	7.5	8.0	8.2	8.1	8.3	0.0	0.1
NW10TR3-4	No	6.4	6.9	7.0	6.9	7.0	0.0	0.0
NW15A-15	N/A	N/A	6.6	6.9	6.6	6.9	0.0	0.0
NW2AV1-2	Yes	7.2	7.2	7.3	7.1	7.2	-0.1	-0.1
NW2AV1-4	No	6.7	7.6	7.7	7.2	7.4	-0.4	-0.3
NW2AV2-2	No	6.4	7.2	7.3	7.1	7.2	-0.1	-0.1
NW2AV2-4	No	6.4	7.2	7.3	7.1	7.2	-0.1	-0.1
NW2AV3-2	No	6.2	7.2	7.3	7.1	7.2	-0.1	0.0
NW2AV3-4	No	6.6	7.2	7.3	7.1	7.2	-0.1	-0.1
NW2AV4-3	No	6.2	7.2	7.3	7.1	7.2	-0.1	-0.1
NW2AV4-4	No	6.2	7.2	7.3	7.1	7.2	-0.1	-0.1
NW2AV5-2	No	6.0	7.2	7.3	7.1	7.2	-0.1	-0.1
NW2AV5-6	No	6.0	7.2	7.3	7.1	7.2	0.0	0.0
NW4AV1-2	Yes	7.0	7.0	7.2	7.0	7.1	0.0	0.0
NW4AV1-6	No	5.9	7.1	7.2	6.4	6.6	-0.6	-0.6

Table 7E-9b. Progresso Alternative No. 5, Combined Alternatives 2, 3, and 4 - Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 5 Peak Stages (ft NGVD)		Delta (Alt. 5 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NW4AV2-2	No	6.8	7.2	7.4	7.3	7.5	0.1	0.1
NW4AV2-4	No	6.9	7.2	7.4	7.3	7.5	0.1	0.1
NW4AV3-2	No	6.0	7.2	7.3	7.1	7.2	-0.1	0.0
NW4AV3-4	No	6.6	7.2	7.3	7.1	7.2	-0.1	-0.1
NW4AV3-6	No	6.4	7.1	7.3	7.1	7.2	0.0	-0.1
NW4AV4-2	No	4.9	7.2	7.3	7.1	7.2	-0.1	0.0
NW4AV4-4	No	6.0	7.2	7.3	7.1	7.2	-0.1	0.0
NW4AV4-6	No	6.0	7.2	7.3	7.1	7.2	-0.1	0.0
NW4AV4-8	No	5.9	7.2	7.3	7.1	7.2	-0.1	0.0
NW4AV5-2	No	5.8	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV5-4	No	5.6	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV6-2	No	5.6	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV6-6	No	5.6	7.2	7.3	7.1	7.3	0.0	0.0
NW4AV6-8	No	6.1	7.2	7.3	7.1	7.3	0.0	0.0
NW5A-05	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NW5A-05OL	N/A	N/A	7.2	7.3	7.2	7.3	0.0	0.0
NW5AV1-2	Yes	7.3	7.0	7.2	7.1	7.3	0.1	0.1
NW5AV1-6	Yes	6.8	6.2	6.5	6.3	6.6	0.1	0.1
NW5AV1-8	No	5.9	6.1	6.3	6.1	6.4	0.0	0.1
NW5AV1-9	No	5.9	5.9	6.3	5.9	6.4	0.1	0.1
NW5AV2-2	No	7.3	7.2	7.3	7.5	7.6	0.4	0.4
NW5AV2-6	No	6.7	7.5	7.6	7.4	7.5	-0.1	-0.1
NW5AV3-2	No	6.7	7.2	7.3	7.1	7.2	-0.1	0.0
NW5AV4-2	No	6.4	7.2	7.3	7.1	7.3	0.0	0.0
NW5AV4-4	No	6.4	7.2	7.3	7.1	7.2	0.0	0.0
NW5AV4-6	No	5.4	7.2	7.3	7.1	7.3	0.0	0.0
NW6AV1-2	No	6.5	6.5	6.7	6.6	6.8	0.1	0.0
NW7AV1-2	No	6.1	6.6	6.8	6.6	6.8	0.1	0.0
NW7AV1-4	No	6.4	6.7	6.9	6.7	6.9	0.0	0.0
NW7AV1-6	Yes	6.5	6.5	6.7	6.6	6.7	0.1	0.0
NW7AV1-8	No	6.4	7.1	7.4	7.3	7.6	0.2	0.2
NW7AV2-2	Yes	6.7	6.7	6.9	6.7	6.9	0.0	0.0

Table 7E-9b. Progresso Alternative No. 5, Combined Alternatives 2, 3, and 4 - Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 5 Peak Stages (ft NGVD)		Delta (Alt. 5 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NW7AV2-4	No	6.8	7.2	7.3	7.2	7.3	0.0	0.0
NW7AV3-2	No	6.2	7.0	7.2	7.0	7.2	0.1	0.1
NW7AV3-4	Yes	7.1	7.1	7.3	7.2	7.3	0.1	0.0
NW7AV4-2	Yes	7.1	7.0	7.2	7.0	7.2	0.0	0.0
NW7AV4-4	No	6.6	7.3	7.5	7.4	7.5	0.1	0.0
NW7AV5-2	No	6.0	7.0	7.2	6.9	7.1	-0.1	-0.1
NW7AV5-4	No	6.3	7.1	7.3	7.1	7.2	0.0	0.0
NW7AV6-2	No	6.2	7.0	7.2	6.9	7.1	-0.1	-0.1
NW7AV7-2	No	6.3	7.0	7.2	6.9	7.1	-0.1	-0.1
NW7AV7-4	No	6.7	7.0	7.2	6.9	7.1	-0.1	-0.1
NW7AV7-6	No	6.5	7.0	7.2	6.9	7.1	-0.1	-0.1
NW7TR1-2	No	6.4	7.0	7.2	6.9	7.1	-0.1	-0.1
NW7TR1-4	No	6.0	7.0	7.2	6.9	7.1	-0.1	-0.1
NW8AV1-2	No	6.4	7.0	7.2	6.9	7.1	-0.1	-0.1
NW8AV2-2	No	7.1	7.3	7.5	7.4	7.5	0.1	0.0
NW8ST-10	N/A	N/A	6.9	7.0	6.9	7.0	0.0	0.0
NW9AV1-2	No	7.2	7.2	7.4	7.3	7.6	0.1	0.2
NW9AV1-4	No	6.5	7.2	7.4	7.3	7.6	0.1	0.2
NW9AV2-2	No	6.5	7.1	7.4	7.3	7.6	0.2	0.2
NW9AV3-2	Yes	7.3	7.1	7.3	7.2	7.4	0.1	0.1
NW9AV3-4	Yes	7.3	7.0	7.1	7.0	7.1	0.0	0.0
NW9AV4-2	Yes	7.2	7.1	7.3	7.2	7.4	0.1	0.0
NW9AV4-4	Yes	7.4	7.0	7.3	7.0	7.2	-0.1	-0.1
NW9AV5-2	No	6.4	7.0	7.1	6.9	7.1	0.0	-0.1
NW9AV5-4	No	6.5	6.9	7.0	6.9	7.0	0.0	0.0
NW9AV5-6	No	6.9	7.0	7.2	7.0	7.2	0.0	-0.1
NW9AV5-8	Yes	7.0	7.1	7.3	7.1	7.2	0.0	-0.1
NW9AV6-2	No	5.5	7.0	7.2	6.9	7.1	-0.1	-0.1
NW9AV6-4	No	6.2	7.0	7.1	6.9	7.1	-0.1	0.0
NW9AV6-6	No	6.7	7.1	7.1	7.0	7.1	-0.1	-0.1
NW9AV7-2	Yes	7.1	7.1	7.2	7.1	7.1	-0.1	0.0
NW9AV7-4	No	7.0	7.2	7.3	7.2	7.3	0.0	0.0

Table 7E-9b. Progresso Alternative No. 5, Combined Alternatives 2, 3, and 4 - Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 5 Peak Stages (ft NGVD)		Delta (Alt. 5 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
REGALS-2	No	7.4	8.0	8.2	7.7	7.9	-0.3	-0.3
REGALS-4	No	8.0	8.2	8.4	8.2	8.3	-0.1	-0.1
WSUNR-05	Yes	7.7	7.2	7.3	7.2	7.3	0.0	0.0
						Maximum:	0.4	0.4
						Minimum:	-0.6	0.0

Appendix 7F
Surface Water Management Model Results

The following tables present the base model and alternative results for simulations of the City of Fort Lauderdale EPA SWMM for the Victoria Park Project.

Table 7F-1. Victoria Park Base Model Results

Model Node	Description	5-Yr LOS Goal Met	Reference Elevation (ft NGVD)	Design Storm Peak Stages (ft NGVD)				
				2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
BRWRD-12AV	Broward Blvd and 12th Ave/LIDAR	Yes	7.4	7.5	7.6	7.7	7.8	7.8
BRWRD-13AV	Broward Blvd and 13th Ave/LIDAR	No	7.7	8.4	8.5	8.5	8.6	8.7
BRWRD-14AV	Broward Blvd and 14th Ave/LIDAR	Yes	8.7	8.5	8.6	8.6	8.8	8.8
BRWRD-16AV	Broward Blvd and 16th Ave /SURVEY	Yes	10.9	10.8	10.9	11.0	11.2	11.3
BRWRD-8AV	Broward Blvd and 8th Ave /SURVEY	Yes	5.5	5.2	5.4	5.5	5.5	5.6
C13IC005	Middle River & NE 26th Terr /LIDAR	Yes	2.5	2.5	2.5	2.5	2.5	2.5
C13IC010	E Sunrise Blvd & Middle River /LIDAR	Yes	2.5	2.6	2.7	2.8	2.9	3.1
C13ICSPUR002	Sunrise Key Blvd, east of NE 18th Ave /LIDAR	Yes	2.5	2.6	2.6	2.6	2.6	2.6
C13ICSPUR005	Inter Coastal east of NE 3rd Ct /LIDAR	Yes	2.5	2.6	2.6	2.6	2.6	2.6
ESUNR-01	E Sunrise Blvd & NE 17th Way /LIDAR	Yes	8.3	5.0	6.0	6.4	7.4	7.7
ESUNR-02	E Sunrise Blvd & NE 17th Terr /LIDAR	Yes	7.4	5.6	6.6	6.9	7.8	8.0
ESUNR-05	E Sunrise Blvd & NE 15th Ave /LIDAR	No	6	6.6	7.3	7.5	7.9	8.1
ESUNR-06	E Sunrise Blvd & NE 10th Ave /LIDAR	No	6	6.7	7.0	7.1	7.4	7.5
ESUNR-07	E Sunrise Blvd, west of NE 7th Ave /LIDAR	No	6.5	6.9	7.1	7.1	7.4	7.5
HYPK-E	Low point of E side of Holiday Park /LIDAR	No	6	6.4	6.8	6.9	7.3	7.5
HYPK-NE	Low point of NE side of Holiday Park /LIDAR	No	5.6	6.7	6.9	7.0	7.4	7.5
HYPK-NW	Low point of NW side of Holiday Park /LIDAR	No	4	6.4	6.8	6.9	7.3	7.5
HYPK-SE	Low point of SE side of Holiday Park /LIDAR	No	6.3	7.3	7.4	7.5	7.7	7.8
HYPK-SW2	NE 6th St & NE 8th Ave LIDAR	No	5.3	5.9	6.1	6.3	7.0	7.1
HYPK-W	Low point of W side of Holiday Park /LIDAR	No	5.4	6.3	6.5	6.6	7.0	7.2
NE16AV-9ST	NE 16th Ave & NE 9th St /LIDAR	No	6.8	7.2	7.3	7.5	7.9	8.1
NE16TR-2CT	NE 16th Terr, south of NE 2nd Ct /LIDAR	No	9.7	10.2	10.3	10.4	10.5	10.6
NE17AV-5ST	NE 17th Ave & NE 5th St /SURVEY	No	7.7	8.3	8.7	8.7	9.1	9.3
NE17WY-10ST	NE 17th Way, south of E Sunrise Blvd /LIDAR	No	7.6	8.6	8.7	8.8	9.0	9.0
NE17WY-7ST	NE 17th Way & NE 7th St /LIDAR	No	7.2	8.3	8.8	8.9	9.3	9.5
NE17WY-8ST	NE 17th Way & NE 8th St /LIDAR	No	8.8	9.3	9.3	9.3	9.4	9.4
NE2ST-12AV	NE 2nd St & NE 12th Ave /SURVEY	Yes	7.9	7.9	8.0	8.0	8.1	8.2
NE2ST-7AV	NE 2nd St & NE 7th Ave /LIDAR	No	5.3	5.5	5.7	5.7	6.3	6.4
NE3CT-16AV	NE 3rd Ct & NE 16th Ave /LIDAR	No	6	5.5	6.4	6.8	7.7	8.0

Table 7F-1. Victoria Park Base Model Results

Model Node	Description	5-Yr LOS Goal Met	Reference Elevation (ft NGVD)	Design Storm Peak Stages (ft NGVD)				
				2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 72-hour	100-year, 72-hour
NE3CT-17AV	NE 3rd Ct & NE 17th Ave /SURVEY	No	5.3	5.0	6.4	6.8	7.7	8.0
NE4PL-14AV	NE 4th Pl & NE 14th Ave /LIDAR	No	7.8	8.2	8.2	8.3	8.5	8.6
NE4PL-16AV	NE 4th Pl & NE 16th Ave /LIDAR	No	7.9	6.7	8.2	8.2	8.5	8.6
NE4ST-14AV	NE 4th St & NE 14th Ave /LIDAR	No	6.3	7.2	7.4	7.5	7.7	7.8
NE4ST-16AV	NE 4th St & NE 16th Ave /LIDAR	Yes	7.4	5.9	6.8	7.1	7.7	8.0
NE4ST-7AV	NE 4th St & NE 7th Ave LIDAR	No	5	5.4	5.7	5.8	6.5	6.8
NE5ST-7AV	NE 5th St & NE 7th Ave /LIDAR	No	5.1	5.5	5.7	5.8	6.5	6.8
NE8ST-16TR	NE 8th St & NE 16th Terr /LIDAR	No	7.9	8.2	8.4	8.5	8.7	8.7
NFED-55	Federal Hwy, north of NE 9th St /LIDAR	Yes	7.1	6.9	7.1	7.1	7.3	7.4
NFED-60	Federal Hwy & NE 9th St /LIDAR	No	6	7.0	7.2	7.2	7.3	7.3
NFED-65	Federal Hwy, north of NE 7th St /LIDAR	No	6.2	6.7	6.9	6.9	7.1	7.2
NFED-67	Federal Hwy, south of NE 6th St /LIDAR	No	6.1	6.5	6.8	6.9	7.0	7.1
NFED-70	Federal Hwy & NE 5th St /LIDAR	Yes	5.7	4.4	5.2	5.6	6.4	6.6
NFED-72	Federal Hwy, south of NE 5th St /LIDAR	Yes	5.6	4.0	4.9	5.4	6.5	6.7
NFED-75	Federal Hwy, south of NE 4th St /LIDAR	Yes	6	3.7	4.7	5.4	6.8	7.3
NFED-80	Federal Hwy & NE 2nd St /LIDAR	Yes	6	3.6	4.1	4.5	6.2	6.4
NFED-BR	Federal Hwy & Broward Blvd /LIDAR	Yes	6	3.1	3.5	3.7	4.6	5.3

Table 7F-2a. Victoria Park Alternative No. 1, 10% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 [10%] Stages (ft NGVD)			Delta (Alt. 1 [10%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
BRWRD-12AV	No	7.4	7.5	7.6	7.7	7.6	7.7	7.7	0.0	0.0	0.0
BRWRD-13AV	No	7.7	8.4	8.5	8.5	8.4	8.5	8.5	0.0	0.0	0.0
BRWRD-14AV	Yes	8.7	8.5	8.6	8.6	8.5	8.6	8.7	0.0	0.0	0.0
BRWRD-16AV	Yes	10.9	10.8	10.9	11.0	10.8	10.9	11.0	0.0	0.0	0.0
BRWRD-8AV	Yes	5.5	5.2	5.4	5.5	5.2	5.4	5.5	0.0	0.0	0.0
C13IC005	Yes	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0
C13IC010	Yes	2.5	2.6	2.7	2.8	2.6	2.7	2.8	0.0	0.0	0.0
C13ICSPUR002	Yes	2.5	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13ICSPUR005	Yes	2.5	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0
ESUNR-01	Yes	8.3	5.0	6.0	6.4	5.3	6.4	6.7	0.3	0.4	0.4
ESUNR-02	Yes	7.4	5.6	6.6	6.9	5.9	6.8	7.1	0.3	0.2	0.2
ESUNR-05	No	6.0	6.6	7.3	7.5	6.8	7.4	7.6	0.2	0.1	0.1
ESUNR-06	No	6.0	6.7	7.0	7.1	6.8	7.0	7.1	0.1	0.0	0.0
ESUNR-07	No	6.5	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
HYPK-E	No	6.0	6.4	6.8	6.9	6.4	6.9	7.0	0.0	0.1	0.0
HYPK-NE	No	5.6	6.7	6.9	7.0	6.7	6.9	7.0	0.0	0.0	0.0
HYPK-NW	No	4.0	6.4	6.8	6.9	6.4	6.9	7.0	0.0	0.1	0.0
HYPK-SE	No	6.3	7.3	7.4	7.5	7.3	7.4	7.5	0.0	0.0	0.0
HYPK-SW2	No	5.3	5.9	6.1	6.3	5.9	6.2	6.4	0.0	0.1	0.0
HYPK-W	No	5.4	6.3	6.5	6.6	6.3	6.6	6.7	0.0	0.0	0.0
NE16AV-9ST	No	6.8	7.2	7.3	7.5	7.2	7.4	7.6	0.0	0.1	0.0
NE16TR-2CT	No	9.7	10.2	10.3	10.4	10.2	10.3	10.4	0.0	0.0	0.0
NE17AV-5ST	No	7.7	8.3	8.7	8.7	8.3	8.7	8.7	0.0	0.0	0.0
NE17WY-10ST	No	7.6	8.6	8.7	8.8	8.6	8.8	8.8	0.0	0.0	0.0
NE17WY-7ST	No	7.2	8.3	8.8	8.9	8.3	8.8	8.9	0.0	0.0	0.0
NE17WY-8ST	No	8.8	9.3	9.3	9.3	9.3	9.3	9.3	0.0	0.0	0.0
NE2ST-12AV	Yes	7.9	7.9	8.0	8.0	7.9	8.0	8.0	0.0	0.0	0.0
NE2ST-7AV	No	5.3	5.5	5.7	5.7	5.5	5.7	5.7	0.0	0.0	0.0
NE3CT-16AV	No	6.0	5.5	6.4	6.8	5.7	6.7	7.1	0.3	0.3	0.3

Table 7F-2a. Victoria Park Alternative No. 1, 10% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 [10%] Stages (ft NGVD)			Delta (Alt. 1 [10%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NE3CT-17AV	No	5.3	5.0	6.4	6.8	5.6	6.7	7.1	0.6	0.4	0.3
NE4PL-14AV	No	7.8	8.2	8.2	8.3	8.2	8.2	8.3	0.0	0.0	0.0
NE4PL-16AV	No	7.9	6.7	8.2	8.2	7.6	8.2	8.3	0.9	0.0	0.0
NE4ST-14AV	No	6.3	7.2	7.4	7.5	7.3	7.4	7.5	0.1	0.0	0.0
NE4ST-16AV	Yes	7.4	5.9	6.8	7.1	6.2	7.0	7.2	0.3	0.2	0.2
NE4ST-7AV	No	5.0	5.4	5.7	5.8	5.4	5.7	5.9	0.0	0.0	0.1
NE5ST-7AV	No	5.1	5.5	5.7	5.8	5.5	5.7	5.9	0.0	0.0	0.1
NE8ST-16TR	No	7.9	8.2	8.4	8.5	8.2	8.4	8.5	0.0	0.0	0.0
NFED-55	Yes	7.1	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
NFED-60	No	6.0	7.0	7.2	7.2	7.1	7.2	7.2	0.0	0.0	0.0
NFED-65	No	6.2	6.7	6.9	6.9	6.7	6.9	7.0	0.0	0.0	0.0
NFED-67	No	6.1	6.5	6.8	6.9	6.6	6.9	6.9	0.2	0.1	0.1
NFED-70	Yes	5.7	4.4	5.2	5.6	4.6	5.5	5.8	0.2	0.3	0.2
NFED-72	Yes	5.6	4.0	4.9	5.4	4.1	5.3	5.8	0.2	0.4	0.4
NFED-75	Yes	6.0	3.7	4.7	5.4	3.8	5.3	5.8	0.2	0.6	0.5
NFED-80	Yes	6	3.6	4.1	4.5	3.8	4.4	5.2	0.2	0.3	0.7
NFED-BR	Yes	6	3.1	3.5	3.7	3.2	3.6	4.0	0.1	0.1	0.3
NFNRSPUR004	No	2.5	2.6	2.8	2.8	2.6	2.8	2.8	0.0	0.0	0.0
NFNRSPUR005	No	2.5	2.8	2.9	3.0	2.8	2.9	3.0	0.0	0.0	0.0
NFNRSPUR007	No	2.5	2.8	2.9	3.0	2.8	2.9	3.0	0.0	0.0	0.0
NFNRSPUR009	No	2.5	2.8	3.0	3.2	2.8	3.0	3.2	0.0	0.0	0.0
NFNRSPUR010	No	2.5	2.8	3.0	3.2	2.8	3.0	3.2	0.0	0.0	0.0
OUT_IC015	N/A	N/R	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0
							Maximum:		**0.9**	**0.6**	**0.7**
							Minimum:		**0.0**	**0.0**	**0.0**

Table 7F-2b. Victoria Park Alternative No. 1, 10% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 [10%] Stages (ft NGVD)		Delta (Alt. 1 [10%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
BRWRD-12AV	No	7.4	7.8	7.8	7.8	7.8	0.0	0.0
BRWRD-13AV	No	7.7	8.6	8.7	8.6	8.7	0.0	0.0
BRWRD-14AV	Yes	8.7	8.8	8.8	8.8	8.8	0.0	0.0
BRWRD-16AV	Yes	10.9	11.2	11.3	11.2	11.3	0.0	0.0
BRWRD-8AV	Yes	5.5	5.5	5.6	5.6	5.6	0.0	0.0
C13IC005	Yes	2.5	2.5	2.5	2.5	2.5	0.0	0.0
C13IC010	Yes	2.5	2.9	3.1	2.9	3.0	0.0	0.0
C13ICSPUR002	Yes	2.5	2.6	2.6	2.6	2.6	0.0	0.0
C13ICSPUR005	Yes	2.5	2.6	2.6	2.6	2.6	0.0	0.0
ESUNR-01	Yes	8.3	7.4	7.7	7.7	8.0	0.4	0.3
ESUNR-02	Yes	7.4	7.8	8.0	7.9	8.1	0.1	0.1
ESUNR-05	No	6.0	7.9	8.1	8.0	8.1	0.0	0.0
ESUNR-06	No	6.0	7.4	7.5	7.4	7.5	0.0	0.0
ESUNR-07	No	6.5	7.4	7.5	7.4	7.5	0.0	0.0
HYPK-E	No	6.0	7.3	7.5	7.3	7.5	0.0	0.0
HYPK-NE	No	5.6	7.4	7.5	7.4	7.6	0.0	0.0
HYPK-NW	No	4.0	7.3	7.5	7.4	7.5	0.0	0.0
HYPK-SE	No	6.3	7.7	7.8	7.7	7.8	0.0	0.0
HYPK-SW2	No	5.3	7.0	7.1	7.0	7.2	0.0	0.0
HYPK-W	No	5.4	7.0	7.2	7.0	7.2	0.0	0.0
NE16AV-9ST	No	6.8	7.9	8.1	8.0	8.1	0.0	0.0
NE16TR-2CT	No	9.7	10.5	10.6	10.5	10.6	0.0	0.0
NE17AV-5ST	No	7.7	9.1	9.3	9.1	9.3	0.0	0.0
NE17WY-10ST	No	7.6	9.0	9.0	9.0	9.0	0.0	0.0
NE17WY-7ST	No	7.2	9.3	9.5	9.3	9.5	0.0	0.0
NE17WY-8ST	No	8.8	9.4	9.4	9.4	9.4	0.0	0.0
NE2ST-12AV	Yes	7.9	8.1	8.2	8.1	8.2	0.0	0.0
NE2ST-7AV	No	5.3	6.3	6.4	6.3	6.5	0.0	0.0
NE3CT-16AV	No	6.0	7.7	8.0	7.9	8.2	0.1	0.1

Table 7F-2b. Victoria Park Alternative No. 1, 10% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 [10%] Stages (ft NGVD)		Delta (Alt. 1 [10%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NE3CT-17AV	No	5.3	7.7	8.0	7.9	8.1	0.2	0.1
NE4PL-14AV	No	7.8	8.5	8.6	8.5	8.6	0.0	0.0
NE4PL-16AV	No	7.9	8.5	8.6	8.5	8.6	0.0	0.0
NE4ST-14AV	No	6.3	7.7	7.8	7.7	7.8	0.0	0.0
NE4ST-16AV	Yes	7.4	7.7	8.0	7.9	8.1	0.1	0.1
NE4ST-7AV	No	5.0	6.5	6.8	6.6	6.9	0.1	0.1
NE5ST-7AV	No	5.1	6.5	6.8	6.6	6.9	0.1	0.1
NE8ST-16TR	No	7.9	8.7	8.7	8.7	8.7	0.0	0.0
NFED-55	Yes	7.1	7.3	7.4	7.3	7.4	0.0	0.0
NFED-60	No	6.0	7.3	7.3	7.3	7.3	0.0	0.0
NFED-65	No	6.2	7.1	7.2	7.1	7.2	0.0	0.0
NFED-67	No	6.1	7.0	7.1	7.1	7.2	0.1	0.0
NFED-70	Yes	5.7	6.4	6.6	6.5	6.7	0.0	0.0
NFED-72	Yes	5.6	6.5	6.7	6.5	6.8	0.0	0.0
NFED-75	Yes	6.0	6.8	7.3	6.8	7.1	0.0	-0.1
NFED-80	Yes	6	6.2	6.4	6.3	6.4	0.0	0.0
NFED-BR	Yes	6	4.6	5.3	4.8	5.5	0.1	0.2
NFNRSPUR004	No	2.5	3.0	3.1	3.0	3.1	0.0	0.0
NFNRSPUR005	No	2.5	3.3	3.5	3.2	3.5	0.0	0.0
NFNRSPUR007	No	2.5	3.4	3.7	3.4	3.7	0.0	0.0
NFNRSPUR009	No	2.5	3.5	4.0	3.5	4.2	0.0	0.1
NFNRSPUR010	No	2.5	3.5	4.1	3.5	4.3	0.0	0.1
OUT_IC015	N/A	N/R	2.5	2.5	2.5	2.5	0.0	0.0
						Maximum:	**0.4**	**0.3**
						Minimum:	**0.0**	**-0.1**

Table 7F-3a. Victoria Park Alternative No. 1, 20% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 [20%] Stages (ft NGVD)			Delta (Alt. 1 [20%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
BRWRD-12AV	No	7.4	7.5	7.6	7.7	7.6	7.7	7.7	0.0	0.0	0.0
BRWRD-13AV	No	7.7	8.4	8.5	8.5	8.4	8.5	8.5	0.0	0.0	0.0
BRWRD-14AV	Yes	8.7	8.5	8.6	8.6	8.5	8.6	8.7	0.0	0.0	0.0
BRWRD-16AV	Yes	10.9	10.8	10.9	11.0	10.8	10.9	11.0	0.0	0.0	0.0
BRWRD-8AV	Yes	5.5	5.2	5.4	5.5	5.2	5.4	5.5	0.0	0.0	0.0
C13IC005	Yes	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0
C13IC010	Yes	2.5	2.6	2.7	2.8	2.6	2.7	2.8	0.0	0.0	0.0
C13ICSPUR002	Yes	2.5	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13ICSPUR005	Yes	2.5	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0
ESUNR-01	Yes	8.3	5.0	6.0	6.4	5.3	6.4	6.7	0.3	0.4	0.4
ESUNR-02	Yes	7.4	5.6	6.6	6.9	5.9	6.8	7.1	0.3	0.2	0.2
ESUNR-05	No	6.0	6.6	7.3	7.5	6.8	7.4	7.6	0.2	0.1	0.1
ESUNR-06	No	6.0	6.7	7.0	7.1	6.8	7.0	7.1	0.1	0.0	0.0
ESUNR-07	No	6.5	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
HYPK-E	No	6.0	6.4	6.8	6.9	6.4	6.9	7.0	0.0	0.1	0.0
HYPK-NE	No	5.6	6.7	6.9	7.0	6.7	6.9	7.0	0.0	0.0	0.0
HYPK-NW	No	4.0	6.4	6.8	6.9	6.4	6.9	7.0	0.0	0.1	0.0
HYPK-SE	No	6.3	7.3	7.4	7.5	7.3	7.4	7.5	0.0	0.0	0.0
HYPK-SW2	No	5.3	5.9	6.1	6.3	5.9	6.2	6.4	0.0	0.1	0.0
HYPK-W	No	5.4	6.3	6.5	6.6	6.3	6.6	6.7	0.0	0.0	0.0
NE16AV-9ST	No	6.8	7.2	7.3	7.5	7.2	7.4	7.6	0.0	0.1	0.0
NE16TR-2CT	No	9.7	10.2	10.3	10.4	10.2	10.3	10.4	0.0	0.0	0.0
NE17AV-5ST	No	7.7	8.3	8.7	8.7	8.3	8.7	8.7	0.0	0.0	0.0
NE17WY-10ST	No	7.6	8.6	8.7	8.8	8.6	8.8	8.8	0.0	0.0	0.0
NE17WY-7ST	No	7.2	8.3	8.8	8.9	8.3	8.8	8.9	0.0	0.0	0.0
NE17WY-8ST	No	8.8	9.3	9.3	9.3	9.3	9.3	9.3	0.0	0.0	0.0
NE2ST-12AV	Yes	7.9	7.9	8.0	8.0	7.9	8.0	8.0	0.0	0.0	0.0
NE2ST-7AV	No	5.3	5.5	5.7	5.7	5.5	5.7	5.7	0.0	0.0	0.0
NE3CT-16AV	No	6.0	5.5	6.4	6.8	5.7	6.7	7.1	0.3	0.3	0.3

Table 7F-3a. Victoria Park Alternative No. 1, 20% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 [20%] Stages (ft NGVD)			Delta (Alt. 1 [20%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NE3CT-17AV	No	5.3	5.0	6.4	6.8	5.6	6.7	7.1	0.6	0.4	0.3
NE4PL-14AV	No	7.8	8.2	8.2	8.3	8.2	8.2	8.3	0.0	0.0	0.0
NE4PL-16AV	No	7.9	6.7	8.2	8.2	7.6	8.2	8.3	0.9	0.0	0.0
NE4ST-14AV	No	6.3	7.2	7.4	7.5	7.3	7.4	7.5	0.1	0.0	0.0
NE4ST-16AV	Yes	7.4	5.9	6.8	7.1	6.2	7.0	7.2	0.3	0.2	0.2
NE4ST-7AV	No	5.0	5.4	5.7	5.8	5.4	5.7	5.9	0.0	0.0	0.1
NE5ST-7AV	No	5.1	5.5	5.7	5.8	5.5	5.7	5.9	0.0	0.0	0.1
NE8ST-16TR	No	7.9	8.2	8.4	8.5	8.2	8.4	8.5	0.0	0.0	0.0
NFED-55	Yes	7.1	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
NFED-60	No	6.0	7.0	7.2	7.2	7.1	7.2	7.2	0.0	0.0	0.0
NFED-65	No	6.2	6.7	6.9	6.9	6.7	6.9	7.0	0.0	0.0	0.0
NFED-67	No	6.1	6.5	6.8	6.9	6.6	6.9	6.9	0.2	0.1	0.1
NFED-70	Yes	5.7	4.4	5.2	5.6	4.6	5.5	5.8	0.2	0.3	0.2
NFED-72	Yes	5.6	4.0	4.9	5.4	4.1	5.3	5.8	0.2	0.4	0.4
NFED-75	Yes	6.0	3.7	4.7	5.4	3.8	5.3	5.8	0.2	0.6	0.5
NFED-80	Yes	6	3.6	4.1	4.5	3.8	4.4	5.2	0.2	0.3	0.7
NFED-BR	Yes	6	3.1	3.5	3.7	3.2	3.6	4.0	0.1	0.1	0.3
NFNRSPUR004	No	2.5	2.6	2.8	2.8	2.6	2.8	2.8	0.0	0.0	0.0
NFNRSPUR005	No	2.5	2.8	2.9	3.0	2.8	2.9	3.0	0.0	0.0	0.0
NFNRSPUR007	No	2.5	2.8	2.9	3.0	2.8	2.9	3.0	0.0	0.0	0.0
NFNRSPUR009	No	2.5	2.8	3.0	3.2	2.8	3.0	3.2	0.0	0.0	0.0
NFNRSPUR010	No	2.5	2.8	3.0	3.2	2.8	3.0	3.2	0.0	0.0	0.0
OUT_IC015	N/A	N/R	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0
							Maximum:		**0.9**	**0.6**	**0.7**
							Minimum:		**0.0**	**0.0**	**0.0**

Table 7F-3b. Victoria Park Alternative No. 1, 20% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 [20%] Stages (ft NGVD)		Delta (Alt. 1 [20%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
BRWRD-12AV	No	7.4	7.8	7.8	7.8	7.8	0.0	0.0
BRWRD-13AV	No	7.7	8.6	8.7	8.6	8.7	0.0	0.0
BRWRD-14AV	Yes	8.7	8.8	8.8	8.8	8.8	0.0	0.0
BRWRD-16AV	Yes	10.9	11.2	11.3	11.2	11.3	0.0	0.0
BRWRD-8AV	Yes	5.5	5.5	5.6	5.6	5.6	0.0	0.0
C13IC005	Yes	2.5	2.5	2.5	2.5	2.5	0.0	0.0
C13IC010	Yes	2.5	2.9	3.1	2.9	3.0	0.0	0.0
C13ICSPUR002	Yes	2.5	2.6	2.6	2.6	2.6	0.0	0.0
C13ICSPUR005	Yes	2.5	2.6	2.6	2.6	2.6	0.0	0.0
ESUNR-01	Yes	8.3	7.4	7.7	7.7	8.0	0.4	0.3
ESUNR-02	Yes	7.4	7.8	8.0	7.9	8.1	0.1	0.1
ESUNR-05	No	6.0	7.9	8.1	8.0	8.1	0.0	0.0
ESUNR-06	No	6.0	7.4	7.5	7.4	7.5	0.0	0.0
ESUNR-07	No	6.5	7.4	7.5	7.4	7.5	0.0	0.0
HYPK-E	No	6.0	7.3	7.5	7.3	7.5	0.0	0.0
HYPK-NE	No	5.6	7.4	7.5	7.4	7.6	0.0	0.0
HYPK-NW	No	4.0	7.3	7.5	7.4	7.5	0.0	0.0
HYPK-SE	No	6.3	7.7	7.8	7.7	7.8	0.0	0.0
HYPK-SW2	No	5.3	7.0	7.1	7.0	7.2	0.0	0.0
HYPK-W	No	5.4	7.0	7.2	7.0	7.2	0.0	0.0
NE16AV-9ST	No	6.8	7.9	8.1	8.0	8.1	0.0	0.0
NE16TR-2CT	No	9.7	10.5	10.6	10.5	10.6	0.0	0.0
NE17AV-5ST	No	7.7	9.1	9.3	9.1	9.3	0.0	0.0
NE17WY-10ST	No	7.6	9.0	9.0	9.0	9.0	0.0	0.0
NE17WY-7ST	No	7.2	9.3	9.5	9.3	9.5	0.0	0.0
NE17WY-8ST	No	8.8	9.4	9.4	9.4	9.4	0.0	0.0
NE2ST-12AV	Yes	7.9	8.1	8.2	8.1	8.2	0.0	0.0
NE2ST-7AV	No	5.3	6.3	6.4	6.3	6.5	0.0	0.0
NE3CT-16AV	No	6.0	7.7	8.0	7.9	8.2	0.1	0.1

Table 7F-3b. Victoria Park Alternative No. 1, 20% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 [20%] Stages (ft NGVD)		Delta (Alt. 1 [20%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NE3CT-17AV	No	5.3	7.7	8.0	7.9	8.1	0.2	0.1
NE4PL-14AV	No	7.8	8.5	8.6	8.5	8.6	0.0	0.0
NE4PL-16AV	No	7.9	8.5	8.6	8.5	8.6	0.0	0.0
NE4ST-14AV	No	6.3	7.7	7.8	7.7	7.8	0.0	0.0
NE4ST-16AV	Yes	7.4	7.7	8.0	7.9	8.1	0.1	0.1
NE4ST-7AV	No	5.0	6.5	6.8	6.6	6.9	0.1	0.1
NE5ST-7AV	No	5.1	6.5	6.8	6.6	6.9	0.1	0.1
NE8ST-16TR	No	7.9	8.7	8.7	8.7	8.7	0.0	0.0
NFED-55	Yes	7.1	7.3	7.4	7.3	7.4	0.0	0.0
NFED-60	No	6.0	7.3	7.3	7.3	7.3	0.0	0.0
NFED-65	No	6.2	7.1	7.2	7.1	7.2	0.0	0.0
NFED-67	No	6.1	7.0	7.1	7.1	7.2	0.1	0.0
NFED-70	Yes	5.7	6.4	6.6	6.5	6.7	0.0	0.0
NFED-72	Yes	5.6	6.5	6.7	6.5	6.8	0.0	0.0
NFED-75	Yes	6.0	6.8	7.3	6.8	7.1	0.0	-0.1
NFED-80	Yes	6	6.2	6.4	6.3	6.4	0.0	0.0
NFED-BR	Yes	6	4.6	5.3	4.8	5.5	0.1	0.2
NFNRSPUR004	No	2.5	3.0	3.1	3.0	3.1	0.0	0.0
NFNRSPUR005	No	2.5	3.3	3.5	3.2	3.5	0.0	0.0
NFNRSPUR007	No	2.5	3.4	3.7	3.4	3.7	0.0	0.0
NFNRSPUR009	No	2.5	3.5	4.0	3.5	4.2	0.0	0.1
NFNRSPUR010	No	2.5	3.5	4.1	3.5	4.3	0.0	0.1
OUT_IC015	N/A	N/R	2.5	2.5	2.5	2.5	0.0	0.0
						Maximum:	**0.4**	**0.3**
						Minimum:	**0.0**	**-0.1**

Table 7F-4a. Victoria Park Alternative No. 1, 30% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 [30%] Stages (ft NGVD)			Delta (Alt. 1 [30%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
BRWRD-12AV	No	7.4	7.5	7.6	7.7	7.6	7.7	7.7	0.1	0.0	0.0
BRWRD-13AV	No	7.7	8.4	8.5	8.5	8.4	8.5	8.5	0.0	0.0	0.0
BRWRD-14AV	Yes	8.7	8.5	8.6	8.6	8.5	8.6	8.7	0.0	0.0	0.0
BRWRD-16AV	Yes	10.9	10.8	10.9	11.0	10.8	10.9	11.0	0.0	0.0	0.0
BRWRD-8AV	Yes	5.5	5.2	5.4	5.5	5.3	5.5	5.5	0.1	0.0	0.0
C13IC005	Yes	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0
C13IC010	Yes	2.5	2.6	2.7	2.8	2.6	2.7	2.8	0.0	0.0	0.0
C13ICSPUR002	Yes	2.5	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13ICSPUR005	Yes	2.5	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0
ESUNR-01	Yes	8.3	5.0	6.0	6.4	5.9	6.9	7.2	0.9	0.8	0.8
ESUNR-02	Yes	7.4	5.6	6.6	6.9	6.2	7.1	7.3	0.6	0.4	0.4
ESUNR-05	No	6.0	6.6	7.3	7.5	6.9	7.5	7.6	0.3	0.2	0.1
ESUNR-06	No	6.0	6.7	7.0	7.1	6.9	7.0	7.1	0.1	0.0	0.0
ESUNR-07	No	6.5	6.9	7.1	7.1	6.9	7.1	7.2	0.0	0.0	0.0
HYPK-E	No	6.0	6.4	6.8	6.9	6.5	6.9	7.0	0.1	0.1	0.0
HYPK-NE	No	5.6	6.7	6.9	7.0	6.8	6.9	7.0	0.1	0.0	0.0
HYPK-NW	No	4.0	6.4	6.8	6.9	6.5	6.9	7.0	0.1	0.1	0.0
HYPK-SE	No	6.3	7.3	7.4	7.5	7.3	7.4	7.5	0.0	0.0	0.0
HYPK-SW2	No	5.3	5.9	6.1	6.3	5.9	6.2	6.4	0.0	0.1	0.1
HYPK-W	No	5.4	6.3	6.5	6.6	6.3	6.6	6.7	0.0	0.1	0.0
NE16AV-9ST	No	6.8	7.2	7.3	7.5	7.2	7.5	7.6	0.0	0.1	0.1
NE16TR-2CT	No	9.7	10.2	10.3	10.4	10.2	10.3	10.4	0.0	0.0	0.0
NE17AV-5ST	No	7.7	8.3	8.7	8.7	8.3	8.7	8.7	0.0	0.0	0.0
NE17WY-10ST	No	7.6	8.6	8.7	8.8	8.6	8.8	8.8	0.1	0.0	0.0
NE17WY-7ST	No	7.2	8.3	8.8	8.9	8.3	8.8	8.9	0.0	0.0	0.0
NE17WY-8ST	No	8.8	9.3	9.3	9.3	9.3	9.3	9.3	0.0	0.0	0.0
NE2ST-12AV	Yes	7.9	7.9	8.0	8.0	7.9	8.0	8.0	0.0	0.0	0.0
NE2ST-7AV	No	5.3	5.5	5.7	5.7	5.5	5.7	5.8	0.1	0.0	0.1
NE3CT-16AV	No	6.0	5.5	6.4	6.8	6.2	7.1	7.4	0.8	0.7	0.6

Table 7F-4a. Victoria Park Alternative No. 1, 30% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 1 [30%] Stages (ft NGVD)			Delta (Alt. 1 [30%] - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NE3CT-17AV	No	5.3	5.0	6.4	6.8	6.2	7.1	7.4	1.2	0.7	0.6
NE4PL-14AV	No	7.8	8.2	8.2	8.3	8.2	8.2	8.3	0.0	0.0	0.0
NE4PL-16AV	No	7.9	6.7	8.2	8.2	8.1	8.2	8.3	1.5	0.1	0.0
NE4ST-14AV	No	6.3	7.2	7.4	7.5	7.3	7.4	7.5	0.1	0.0	0.0
NE4ST-16AV	Yes	7.4	5.9	6.8	7.1	6.6	7.3	7.4	0.7	0.5	0.4
NE4ST-7AV	No	5.0	5.4	5.7	5.8	5.5	5.8	6.0	0.0	0.1	0.2
NE5ST-7AV	No	5.1	5.5	5.7	5.8	5.5	5.8	6.0	0.0	0.1	0.2
NE8ST-16TR	No	7.9	8.2	8.4	8.5	8.2	8.4	8.5	0.0	0.0	0.0
NFED-55	Yes	7.1	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
NFED-60	No	6.0	7.0	7.2	7.2	7.1	7.2	7.2	0.0	0.0	0.0
NFED-65	No	6.2	6.7	6.9	6.9	6.8	7.0	7.0	0.1	0.1	0.1
NFED-67	No	6.1	6.5	6.8	6.9	6.7	6.9	7.0	0.3	0.1	0.1
NFED-70	Yes	5.7	4.4	5.2	5.6	4.8	5.8	6.0	0.4	0.6	0.4
NFED-72	Yes	5.6	4.0	4.9	5.4	4.4	5.8	6.0	0.4	0.9	0.6
NFED-75	Yes	6.0	3.7	4.7	5.4	4.3	5.8	6.1	0.6	1.1	0.7
NFED-80	Yes	6	3.6	4.1	4.5	4.1	5.6	5.7	0.5	1.5	1.2
NFED-BR	Yes	6	3.1	3.5	3.7	3.3	4.2	4.4	0.2	0.7	0.8
NFNRSPUR004	No	2.5	2.6	2.8	2.8	2.6	2.8	2.8	0.0	0.0	0.0
NFNRSPUR005	No	2.5	2.8	2.9	3.0	2.8	2.9	3.1	0.0	0.1	0.1
NFNRSPUR007	No	2.5	2.8	2.9	3.0	2.7	3.0	3.1	-0.1	0.0	0.1
NFNRSPUR009	No	2.5	2.8	3.0	3.2	2.8	3.1	3.2	0.0	0.0	0.1
NFNRSPUR010	No	2.5	2.8	3.0	3.2	2.8	3.1	3.2	0.0	0.0	0.1
OUT_IC015	N/A	N/R	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0
							Maximum:		**1.5**	**1.5**	**1.2**
							Minimum:		**-0.1**	**0.0**	**0.0**

Table 7F-4b. Victoria Park Alternative No. 1, 30% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 [30%] Stages (ft NGVD)		Delta (Alt. 1 [30%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
BRWRD-12AV	No	7.4	7.8	7.8	7.8	7.8	0.0	0.0
BRWRD-13AV	No	7.7	8.6	8.7	8.6	8.7	0.0	0.0
BRWRD-14AV	Yes	8.7	8.8	8.8	8.8	8.9	0.0	0.0
BRWRD-16AV	Yes	10.9	11.2	11.3	11.2	11.3	0.0	0.0
BRWRD-8AV	Yes	5.5	5.5	5.6	5.6	5.7	0.1	0.1
C13IC005	Yes	2.5	2.5	2.5	2.5	2.5	0.0	0.0
C13IC010	Yes	2.5	2.9	3.1	2.9	3.0	0.0	0.0
C13ICSPUR002	Yes	2.5	2.6	2.6	2.6	2.6	0.0	0.0
C13ICSPUR005	Yes	2.5	2.6	2.6	2.6	2.6	0.0	0.0
ESUNR-01	Yes	8.3	7.4	7.7	8.5	8.7	1.2	0.9
ESUNR-02	Yes	7.4	7.8	8.0	8.0	8.1	0.2	0.1
ESUNR-05	No	6.0	7.9	8.1	8.0	8.1	0.0	0.0
ESUNR-06	No	6.0	7.4	7.5	7.4	7.5	0.0	0.0
ESUNR-07	No	6.5	7.4	7.5	7.4	7.5	0.0	0.0
HYPK-E	No	6.0	7.3	7.5	7.4	7.5	0.0	0.0
HYPK-NE	No	5.6	7.4	7.5	7.4	7.6	0.0	0.1
HYPK-NW	No	4.0	7.3	7.5	7.4	7.5	0.0	0.0
HYPK-SE	No	6.3	7.7	7.8	7.7	7.9	0.0	0.0
HYPK-SW2	No	5.3	7.0	7.1	7.0	7.2	0.0	0.1
HYPK-W	No	5.4	7.0	7.2	7.1	7.2	0.0	0.1
NE16AV-9ST	No	6.8	7.9	8.1	8.0	8.1	0.0	0.0
NE16TR-2CT	No	9.7	10.5	10.6	10.5	10.6	0.0	0.0
NE17AV-5ST	No	7.7	9.1	9.3	9.1	9.3	0.0	0.0
NE17WY-10ST	No	7.6	9.0	9.0	9.0	9.0	0.0	0.0
NE17WY-7ST	No	7.2	9.3	9.5	9.3	9.5	0.0	0.0
NE17WY-8ST	No	8.8	9.4	9.4	9.4	9.4	0.0	0.0
NE2ST-12AV	Yes	7.9	8.1	8.2	8.1	8.2	0.0	0.0
NE2ST-7AV	No	5.3	6.3	6.4	6.3	6.5	0.1	0.1
NE3CT-16AV	No	6.0	7.7	8.0	8.0	8.3	0.3	0.3

Table 7F-4b. Victoria Park Alternative No. 1, 30% Silted Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 1 [30%] Stages (ft NGVD)		Delta (Alt. 1 [30%] - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NE3CT-17AV	No	5.3	7.7	8.0	8.0	8.3	0.3	0.3
NE4PL-14AV	No	7.8	8.5	8.6	8.5	8.6	0.0	0.0
NE4PL-16AV	No	7.9	8.5	8.6	8.5	8.6	0.0	0.0
NE4ST-14AV	No	6.3	7.7	7.8	7.7	7.9	0.0	0.0
NE4ST-16AV	Yes	7.4	7.7	8.0	8.0	8.3	0.3	0.3
NE4ST-7AV	No	5.0	6.5	6.8	6.6	6.9	0.1	0.2
NE5ST-7AV	No	5.1	6.5	6.8	6.6	7.0	0.1	0.2
NE8ST-16TR	No	7.9	8.7	8.7	8.7	8.7	0.0	0.0
NFED-55	Yes	7.1	7.3	7.4	7.3	7.5	0.0	0.0
NFED-60	No	6.0	7.3	7.3	7.3	7.3	0.0	0.0
NFED-65	No	6.2	7.1	7.2	7.2	7.3	0.1	0.1
NFED-67	No	6.1	7.0	7.1	7.1	7.2	0.1	0.1
NFED-70	Yes	5.7	6.4	6.6	6.5	6.7	0.1	0.1
NFED-72	Yes	5.6	6.5	6.7	6.6	6.8	0.0	0.0
NFED-75	Yes	6.0	6.8	7.3	6.7	6.9	-0.1	-0.3
NFED-80	Yes	6	6.2	6.4	6.3	6.5	0.1	0.1
NFED-BR	Yes	6	4.6	5.3	5.2	5.7	0.6	0.4
NFNRSPUR004	No	2.5	3.0	3.1	3.0	3.1	0.0	0.0
NFNRSPUR005	No	2.5	3.3	3.5	3.4	3.8	0.1	0.3
NFNRSPUR007	No	2.5	3.4	3.7	3.5	4.0	0.1	0.3
NFNRSPUR009	No	2.5	3.5	4.0	3.6	4.6	0.1	0.6
NFNRSPUR010	No	2.5	3.5	4.1	3.6	4.7	0.1	0.6
OUT_IC015	N/A	N/R	2.5	2.5	2.5	2.5	0.0	0.0
						Maximum:	**1.2**	**0.9**
						Minimum:	**-0.1**	**-0.3**

Table 7F-5a. Victoria Park Alternative No. 2a, Lower K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2a [K = $1x10^{-4}$] (ft NGVD)			Delta (Alt. 2a - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
BRWRD-12AV	Yes	7.4	7.5	7.6	7.7	7.5	7.6	7.7	0.0	0.0	0.0
BRWRD-13AV	No	7.7	8.4	8.5	8.5	8.4	8.5	8.5	0.0	0.0	0.0
BRWRD-14AV	Yes	8.7	8.5	8.6	8.6	8.5	8.6	8.6	0.0	0.0	0.0
BRWRD-16AV	Yes	10.9	10.8	10.9	11.0	10.8	10.9	11.0	0.0	0.0	0.0
BRWRD-8AV	Yes	5.5	5.2	5.4	5.5	5.2	5.4	5.5	0.0	0.0	0.0
C13IC005	Yes	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0
C13IC010	Yes	2.5	2.6	2.7	2.8	2.6	2.7	2.8	0.0	0.0	0.0
C13ICSPUR002	Yes	2.5	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13ICSPUR005	Yes	2.5	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0
ESUNR-01	Yes	8.3	5.0	6.0	6.4	5.0	6.0	6.4	0.0	0.0	0.0
ESUNR-02	Yes	7.4	5.6	6.6	6.9	5.6	6.6	6.9	0.0	0.0	0.0
ESUNR-05	No	6.0	6.6	7.3	7.5	6.6	7.3	7.5	0.0	0.0	0.0
ESUNR-06	No	6.0	6.7	7.0	7.1	6.7	7.0	7.1	0.0	0.0	0.0
ESUNR-07	No	6.5	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
HYPK-E	No	6.0	6.4	6.8	6.9	6.4	6.8	6.9	0.0	0.0	0.0
HYPK-NE	No	5.6	6.7	6.9	7.0	6.7	6.9	7.0	0.0	0.0	0.0
HYPK-NW	No	4.0	6.4	6.8	6.9	6.4	6.8	6.9	0.0	0.0	0.0
HYPK-SE	No	6.3	7.3	7.4	7.5	7.2	7.4	7.5	0.0	0.0	0.0
HYPK-SW2	No	5.3	5.9	6.1	6.3	5.9	6.1	6.3	0.0	0.0	0.0
HYPK-W	No	5.4	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
NE16AV-9ST	No	6.8	7.2	7.3	7.5	7.2	7.3	7.5	0.0	0.0	0.0
NE16TR-2CT	No	9.7	10.2	10.3	10.4	10.2	10.3	10.4	0.0	0.0	0.0
NE17AV-5ST	No	7.7	8.3	8.7	8.7	8.3	8.7	8.7	0.0	0.0	0.0
NE17WY-10ST	No	7.6	8.6	8.7	8.8	8.6	8.7	8.8	0.0	0.0	0.0
NE17WY-7ST	No	7.2	8.3	8.8	8.9	8.3	8.8	8.9	0.0	0.0	0.0
NE17WY-8ST	No	8.8	9.3	9.3	9.3	9.3	9.3	9.3	0.0	0.0	0.0
NE2ST-12AV	Yes	7.9	7.9	8.0	8.0	7.9	8.0	8.0	0.0	0.0	0.0
NE2ST-7AV	No	5.3	5.5	5.7	5.7	5.5	5.7	5.7	0.0	0.0	0.0

Table 7F-5a. Victoria Park Alternative No. 2a, Lower K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2a [K = $1x10^{-4}$] (ft NGVD)			Delta (Alt. 2a - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NE3CT-16AV	No	6.0	5.5	6.4	6.8	5.5	6.4	6.8	0.0	0.0	0.0
NE3CT-17AV	No	5.3	5.0	6.4	6.8	5.0	6.4	6.8	0.0	0.0	0.0
NE4PL-14AV	No	7.8	8.2	8.2	8.3	8.2	8.2	8.3	0.0	0.0	0.0
NE4PL-16AV	No	7.9	6.7	8.2	8.2	6.7	8.2	8.2	0.0	0.0	0.0
NE4ST-14AV	No	6.3	7.2	7.4	7.5	7.2	7.4	7.5	0.0	0.0	0.0
NE4ST-16AV	Yes	7.4	5.9	6.8	7.1	5.9	6.8	7.1	0.0	0.0	0.0
NE4ST-7AV	No	5.0	5.4	5.7	5.8	5.4	5.7	5.8	0.0	0.0	0.0
NE5ST-7AV	No	5.1	5.5	5.7	5.8	5.4	5.7	5.8	0.0	0.0	0.0
NE8ST-16TR	No	7.9	8.2	8.4	8.5	8.2	8.4	8.5	0.0	0.0	0.0
NFED-55	Yes	7.1	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
NFED-60	No	6.0	7.0	7.2	7.2	7.0	7.2	7.2	0.0	0.0	0.0
NFED-65	No	6.2	6.7	6.9	6.9	6.7	6.9	6.9	0.0	0.0	0.0
NFED-67	No	6.1	6.5	6.8	6.9	6.5	6.8	6.9	0.0	0.0	0.0
NFED-70	Yes	5.7	4.4	5.2	5.6	4.4	5.2	5.6	0.0	-0.1	0.0
NFED-72	Yes	5.6	4.0	4.9	5.4	4.0	4.8	5.4	0.0	-0.1	-0.1
NFED-75	Yes	6.0	3.7	4.7	5.4	3.7	4.6	5.3	0.0	-0.1	-0.1
NFED-80	Yes	6	3.6	4.1	4.5	3.6	4.1	4.5	0.0	0.0	-0.1
NFED-BR	Yes	6	3.1	3.5	3.7	3.1	3.5	3.7	0.0	0.0	0.0
NFNRSPUR004	No	2.5	2.6	2.8	2.8	2.6	2.8	2.8	0.0	0.0	0.0
NFNRSPUR005	No	2.5	2.8	2.9	3.0	2.8	2.9	3.0	0.0	0.0	0.0
NFNRSPUR007	No	2.5	2.8	2.9	3.0	2.7	2.9	3.0	-0.1	0.0	0.0
NFNRSPUR009	No	2.5	2.8	3.0	3.2	2.8	3.0	3.2	0.0	0.0	0.0
NFNRSPUR010	No	2.5	2.8	3.0	3.2	2.8	3.0	3.2	0.0	0.0	0.0
OUT_IC015	N/A	N/R	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0
							Maximum:		**0.0**	**0.0**	**0.0**
							Minimum:		**-0.1**	**-0.1**	**-0.1**

Table 7F-5b. Victoria Park Alternative No. 2a, Lower K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2a [K = $1x10^{-4}$] (ft NGVD)		Delta (Alt. 2a - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
BRWRD-12AV	Yes	7.4	7.8	7.8	7.8	7.8	0.0	0.0
BRWRD-13AV	No	7.7	8.6	8.7	8.6	8.7	0.0	0.0
BRWRD-14AV	Yes	8.7	8.8	8.8	8.8	8.8	0.0	0.0
BRWRD-16AV	Yes	10.9	11.2	11.3	11.2	11.3	0.0	0.0
BRWRD-8AV	Yes	5.5	5.5	5.6	5.5	5.6	0.0	0.0
C13IC005	Yes	2.5	2.5	2.5	2.5	2.5	0.0	0.0
C13IC010	Yes	2.5	2.9	3.1	2.9	3.1	0.0	0.0
C13ICSPUR002	Yes	2.5	2.6	2.6	2.6	2.6	0.0	0.0
C13ICSPUR005	Yes	2.5	2.6	2.6	2.6	2.6	0.0	0.0
ESUNR-01	Yes	8.3	7.4	7.7	7.4	7.7	0.0	0.0
ESUNR-02	Yes	7.4	7.8	8.0	7.8	8.0	0.0	0.0
ESUNR-05	No	6.0	7.9	8.1	7.9	8.1	0.0	0.0
ESUNR-06	No	6.0	7.4	7.5	7.4	7.5	0.0	0.0
ESUNR-07	No	6.5	7.4	7.5	7.4	7.5	0.0	0.0
HYPK-E	No	6.0	7.3	7.5	7.3	7.5	0.0	0.0
HYPK-NE	No	5.6	7.4	7.5	7.4	7.5	0.0	0.0
HYPK-NW	No	4.0	7.3	7.5	7.3	7.5	0.0	0.0
HYPK-SE	No	6.3	7.7	7.8	7.7	7.8	0.0	0.0
HYPK-SW2	No	5.3	7.0	7.1	7.0	7.1	0.0	0.0
HYPK-W	No	5.4	7.0	7.2	7.0	7.2	0.0	0.0
NE16AV-9ST	No	6.8	7.9	8.1	7.9	8.1	0.0	0.0
NE16TR-2CT	No	9.7	10.5	10.6	10.5	10.6	0.0	0.0
NE17AV-5ST	No	7.7	9.1	9.3	9.1	9.3	0.0	0.0
NE17WY-10ST	No	7.6	9.0	9.0	9.0	9.0	0.0	0.0
NE17WY-7ST	No	7.2	9.3	9.5	9.3	9.5	0.0	0.0
NE17WY-8ST	No	8.8	9.4	9.4	9.4	9.4	0.0	0.0
NE2ST-12AV	Yes	7.9	8.1	8.2	8.1	8.2	0.0	0.0
NE2ST-7AV	No	5.3	6.3	6.4	6.3	6.4	0.0	0.0

Table 7F-5b. Victoria Park Alternative No. 2a, Lower K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2a [K = 1x10^{-4}] (ft NGVD)		Delta (Alt. 2a - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NE3CT-16AV	No	6.0	7.7	8.0	7.7	8.0	0.0	0.0
NE3CT-17AV	No	5.3	7.7	8.0	7.7	8.0	0.0	0.0
NE4PL-14AV	No	7.8	8.5	8.6	8.5	8.6	0.0	0.0
NE4PL-16AV	No	7.9	8.5	8.6	8.5	8.6	0.0	0.0
NE4ST-14AV	No	6.3	7.7	7.8	7.7	7.8	0.0	0.0
NE4ST-16AV	Yes	7.4	7.7	8.0	7.7	8.0	0.0	0.0
NE4ST-7AV	No	5.0	6.5	6.8	6.5	6.8	0.0	0.0
NE5ST-7AV	No	5.1	6.5	6.8	6.5	6.8	0.0	0.0
NE8ST-16TR	No	7.9	8.7	8.7	8.7	8.7	0.0	0.0
NFED-55	Yes	7.1	7.3	7.4	7.3	7.4	0.0	0.0
NFED-60	No	6.0	7.3	7.3	7.3	7.3	0.0	0.0
NFED-65	No	6.2	7.1	7.2	7.1	7.2	0.0	0.0
NFED-67	No	6.1	7.0	7.1	7.0	7.1	0.0	0.0
NFED-70	Yes	5.7	6.4	6.6	6.4	6.6	0.0	0.0
NFED-72	Yes	5.6	6.5	6.7	6.5	6.7	0.0	0.0
NFED-75	Yes	6.0	6.8	7.3	6.8	7.3	0.0	0.0
NFED-80	Yes	6	6.2	6.4	6.2	6.4	0.0	0.0
NFED-BR	Yes	6	4.6	5.3	4.6	5.2	0.0	0.0
NFNRSPUR004	No	2.5	3.0	3.1	3.0	3.1	0.0	0.0
NFNRSPUR005	No	2.5	3.3	3.5	3.3	3.5	0.0	0.0
NFNRSPUR007	No	2.5	3.4	3.7	3.4	3.7	0.0	0.0
NFNRSPUR009	No	2.5	3.5	4.0	3.5	4.0	0.0	0.0
NFNRSPUR010	No	2.5	3.5	4.1	3.5	4.1	0.0	0.0
OUT_IC015	N/A	N/R	2.5	2.5	2.5	2.5	0.0	0.0
						Maximum:	**0.0**	**0.0**
						Minimum:	**0.0**	**0.0**

Table 7F-5c. Victoria Park Alternative No. 2a, Higher K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2a [K = 5x10-4] (ft NGVD)			Delta (Alt. 2a - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
BRWRD-12AV	Yes	7.4	7.5	7.6	7.7	7.5	7.6	7.7	0.0	0.0	0.0
BRWRD-13AV	No	7.7	8.4	8.5	8.5	8.4	8.5	8.5	0.0	0.0	0.0
BRWRD-14AV	Yes	8.7	8.5	8.6	8.6	8.5	8.6	8.6	0.0	0.0	0.0
BRWRD-16AV	Yes	10.9	10.8	10.9	11.0	10.8	10.9	11.0	0.0	0.0	0.0
BRWRD-8AV	Yes	5.5	5.2	5.4	5.5	5.2	5.4	5.5	0.0	0.0	0.0
C13IC005	Yes	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0
C13IC010	Yes	2.5	2.6	2.7	2.8	2.6	2.7	2.8	0.0	0.0	0.0
C13ICSPUR002	Yes	2.5	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13ICSPUR005	Yes	2.5	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0
ESUNR-01	Yes	8.3	5.0	6.0	6.4	5.0	6.0	6.4	0.0	0.0	0.0
ESUNR-02	Yes	7.4	5.6	6.6	6.9	5.6	6.6	6.9	0.0	0.0	0.0
ESUNR-05	No	6.0	6.6	7.3	7.5	6.6	7.3	7.5	0.0	0.0	0.0
ESUNR-06	No	6.0	6.7	7.0	7.1	6.7	7.0	7.1	0.0	0.0	0.0
ESUNR-07	No	6.5	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
HYPK-E	No	6.0	6.4	6.8	6.9	6.4	6.8	6.9	0.0	0.0	0.0
HYPK-NE	No	5.6	6.7	6.9	7.0	6.7	6.9	7.0	0.0	0.0	0.0
HYPK-NW	No	4.0	6.4	6.8	6.9	6.4	6.8	6.9	0.0	0.0	0.0
HYPK-SE	No	6.3	7.3	7.4	7.5	7.2	7.4	7.5	0.0	0.0	0.0
HYPK-SW2	No	5.3	5.9	6.1	6.3	5.8	6.0	6.2	-0.1	-0.2	-0.1
HYPK-W	No	5.4	6.3	6.5	6.6	5.7	6.4	6.6	-0.6	-0.1	-0.1
NE16AV-9ST	No	6.8	7.2	7.3	7.5	7.2	7.3	7.5	0.0	0.0	0.0
NE16TR-2CT	No	9.7	10.2	10.3	10.4	10.2	10.3	10.4	0.0	0.0	0.0
NE17AV-5ST	No	7.7	8.3	8.7	8.7	8.3	8.7	8.7	0.0	0.0	0.0
NE17WY-10ST	No	7.6	8.6	8.7	8.8	8.6	8.7	8.8	0.0	0.0	0.0
NE17WY-7ST	No	7.2	8.3	8.8	8.9	8.3	8.8	8.9	0.0	0.0	0.0
NE17WY-8ST	No	8.8	9.3	9.3	9.3	9.3	9.3	9.3	0.0	0.0	0.0
NE2ST-12AV	Yes	7.9	7.9	8.0	8.0	7.9	8.0	8.0	0.0	0.0	0.0
NE2ST-7AV	No	5.3	5.5	5.7	5.7	5.4	5.6	5.7	0.0	0.0	0.0

Table 7F-5c. Victoria Park Alternative No. 2a, Higher K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2a [K = 5x10-4] (ft NGVD)			Delta (Alt. 2a - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NE3CT-16AV	No	6.0	5.5	6.4	6.8	5.5	6.4	6.8	0.0	0.0	0.0
NE3CT-17AV	No	5.3	5.0	6.4	6.8	5.0	6.4	6.8	0.0	0.0	0.0
NE4PL-14AV	No	7.8	8.2	8.2	8.3	8.2	8.2	8.3	0.0	0.0	0.0
NE4PL-16AV	No	7.9	6.7	8.2	8.2	6.7	8.2	8.2	0.0	0.0	0.0
NE4ST-14AV	No	6.3	7.2	7.4	7.5	7.2	7.4	7.5	0.0	0.0	0.0
NE4ST-16AV	Yes	7.4	5.9	6.8	7.1	5.9	6.8	7.1	0.0	0.0	0.0
NE4ST-7AV	No	5.0	5.4	5.7	5.8	5.4	5.6	5.7	-0.1	0.0	-0.1
NE5ST-7AV	No	5.1	5.5	5.7	5.8	5.4	5.6	5.7	0.0	-0.1	-0.1
NE8ST-16TR	No	7.9	8.2	8.4	8.5	8.2	8.4	8.5	0.0	0.0	0.0
NFED-55	Yes	7.1	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
NFED-60	No	6.0	7.0	7.2	7.2	7.0	7.2	7.2	0.0	0.0	0.0
NFED-65	No	6.2	6.7	6.9	6.9	6.7	6.9	6.9	0.0	0.0	0.0
NFED-67	No	6.1	6.5	6.8	6.9	6.5	6.8	6.9	0.0	0.0	0.0
NFED-70	Yes	5.7	4.4	5.2	5.6	4.4	4.9	5.4	0.0	-0.3	-0.2
NFED-72	Yes	5.6	4.0	4.9	5.4	3.9	4.5	5.1	-0.1	-0.4	-0.3
NFED-75	Yes	6.0	3.7	4.7	5.4	3.7	4.4	5.0	0.0	-0.3	-0.4
NFED-80	Yes	6	3.6	4.1	4.5	3.6	4.1	4.3	0.0	0.0	-0.2
NFED-BR	Yes	6	3.1	3.5	3.7	3.1	3.5	3.7	0.0	0.0	0.0
NFNRSPUR004	No	2.5	2.6	2.8	2.8	2.6	2.8	2.8	0.0	0.0	0.0
NFNRSPUR005	No	2.5	2.8	2.9	3.0	2.8	2.9	3.0	0.0	0.0	0.0
NFNRSPUR007	No	2.5	2.8	2.9	3.0	2.7	2.9	3.0	-0.1	0.0	0.0
NFNRSPUR009	No	2.5	2.8	3.0	3.2	2.8	3.0	3.2	0.0	0.0	0.0
NFNRSPUR010	No	2.5	2.8	3.0	3.2	2.8	3.0	3.2	0.0	0.0	0.0
OUT_IC015	N/A	N/R	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0
							Maximum:		**0.0**	**0.0**	**0.0**
							Minimum:		**-0.6**	**-0.4**	**-0.4**

Table 7F-5d. Victoria Park Alternative No. 2a, Higher K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2a [K = 5x10-4] (ft NGVD)		Delta (Alt. 2a - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
BRWRD-12AV	Yes	7.4	7.8	7.8	7.8	7.8	0.0	0.0
BRWRD-13AV	No	7.7	8.6	8.7	8.6	8.7	0.0	0.0
BRWRD-14AV	Yes	8.7	8.8	8.8	8.8	8.8	0.0	0.0
BRWRD-16AV	Yes	10.9	11.2	11.3	11.2	11.3	0.0	0.0
BRWRD-8AV	Yes	5.5	5.5	5.6	5.5	5.6	0.0	0.0
C13IC005	Yes	2.5	2.5	2.5	2.5	2.5	0.0	0.0
C13IC010	Yes	2.5	2.9	3.1	2.9	3.1	0.0	0.0
C13ICSPUR002	Yes	2.5	2.6	2.6	2.6	2.6	0.0	0.0
C13ICSPUR005	Yes	2.5	2.6	2.6	2.6	2.6	0.0	0.0
ESUNR-01	Yes	8.3	7.4	7.7	7.4	7.7	0.0	0.0
ESUNR-02	Yes	7.4	7.8	8.0	7.8	8.0	0.0	0.0
ESUNR-05	No	6.0	7.9	8.1	7.9	8.1	0.0	0.0
ESUNR-06	No	6.0	7.4	7.5	7.4	7.5	0.0	0.0
ESUNR-07	No	6.5	7.4	7.5	7.4	7.5	0.0	0.0
HYPK-E	No	6.0	7.3	7.5	7.3	7.5	0.0	0.0
HYPK-NE	No	5.6	7.4	7.5	7.4	7.5	0.0	0.0
HYPK-NW	No	4.0	7.3	7.5	7.3	7.5	0.0	0.0
HYPK-SE	No	6.3	7.7	7.8	7.7	7.8	0.0	0.0
HYPK-SW2	No	5.3	7.0	7.1	7.0	7.1	0.0	0.0
HYPK-W	No	5.4	7.0	7.2	7.0	7.2	0.0	0.0
NE16AV-9ST	No	6.8	7.9	8.1	7.9	8.1	0.0	0.0
NE16TR-2CT	No	9.7	10.5	10.6	10.5	10.6	0.0	0.0
NE17AV-5ST	No	7.7	9.1	9.3	9.1	9.3	0.0	0.0
NE17WY-10ST	No	7.6	9.0	9.0	9.0	9.0	0.0	0.0
NE17WY-7ST	No	7.2	9.3	9.5	9.3	9.5	0.0	0.0
NE17WY-8ST	No	8.8	9.4	9.4	9.4	9.4	0.0	0.0
NE2ST-12AV	Yes	7.9	8.1	8.2	8.1	8.2	0.0	0.0
NE2ST-7AV	No	5.3	6.3	6.4	6.3	6.4	0.0	0.0

Table 7F-5d. Victoria Park Alternative No. 2a, Higher K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2a [K = 5x10-4] (ft NGVD)		Delta (Alt. 2a - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NE3CT-16AV	No	6.0	7.7	8.0	7.7	8.0	0.0	0.0
NE3CT-17AV	No	5.3	7.7	8.0	7.7	8.0	0.0	0.0
NE4PL-14AV	No	7.8	8.5	8.6	8.5	8.6	0.0	0.0
NE4PL-16AV	No	7.9	8.5	8.6	8.5	8.6	0.0	0.0
NE4ST-14AV	No	6.3	7.7	7.8	7.7	7.8	0.0	0.0
NE4ST-16AV	Yes	7.4	7.7	8.0	7.7	8.0	0.0	0.0
NE4ST-7AV	No	5.0	6.5	6.8	6.5	6.8	0.0	0.0
NE5ST-7AV	No	5.1	6.5	6.8	6.5	6.8	0.0	0.0
NE8ST-16TR	No	7.9	8.7	8.7	8.7	8.7	0.0	0.0
NFED-55	Yes	7.1	7.3	7.4	7.3	7.4	0.0	0.0
NFED-60	No	6.0	7.3	7.3	7.3	7.3	0.0	0.0
NFED-65	No	6.2	7.1	7.2	7.1	7.2	0.0	0.0
NFED-67	No	6.1	7.0	7.1	7.0	7.1	0.0	0.0
NFED-70	Yes	5.7	6.4	6.6	6.4	6.6	0.0	0.0
NFED-72	Yes	5.6	6.5	6.7	6.5	6.7	0.0	0.0
NFED-75	Yes	6.0	6.8	7.3	6.8	7.2	0.0	0.0
NFED-80	Yes	6	6.2	6.4	6.2	6.4	0.0	0.0
NFED-BR	Yes	6	4.6	5.3	4.6	5.2	0.0	0.0
NFNRSPUR004	No	2.5	3.0	3.1	3.0	3.1	0.0	0.0
NFNRSPUR005	No	2.5	3.3	3.5	3.3	3.5	0.0	0.0
NFNRSPUR007	No	2.5	3.4	3.7	3.4	3.7	0.0	0.0
NFNRSPUR009	No	2.5	3.5	4.0	3.5	4.0	0.0	0.0
NFNRSPUR010	No	2.5	3.5	4.1	3.5	4.1	0.0	0.0
OUT_IC015	N/A	N/R	2.5	2.5	2.5	2.5	0.0	0.0
						Maximum:	**0.0**	**0.0**
						Minimum:	**0.0**	**0.0**

Table 7F-6a. Victoria Park Alternative No. 2b, Lower K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2b [K = 1x10-4] (ft NGVD)			Delta (Alt. 2b - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
BRWRD-12AV	Yes	7.4	7.5	7.6	7.7	7.5	7.6	7.7	0.0	0.0	0.0
BRWRD-13AV	No	7.7	8.4	8.5	8.5	8.4	8.5	8.5	0.0	0.0	0.0
BRWRD-14AV	Yes	8.7	8.5	8.6	8.6	8.5	8.6	8.6	0.0	0.0	0.0
BRWRD-16AV	Yes	10.9	10.8	10.9	11.0	10.8	10.9	11.0	0.0	0.0	0.0
BRWRD-8AV	Yes	5.5	5.2	5.4	5.5	5.2	5.4	5.5	0.0	0.0	0.0
C13IC005	Yes	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0
C13IC010	Yes	2.5	2.6	2.7	2.8	2.6	2.7	2.8	0.0	0.0	0.0
C13ICSPUR002	Yes	2.5	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13ICSPUR005	Yes	2.5	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0
ESUNR-01	Yes	8.3	5.0	6.0	6.4	5.0	6.0	6.4	0.0	0.0	0.0
ESUNR-02	Yes	7.4	5.6	6.6	6.9	5.6	6.6	6.9	0.0	0.0	0.0
ESUNR-05	No	6.0	6.6	7.3	7.4	6.6	7.3	7.5	0.0	0.0	0.1
ESUNR-06	No	6.0	6.7	7.0	7.1	6.7	7.0	7.1	0.0	0.0	0.0
ESUNR-07	No	6.5	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
HYPK-E	No	6.0	6.4	6.8	6.9	6.4	6.8	6.9	0.0	0.0	0.0
HYPK-NE	No	5.6	6.7	6.9	7.0	6.7	6.9	7.0	0.0	0.0	0.0
HYPK-NW	No	4.0	6.4	6.8	6.9	6.4	6.8	6.9	0.0	0.0	0.0
HYPK-SE	No	6.3	7.3	7.4	7.5	7.3	7.4	7.5	0.0	0.0	0.0
HYPK-SW2	No	5.3	5.9	6.1	6.3	5.9	6.1	6.3	0.0	0.0	0.0
HYPK-W	No	5.4	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
NE16AV-9ST	No	6.8	7.2	7.3	7.5	7.2	7.3	7.5	0.0	0.0	0.0
NE16TR-2CT	No	9.7	10.2	10.3	10.4	10.2	10.3	10.4	0.0	0.0	0.0
NE17AV-5ST	No	7.7	8.3	8.7	8.7	8.3	8.7	8.7	0.0	0.0	0.0
NE17WY-10ST	No	7.6	8.6	8.7	8.8	8.6	8.7	8.8	0.0	0.0	0.0
NE17WY-7ST	No	7.2	8.3	8.8	8.9	8.1	8.4	8.6	-0.2	-0.4	-0.3
NE17WY-8ST	No	8.8	9.3	9.3	9.3	9.3	9.3	9.3	0.0	0.0	0.0
NE2ST-12AV	Yes	7.9	7.9	8.0	8.0	7.9	8.0	8.0	0.0	0.0	0.0
NE2ST-7AV	No	5.3	5.5	5.7	5.7	5.5	5.7	5.7	0.0	0.0	0.0
NE3CT-16AV	No	6.0	5.5	6.4	6.8	5.5	6.4	6.8	0.0	0.0	0.0

Table 7F-6a. Victoria Park Alternative No. 2b, Lower K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2b [K = 1x10-4] (ft NGVD)			Delta (Alt. 2b - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NE3CT-17AV	No	5.3	5.0	6.4	6.8	5.0	6.4	6.8	0.0	0.0	0.0
NE4PL-14AV	No	7.8	8.2	8.2	8.3	8.2	8.2	8.3	0.0	0.0	0.0
NE4PL-16AV	No	7.9	6.7	8.2	8.2	6.7	8.2	8.2	0.0	0.0	0.0
NE4ST-14AV	No	6.3	7.2	7.4	7.5	7.2	7.4	7.5	0.0	0.0	0.0
NE4ST-16AV	Yes	7.4	5.9	6.8	7.1	5.9	6.8	7.1	0.0	0.0	0.0
NE4ST-7AV	No	5.0	5.4	5.7	5.8	5.4	5.7	5.8	0.0	0.0	0.0
NE5ST-7AV	No	5.1	5.5	5.7	5.8	5.5	5.7	5.8	0.0	0.0	0.0
NE8ST-16TR	No	7.9	8.2	8.4	8.5	8.2	8.4	8.5	0.0	0.0	0.0
NFED-55	Yes	7.1	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
NFED-60	No	6.0	7.0	7.2	7.2	7.0	7.2	7.2	0.0	0.0	0.0
NFED-65	No	6.2	6.7	6.9	6.9	6.7	6.9	6.9	0.0	0.0	0.0
NFED-67	No	6.1	6.5	6.8	6.9	6.5	6.8	6.9	0.0	0.0	0.0
NFED-70	Yes	5.7	4.4	5.2	5.6	4.4	5.2	5.6	0.0	0.0	0.0
NFED-72	Yes	5.6	4.0	4.9	5.4	4.0	4.9	5.4	0.0	0.0	0.0
NFED-75	Yes	6.0	3.7	4.7	5.4	3.7	4.7	5.4	0.0	0.0	0.0
NFED-80	Yes	6.0	3.6	4.1	4.5	3.6	4.1	4.5	0.0	0.0	0.0
NFED-BR	Yes	6.0	3.1	3.5	3.7	3.1	3.5	3.7	0.0	0.0	0.0
NFNRSPUR004	No	2.5	2.6	2.8	2.8	2.6	2.8	2.8	0.0	0.0	0.0
NFNRSPUR005	No	2.5	2.8	2.9	3.0	2.8	2.9	3.0	0.0	0.0	0.0
NFNRSPUR007	No	2.5	2.8	2.9	3.0	2.8	2.9	3.0	0.0	0.0	0.0
NFNRSPUR009	No	2.5	2.8	3.0	3.2	2.8	3.0	3.2	0.0	0.0	0.0
NFNRSPUR010	No	2.5	2.8	3.0	3.2	2.8	3.0	3.2	0.0	0.0	0.0
OUT_IC015	N/A	N/R	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0
							Maximum:		**0.0**	**0.0**	**0.1**
							Minimum:		**-0.2**	**-0.4**	**-0.3**

Table 7F-6b. Victoria Park Alternative No. 2b, Lower K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2b [K = $1x10^{-4}$] (ft NGVD)		Delta (Alt. 2b - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
BRWRD-12AV	Yes	7.4	7.8	7.8	7.8	7.8	0.0	0.0
BRWRD-13AV	No	7.7	8.6	8.7	8.6	8.7	0.0	0.0
BRWRD-14AV	Yes	8.7	8.8	8.8	8.8	8.8	0.0	0.0
BRWRD-16AV	Yes	10.9	11.2	11.3	11.2	11.3	0.0	0.0
BRWRD-8AV	Yes	5.5	5.5	5.6	5.5	5.6	0.0	0.0
C13IC005	Yes	2.5	2.5	2.5	2.5	2.5	0.0	0.0
C13IC010	Yes	2.5	2.9	2.9	2.9	3.1	0.0	0.1
C13ICSPUR002	Yes	2.5	2.6	2.6	2.6	2.6	0.0	0.0
C13ICSPUR005	Yes	2.5	2.6	2.6	2.6	2.6	0.0	0.0
ESUNR-01	Yes	8.3	7.4	7.7	7.4	7.7	0.0	0.1
ESUNR-02	Yes	7.4	7.8	7.9	7.8	8.0	0.0	0.1
ESUNR-05	No	6.0	7.9	8.0	7.9	8.1	0.0	0.1
ESUNR-06	No	6.0	7.4	7.4	7.4	7.5	0.0	0.0
ESUNR-07	No	6.5	7.4	7.4	7.4	7.5	0.0	0.0
HYPK-E	No	6.0	7.3	7.4	7.3	7.5	0.0	0.0
HYPK-NE	No	5.6	7.4	7.5	7.4	7.5	0.0	0.0
HYPK-NW	No	4.0	7.3	7.4	7.3	7.5	0.0	0.0
HYPK-SE	No	6.3	7.7	7.8	7.7	7.8	0.0	0.0
HYPK-SW2	No	5.3	7.0	7.1	6.9	7.1	0.0	0.0
HYPK-W	No	5.4	7.0	7.1	7.0	7.2	0.0	0.0
NE16AV-9ST	No	6.8	7.9	8.0	7.9	8.1	0.0	0.1
NE16TR-2CT	No	9.7	10.5	10.6	10.5	10.6	0.0	0.0
NE17AV-5ST	No	7.7	9.0	9.2	9.0	9.1	0.0	-0.1
NE17WY-10ST	No	7.6	9.0	9.0	9.0	9.0	0.0	0.0
NE17WY-7ST	No	7.2	9.3	9.5	9.2	9.3	-0.1	-0.1
NE17WY-8ST	No	8.8	9.4	9.4	9.4	9.4	0.0	0.0
NE2ST-12AV	Yes	7.9	8.1	8.2	8.1	8.2	0.0	0.0
NE2ST-7AV	No	5.3	6.3	6.4	6.3	6.4	0.0	0.0

Table 7F-6b. Victoria Park Alternative No. 2b, Lower K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2b [K = $1x10^{-4}$] (ft NGVD)		Delta (Alt. 2b - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NE3CT-16AV	No	6.0	7.7	8.0	7.7	8.0	0.0	0.0
NE3CT-17AV	No	5.3	7.7	8.0	7.7	8.0	0.0	0.0
NE4PL-14AV	No	7.8	8.5	8.6	8.4	8.5	0.0	-0.1
NE4PL-16AV	No	7.9	8.5	8.6	8.5	8.5	0.0	-0.1
NE4ST-14AV	No	6.3	7.7	7.8	7.7	7.8	0.0	0.0
NE4ST-16AV	Yes	7.4	7.7	8.0	7.7	8.0	0.0	0.0
NE4ST-7AV	No	5.0	6.5	6.7	6.5	6.7	0.0	0.0
NE5ST-7AV	No	5.1	6.5	6.7	6.5	6.7	0.0	0.0
NE8ST-16TR	No	7.9	8.7	8.7	8.7	8.7	0.0	0.0
NFED-55	Yes	7.1	7.3	7.4	7.3	7.4	0.0	0.0
NFED-60	No	6.0	7.3	7.3	7.3	7.3	0.0	0.0
NFED-65	No	6.2	7.1	7.2	7.1	7.2	0.0	0.0
NFED-67	No	6.1	7.0	7.1	7.0	7.1	0.0	0.0
NFED-70	Yes	5.7	6.4	6.6	6.4	6.6	0.0	0.0
NFED-72	Yes	5.6	6.5	6.7	6.5	6.7	0.0	0.0
NFED-75	Yes	6.0	6.8	7.2	6.8	7.2	0.0	0.0
NFED-80	Yes	6.0	6.2	6.4	6.2	6.4	0.0	0.0
NFED-BR	Yes	6.0	4.6	5.1	4.6	5.2	0.0	0.1
NFNRSPUR004	No	2.5	3.0	3.0	3.0	3.1	0.0	0.2
NFNRSPUR005	No	2.5	3.3	3.4	3.3	3.5	0.0	0.1
NFNRSPUR007	No	2.5	3.4	3.6	3.4	3.7	0.0	0.1
NFNRSPUR009	No	2.5	3.5	3.8	3.5	4.0	0.0	0.2
NFNRSPUR010	No	2.5	3.5	3.9	3.5	4.1	0.0	0.2
OUT_IC015	N/A	N/R	2.5	2.5	2.5	2.5	0.0	0.0
						Maximum:	**0.0**	**0.2**
						Minimum:	**-0.1**	**-0.1**

Table 7F-6c. Victoria Park Alternative No. 2b, Higher K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2b [K = $5x10^{-4}$] (ft NGVD)			Delta (Alt. 2b - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
BRWRD-12AV	Yes	7.4	7.5	7.6	7.7	7.5	7.6	7.7	0.0	0.0	0.0
BRWRD-13AV	No	7.7	8.4	8.5	8.5	8.4	8.5	8.5	0.0	0.0	0.0
BRWRD-14AV	Yes	8.7	8.5	8.6	8.6	8.5	8.6	8.6	0.0	0.0	0.0
BRWRD-16AV	Yes	10.9	10.8	10.9	11.0	10.8	10.9	11.0	0.0	0.0	0.0
BRWRD-8AV	Yes	5.5	5.2	5.4	5.5	5.2	5.4	5.5	0.0	0.0	0.0
C13IC005	Yes	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0
C13IC010	Yes	2.5	2.6	2.7	2.8	2.6	2.7	2.8	0.0	0.0	0.0
C13ICSPUR002	Yes	2.5	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13ICSPUR005	Yes	2.5	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0
ESUNR-01	Yes	8.3	5.0	6.0	6.4	5.0	6.0	6.4	0.0	0.0	0.0
ESUNR-02	Yes	7.4	5.6	6.6	6.9	5.6	6.6	6.9	0.0	0.0	0.0
ESUNR-05	No	6.0	6.6	7.3	7.4	6.6	7.3	7.5	0.0	0.0	0.1
ESUNR-06	No	6.0	6.7	7.0	7.1	6.7	7.0	7.1	0.0	0.0	0.0
ESUNR-07	No	6.5	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
HYPK-E	No	6.0	6.4	6.8	6.9	6.4	6.8	6.9	0.0	0.0	0.0
HYPK-NE	No	5.6	6.7	6.9	7.0	6.7	6.9	7.0	0.0	0.0	0.0
HYPK-NW	No	4.0	6.4	6.8	6.9	6.4	6.8	6.9	0.0	0.0	0.0
HYPK-SE	No	6.3	7.3	7.4	7.5	7.3	7.4	7.5	0.0	0.0	0.0
HYPK-SW2	No	5.3	5.9	6.1	6.3	5.9	6.1	6.3	0.0	0.0	0.0
HYPK-W	No	5.4	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
NE16AV-9ST	No	6.8	7.2	7.3	7.5	7.2	7.3	7.5	0.0	0.0	0.0
NE16TR-2CT	No	9.7	10.2	10.3	10.4	10.2	10.3	10.4	0.0	0.0	0.0
NE17AV-5ST	No	7.7	8.3	8.7	8.7	8.3	8.7	8.7	0.0	0.0	0.0
NE17WY-10ST	No	7.6	8.6	8.7	8.8	8.6	8.7	8.8	0.0	0.0	0.0
NE17WY-7ST	No	7.2	8.3	8.8	8.9	7.8	8.2	8.4	-0.5	-0.6	-0.5
NE17WY-8ST	No	8.8	9.3	9.3	9.3	9.3	9.3	9.3	0.0	0.0	0.0
NE2ST-12AV	Yes	7.9	7.9	8.0	8.0	7.9	8.0	8.0	0.0	0.0	0.0
NE2ST-7AV	No	5.3	5.5	5.7	5.7	5.5	5.7	5.7	0.0	0.0	0.0

Table 7F-6c. Victoria Park Alternative No. 2b, Higher K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 2b [K = 5x10^{-4}] (ft NGVD)			Delta (Alt. 2b - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NE3CT-16AV	No	6.0	5.5	6.4	6.8	5.5	6.4	6.8	0.0	0.0	0.0
NE3CT-17AV	No	5.3	5.0	6.4	6.8	5.0	6.4	6.8	0.0	0.0	0.0
NE4PL-14AV	No	7.8	8.2	8.2	8.3	8.2	8.2	8.3	0.0	0.0	0.0
NE4PL-16AV	No	7.9	6.7	8.2	8.2	6.7	8.2	8.2	0.0	0.0	0.0
NE4ST-14AV	No	6.3	7.2	7.4	7.5	7.2	7.4	7.5	0.0	0.0	0.0
NE4ST-16AV	Yes	7.4	5.9	6.8	7.1	5.9	6.8	7.1	0.0	0.0	0.0
NE4ST-7AV	No	5.0	5.4	5.7	5.8	5.4	5.7	5.8	0.0	0.0	0.0
NE5ST-7AV	No	5.1	5.5	5.7	5.8	5.5	5.7	5.8	0.0	0.0	0.0
NE8ST-16TR	No	7.9	8.2	8.4	8.5	8.2	8.4	8.5	0.0	0.0	0.0
NFED-55	Yes	7.1	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
NFED-60	No	6.0	7.0	7.2	7.2	7.0	7.2	7.2	0.0	0.0	0.0
NFED-65	No	6.2	6.7	6.9	6.9	6.7	6.9	6.9	0.0	0.0	0.0
NFED-67	No	6.1	6.5	6.8	6.9	6.5	6.8	6.9	0.0	0.0	0.0
NFED-70	Yes	5.7	4.4	5.2	5.6	4.4	5.2	5.6	0.0	0.0	0.0
NFED-72	Yes	5.6	4.0	4.9	5.4	4.0	4.9	5.4	0.0	0.0	0.0
NFED-75	Yes	6.0	3.7	4.7	5.4	3.7	4.7	5.4	0.0	0.0	0.0
NFED-80	Yes	6.0	3.6	4.1	4.5	3.6	4.1	4.5	0.0	0.0	0.0
NFED-BR	Yes	6.0	3.1	3.5	3.7	3.1	3.5	3.7	0.0	0.0	0.0
NFNRSPUR004	No	2.5	2.6	2.8	2.8	2.6	2.8	2.8	0.0	0.0	0.0
NFNRSPUR005	No	2.5	2.8	2.9	3.0	2.8	2.9	3.0	0.0	0.0	0.0
NFNRSPUR007	No	2.5	2.8	2.9	3.0	2.8	2.9	3.0	0.0	0.0	0.0
NFNRSPUR009	No	2.5	2.8	3.0	3.2	2.8	3.0	3.2	0.0	0.0	0.0
NFNRSPUR010	No	2.5	2.8	3.0	3.2	2.8	3.0	3.2	0.0	0.0	0.0
OUT_IC015	N/A	N/R	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0
							Maximum:		**0.0**	**0.0**	**0.1**
							Minimum:		**-0.5**	**-0.6**	**-0.5**

Table 7F-6d. Victoria Park Alternative No. 2b, Higher K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2b [K = 5x10^{-4}] (ft NGVD)		Delta (Alt. 2b - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
BRWRD-12AV	Yes	7.4	7.8	7.8	7.8	7.8	0.0	0.0
BRWRD-13AV	No	7.7	8.6	8.7	8.6	8.7	0.0	0.0
BRWRD-14AV	Yes	8.7	8.8	8.8	8.8	8.8	0.0	0.0
BRWRD-16AV	Yes	10.9	11.2	11.3	11.2	11.3	0.0	0.0
BRWRD-8AV	Yes	5.5	5.5	5.6	5.5	5.6	0.0	0.0
C13IC005	Yes	2.5	2.5	2.5	2.5	2.5	0.0	0.0
C13IC010	Yes	2.5	2.9	2.9	2.9	3.1	0.0	0.1
C13ICSPUR002	Yes	2.5	2.6	2.6	2.6	2.6	0.0	0.0
C13ICSPUR005	Yes	2.5	2.6	2.6	2.6	2.6	0.0	0.0
ESUNR-01	Yes	8.3	7.4	7.7	7.4	7.7	0.0	0.1
ESUNR-02	Yes	7.4	7.8	7.9	7.8	8.0	0.0	0.1
ESUNR-05	No	6.0	7.9	8.0	7.9	8.1	0.0	0.1
ESUNR-06	No	6.0	7.4	7.4	7.4	7.5	0.0	0.0
ESUNR-07	No	6.5	7.4	7.4	7.4	7.5	0.0	0.0
HYPK-E	No	6.0	7.3	7.4	7.3	7.5	0.0	0.0
HYPK-NE	No	5.6	7.4	7.5	7.4	7.5	0.0	0.0
HYPK-NW	No	4.0	7.3	7.4	7.3	7.5	0.0	0.0
HYPK-SE	No	6.3	7.7	7.8	7.7	7.8	0.0	0.0
HYPK-SW2	No	5.3	7.0	7.1	6.9	7.1	0.0	0.0
HYPK-W	No	5.4	7.0	7.1	7.0	7.2	0.0	0.0
NE16AV-9ST	No	6.8	7.9	8.0	7.9	8.1	0.0	0.1
NE16TR-2CT	No	9.7	10.5	10.6	10.5	10.6	0.0	0.0
NE17AV-5ST	No	7.7	9.0	9.2	9.0	9.1	0.0	-0.1
NE17WY-10ST	No	7.6	9.0	9.0	9.0	9.0	0.0	0.0
NE17WY-7ST	No	7.2	9.3	9.5	9.2	9.3	-0.1	-0.1
NE17WY-8ST	No	8.8	9.4	9.4	9.4	9.4	0.0	0.0
NE2ST-12AV	Yes	7.9	8.1	8.2	8.1	8.2	0.0	0.0
NE2ST-7AV	No	5.3	6.3	6.4	6.3	6.4	0.0	0.0
NE3CT-16AV	No	6.0	7.7	8.0	7.7	8.0	0.0	0.0

Table 7F-6d. Victoria Park Alternative No. 2b, Higher K Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 2b [K = $5x10^{-4}$] (ft NGVD)		Delta (Alt. 2b - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NE3CT-17AV	No	5.3	7.7	8.0	7.7	8.0	0.0	0.0
NE4PL-14AV	No	7.8	8.5	8.6	8.4	8.5	0.0	-0.1
NE4PL-16AV	No	7.9	8.5	8.6	8.5	8.5	0.0	-0.1
NE4ST-14AV	No	6.3	7.7	7.8	7.7	7.8	0.0	0.0
NE4ST-16AV	Yes	7.4	7.7	8.0	7.7	8.0	0.0	0.0
NE4ST-7AV	No	5.0	6.5	6.7	6.5	6.7	0.0	0.0
NE5ST-7AV	No	5.1	6.5	6.7	6.5	6.7	0.0	0.0
NE8ST-16TR	No	7.9	8.7	8.7	8.7	8.7	0.0	0.0
NFED-55	Yes	7.1	7.3	7.4	7.3	7.4	0.0	0.0
NFED-60	No	6.0	7.3	7.3	7.3	7.3	0.0	0.0
NFED-65	No	6.2	7.1	7.2	7.1	7.2	0.0	0.0
NFED-67	No	6.1	7.0	7.1	7.0	7.1	0.0	0.0
NFED-70	Yes	5.7	6.4	6.6	6.4	6.6	0.0	0.0
NFED-72	Yes	5.6	6.5	6.7	6.5	6.7	0.0	0.0
NFED-75	Yes	6.0	6.8	7.2	6.8	7.2	0.0	0.0
NFED-80	Yes	6.0	6.2	6.4	6.2	6.4	0.0	0.0
NFED-BR	Yes	6.0	4.6	5.1	4.6	5.2	0.0	0.1
NFNRSPUR004	No	2.5	3.0	3.0	3.0	3.1	0.0	0.2
NFNRSPUR005	No	2.5	3.3	3.4	3.3	3.5	0.0	0.1
NFNRSPUR007	No	2.5	3.4	3.6	3.4	3.7	0.0	0.1
NFNRSPUR009	No	2.5	3.5	3.8	3.5	4.0	0.0	0.2
NFNRSPUR010	No	2.5	3.5	3.9	3.5	4.1	0.0	0.2
OUT_IC015	N/A	N/R	2.5	2.5	2.5	2.5	0.0	0.0
						Maximum:	**0.0**	**0.2**
						Minimum:	**-0.1**	**-0.1**

Table 7F-7a. Victoria Park Alternative No. 3 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 3 Peak Stages (ft NGVD)			Delta (Alt. 3 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
BRWRD-12AV	Yes	7.4	7.5	7.6	7.7	7.5	7.6	7.7	0.0	0.0	0.0
BRWRD-13AV	No	7.7	8.4	8.5	8.5	8.4	8.5	8.5	0.0	0.0	0.0
BRWRD-14AV	Yes	8.7	8.5	8.6	8.6	8.5	8.6	8.6	0.0	0.0	0.0
BRWRD-16AV	Yes	10.9	10.8	10.9	11.0	10.8	10.9	11.0	0.0	0.0	0.0
BRWRD-8AV	Yes	5.5	5.2	5.4	5.5	5.2	5.4	5.5	0.0	0.0	0.0
C13IC005	Yes	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0
C13IC010	Yes	2.5	2.6	2.7	2.8	2.6	2.7	2.8	0.0	0.0	0.0
C13ICSPUR002	Yes	2.5	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13ICSPUR005	Yes	2.5	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0
ESUNR-01	Yes	8.3	5.0	6.0	6.4	5.0	6.0	6.3	0.0	0.0	0.0
ESUNR-02	Yes	7.4	5.6	6.6	6.9	5.6	6.6	6.9	0.0	0.0	0.0
ESUNR-05	No	6.0	6.6	7.3	7.5	6.6	7.3	7.5	0.0	0.0	0.0
ESUNR-06	No	6.0	6.7	7.0	7.1	6.7	7.0	7.1	0.0	0.0	0.0
ESUNR-07	No	6.5	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
HYPK-E	No	6.0	6.4	6.8	6.9	6.4	6.8	6.9	0.0	0.0	0.0
HYPK-NE	No	5.6	6.7	6.9	7.0	6.7	6.9	6.9	0.0	0.0	0.0
HYPK-NW	No	4.0	6.4	6.8	6.9	6.4	6.8	6.9	0.0	0.0	0.0
HYPK-SE	No	6.3	7.3	7.4	7.5	7.2	7.4	7.5	0.0	0.0	0.0
HYPK-SW2	No	5.3	5.9	6.1	6.3	5.9	6.1	6.3	0.0	0.0	0.0
HYPK-W	No	5.4	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
NE16AV-9ST	No	6.8	7.2	7.3	7.5	7.2	7.3	7.5	0.0	0.0	0.0
NE16TR-2CT	No	9.7	10.2	10.3	10.4	10.2	10.3	10.4	0.0	0.0	0.0
NE17AV-5ST	No	7.7	8.3	8.7	8.7	8.3	8.7	8.7	0.0	0.0	0.0
NE17WY-10ST	No	7.6	8.6	8.7	8.8	8.6	8.7	8.8	0.0	0.0	0.0
NE17WY-7ST	No	7.2	8.3	8.8	8.9	8.3	8.7	8.8	0.0	-0.1	-0.1
NE17WY-8ST	No	8.8	9.3	9.3	9.3	9.3	9.3	9.3	0.0	0.0	0.0
NE2ST-12AV	Yes	7.9	7.9	8.0	8.0	7.9	8.0	8.0	0.0	0.0	0.0
NE2ST-7AV	No	5.3	5.5	5.7	5.7	5.5	5.6	5.7	0.0	0.0	0.0

Table 7F-7a. Victoria Park Alternative No. 3 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 3 Peak Stages (ft NGVD)			Delta (Alt. 3 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NE3CT-16AV	No	6.0	5.5	6.4	6.8	5.5	6.4	6.8	0.0	0.0	0.0
NE3CT-17AV	No	5.3	5.0	6.4	6.8	5.0	6.3	6.8	0.0	0.0	0.0
NE4PL-14AV	No	7.8	8.2	8.2	8.3	8.2	8.2	8.3	0.0	0.0	0.0
NE4PL-16AV	No	7.9	6.7	8.2	8.2	6.7	8.2	8.2	0.0	0.0	0.0
NE4ST-14AV	No	6.3	7.2	7.4	7.5	7.2	7.4	7.5	0.0	0.0	0.0
NE4ST-16AV	Yes	7.4	5.9	6.8	7.1	5.9	6.8	7.0	0.0	0.0	0.0
NE4ST-7AV	No	5.0	5.4	5.7	5.8	5.4	5.7	5.8	0.0	0.0	0.0
NE5ST-7AV	No	5.1	5.5	5.7	5.8	5.4	5.7	5.8	0.0	0.0	0.0
NE8ST-16TR	No	7.9	8.2	8.4	8.5	8.2	8.4	8.5	0.0	0.0	0.0
NFED-55	Yes	7.1	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
NFED-60	No	6.0	7.0	7.2	7.2	7.0	7.2	7.2	0.0	0.0	0.0
NFED-65	No	6.2	6.7	6.9	6.9	6.7	6.9	6.9	0.0	0.0	0.0
NFED-67	No	6.1	6.5	6.8	6.9	6.5	6.8	6.9	0.0	0.0	0.0
NFED-70	Yes	5.7	4.4	5.2	5.6	4.4	5.1	5.5	0.0	-0.1	-0.1
NFED-72	Yes	5.6	4.0	4.9	5.4	4.0	4.7	5.3	0.0	-0.1	-0.1
NFED-75	Yes	6.0	3.7	4.7	5.4	3.7	4.5	5.3	0.0	-0.2	-0.1
NFED-80	Yes	6.0	3.6	4.1	4.5	3.6	4.0	4.4	0.0	0.0	-0.1
NFED-BR	Yes	6.0	3.1	3.4	3.7	3.1	3.4	3.6	0.0	0.0	-0.1
NFNRSPUR004	No	2.5	2.6	2.8	2.8	2.6	2.8	2.8	0.0	0.0	0.0
NFNRSPUR005	No	2.5	2.8	2.8	3.0	2.8	2.8	2.9	0.0	0.0	0.0
NFNRSPUR007	No	2.5	2.8	2.9	3.0	2.7	2.9	3.0	-0.1	0.0	-0.1
NFNRSPUR009	No	2.5	2.8	2.9	3.2	2.8	2.9	3.0	0.0	0.0	-0.1
NFNRSPUR010	No	2.5	2.8	2.9	3.2	2.8	2.9	3.1	0.0	0.0	-0.1
OUT_IC015	N/A	N/R	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0
							Maximum:		**0.0**	**0.0**	**0.0**
							Minimum:		**-0.1**	**-0.1**	**0.0**

Table 7F-7b. Victoria Park Alternative No. 3 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 3 Peak Stages (ft NGVD)		Delta (Alt. 3 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
BRWRD-12AV	Yes	7.4	7.8	7.8	7.7	7.8	0.0	0.0
BRWRD-13AV	No	7.7	8.6	8.7	8.6	8.7	0.0	0.0
BRWRD-14AV	Yes	8.7	8.8	8.8	8.8	8.8	0.0	0.0
BRWRD-16AV	Yes	10.9	11.2	11.3	11.2	11.3	0.0	0.0
BRWRD-8AV	Yes	5.5	5.5	5.6	5.5	5.6	0.0	0.0
C13IC005	Yes	2.5	2.5	2.5	2.5	2.5	0.0	0.0
C13IC010	Yes	2.5	2.9	3.1	2.9	3.1	0.0	0.0
C13ICSPUR002	Yes	2.5	2.6	2.6	2.6	2.6	0.0	0.0
C13ICSPUR005	Yes	2.5	2.6	2.6	2.6	2.6	0.0	0.0
ESUNR-01	Yes	8.3	7.4	7.7	7.3	7.7	0.0	0.0
ESUNR-02	Yes	7.4	7.8	8.0	7.8	8.0	0.0	0.0
ESUNR-05	No	6.0	7.9	8.1	7.9	8.1	0.0	0.0
ESUNR-06	No	6.0	7.4	7.5	7.3	7.5	0.0	0.0
ESUNR-07	No	6.5	7.4	7.5	7.3	7.5	0.0	0.0
HYPK-E	No	6.0	7.3	7.5	7.3	7.5	0.0	0.0
HYPK-NE	No	5.6	7.4	7.5	7.3	7.5	0.0	0.0
HYPK-NW	No	4.0	7.3	7.5	7.3	7.5	0.0	0.0
HYPK-SE	No	6.3	7.7	7.8	7.7	7.8	0.0	0.0
HYPK-SW2	No	5.3	7.0	7.1	6.9	7.1	0.0	0.0
HYPK-W	No	5.4	7.0	7.2	7.0	7.2	0.0	0.0
NE16AV-9ST	No	6.8	7.9	8.1	7.9	8.1	0.0	0.0
NE16TR-2CT	No	9.7	10.5	10.6	10.5	10.6	0.0	0.0
NE17AV-5ST	No	7.7	9.1	9.3	9.1	9.2	0.0	0.0
NE17WY-10ST	No	7.6	9.0	9.0	9.0	9.0	0.0	0.0
NE17WY-7ST	No	7.2	9.3	9.5	9.3	9.4	-0.1	0.0
NE17WY-8ST	No	8.8	9.4	9.4	9.4	9.4	0.0	0.0
NE2ST-12AV	Yes	7.9	8.1	8.2	8.1	8.2	0.0	0.0
NE2ST-7AV	No	5.3	6.3	6.4	6.2	6.4	0.0	0.0

Table 7F-7b. Victoria Park Alternative No. 3 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 3 Peak Stages (ft NGVD)		Delta (Alt. 3 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NE3CT-16AV	No	6.0	7.7	8.0	7.7	8.0	0.0	0.0
NE3CT-17AV	No	5.3	7.7	8.0	7.7	8.0	0.0	0.0
NE4PL-14AV	No	7.8	8.5	8.6	8.5	8.6	0.0	0.0
NE4PL-16AV	No	7.9	8.5	8.6	8.5	8.6	0.0	0.0
NE4ST-14AV	No	6.3	7.7	7.8	7.7	7.8	0.0	0.0
NE4ST-16AV	Yes	7.4	7.7	8.0	7.7	8.0	0.0	0.0
NE4ST-7AV	No	5.0	6.5	6.8	6.5	6.7	0.0	0.0
NE5ST-7AV	No	5.1	6.5	6.8	6.5	6.7	0.0	0.0
NE8ST-16TR	No	7.9	8.7	8.7	8.7	8.7	0.0	0.0
NFED-55	Yes	7.1	7.3	7.4	7.3	7.4	0.0	0.0
NFED-60	No	6.0	7.3	7.3	7.3	7.3	0.0	0.0
NFED-65	No	6.2	7.1	7.2	7.1	7.2	0.0	0.0
NFED-67	No	6.1	7.0	7.1	7.0	7.1	0.0	0.0
NFED-70	Yes	5.7	6.4	6.6	6.4	6.6	0.0	0.0
NFED-72	Yes	5.6	6.5	6.7	6.5	6.7	0.0	0.0
NFED-75	Yes	6.0	6.8	7.3	6.8	7.3	0.0	0.0
NFED-80	Yes	6.0	6.2	6.4	6.2	6.4	0.0	0.0
NFED-BR	Yes	6.0	4.6	5.3	4.5	5.1	-0.2	-0.2
NFNRSPUR004	No	2.5	3.0	3.1	3.0	3.1	0.0	0.0
NFNRSPUR005	No	2.5	3.3	3.5	3.2	3.5	0.0	-0.1
NFNRSPUR007	No	2.5	3.4	3.7	3.3	3.6	-0.1	-0.1
NFNRSPUR009	No	2.5	3.5	4.0	3.4	3.8	-0.1	-0.2
NFNRSPUR010	No	2.5	3.5	4.1	3.4	3.9	-0.2	-0.2
OUT_IC015	N/A	N/R	2.5	2.5	2.5	2.5	0.0	0.0
						Maximum:	**0.0**	**0.0**
						Minimum:	**-0.1**	**0.0**

Table 7F-8a. Victoria Park Alternative No. 4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 4 Peak Stages (ft NGVD)			Delta (Alt. 4 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
BRWRD-12AV	Yes	7.4	7.5	7.6	7.7	7.5	7.6	7.7	0.0	0.0	0.0
BRWRD-13AV	No	7.7	8.4	8.5	8.5	8.4	8.5	8.5	0.0	0.0	0.0
BRWRD-14AV	Yes	8.7	8.5	8.6	8.7	8.5	8.6	8.7	0.0	0.0	0.0
BRWRD-16AV	Yes	10.9	10.8	10.9	11.0	10.8	10.9	11.0	0.0	0.0	0.0
BRWRD-8AV	Yes	5.5	5.2	5.4	5.5	5.2	5.4	5.5	0.0	0.0	0.0
C13IC005	Yes	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0
C13IC010	Yes	2.5	2.6	2.7	2.8	2.6	2.7	2.8	0.0	0.0	0.0
C13ICSPUR002	Yes	2.5	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0
C13ICSPUR005	Yes	2.5	2.6	2.6	2.6	2.6	2.6	2.6	0.0	0.0	0.0
ESUNR-01	Yes	8.3	5.0	6.1	6.4	5.0	6.1	6.4	0.0	0.0	0.0
ESUNR-02	Yes	7.4	5.6	6.6	6.9	5.6	6.6	6.9	0.0	0.0	0.0
ESUNR-05	No	6.0	6.6	7.3	7.5	6.6	7.3	7.5	0.0	0.0	0.0
ESUNR-06	No	6.0	6.7	7.0	7.1	6.7	7.0	7.1	0.0	0.0	0.0
ESUNR-07	No	6.5	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
HYPK-E	No	6.0	6.4	6.8	6.9	6.4	6.8	6.9	0.0	0.0	0.0
HYPK-NE	No	5.6	6.7	6.9	6.9	6.7	6.9	7.0	0.0	0.0	0.0
HYPK-NW	No	4.0	6.3	6.8	6.9	6.3	6.8	7.0	0.0	0.0	0.0
HYPK-SE	No	6.3	7.3	7.4	7.5	7.2	7.4	7.5	0.0	0.0	0.0
HYPK-SW2	No	5.3	5.9	6.1	6.3	5.6	6.0	6.3	-0.3	-0.1	0.0
HYPK-W	No	5.4	6.3	6.5	6.6	6.3	6.5	6.6	0.0	0.0	0.0
NE16AV-9ST	No	6.8	7.2	7.3	7.5	7.2	7.3	7.5	0.0	0.0	0.0
NE16TR-2CT	No	9.7	10.2	10.3	10.4	10.2	10.3	10.4	0.0	0.0	0.0
NE17AV-5ST	No	7.7	8.3	8.7	8.7	8.3	8.7	8.7	0.0	0.0	0.0
NE17WY-10ST	No	7.6	8.6	8.8	8.8	8.6	8.8	8.8	0.0	0.0	0.0
NE17WY-7ST	No	7.2	8.3	8.8	8.9	8.3	8.8	8.9	0.0	0.0	0.0
NE17WY-8ST	No	8.8	9.3	9.3	9.3	9.3	9.3	9.3	0.0	0.0	0.0
NE2ST-12AV	Yes	7.9	7.9	8.0	8.0	7.9	8.0	8.0	0.0	0.0	0.0
NE2ST-7AV	No	5.3	5.5	5.7	5.7	5.5	5.7	5.7	0.0	0.0	0.0
NE3CT-16AV	No	6.0	5.5	6.4	6.8	5.5	6.4	6.8	0.0	0.0	0.0

Table 7F-8a. Victoria Park Alternative No. 4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)			Alt. 4 Peak Stages (ft NGVD)			Delta (Alt. 4 - Base, ft)		
			2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour
NE3CT-17AV	No	5.3	5.0	6.4	6.8	5.0	6.4	6.8	0.0	0.0	0.0
NE4PL-14AV	No	7.8	8.2	8.2	8.3	8.2	8.2	8.3	0.0	0.0	0.0
NE4PL-16AV	No	7.9	6.7	8.2	8.2	6.7	8.2	8.2	0.0	0.0	0.0
NE4ST-14AV	No	6.3	7.2	7.4	7.5	7.2	7.4	7.5	0.0	0.0	0.0
NE4ST-16AV	Yes	7.4	5.9	6.8	7.1	5.9	6.8	7.1	0.0	0.0	0.0
NE4ST-7AV	No	5.0	5.5	5.7	5.8	5.4	5.7	5.8	-0.1	-0.1	-0.1
NE5ST-7AV	No	5.1	5.5	5.7	5.8	5.4	5.7	5.8	-0.1	-0.1	-0.1
NE8ST-16TR	No	7.9	8.2	8.4	8.5	8.2	8.4	8.5	0.0	0.0	0.0
NFED-55	Yes	7.1	6.9	7.1	7.1	6.9	7.1	7.1	0.0	0.0	0.0
NFED-60	No	6.0	7.0	7.2	7.2	7.0	7.2	7.2	0.0	0.0	0.0
NFED-65	No	6.2	6.7	6.9	6.9	6.7	6.9	6.9	0.0	0.0	0.0
NFED-67	No	6.1	6.5	6.8	6.9	6.4	6.8	6.8	-0.1	0.0	0.0
NFED-70	Yes	5.7	4.4	5.3	5.6	4.3	5.0	5.5	-0.1	-0.2	-0.1
NFED-72	Yes	5.6	4.0	4.9	5.4	3.9	4.6	5.3	-0.2	-0.3	-0.2
NFED-75	Yes	6.0	3.7	4.8	5.4	3.7	4.5	5.2	0.0	-0.3	-0.1
NFED-80	Yes	6	3.6	4.1	4.6	3.6	4.1	4.4	0.0	-0.1	-0.2
NFED-BR	Yes	6	3.1	3.5	3.7	3.1	3.5	3.7	0.0	0.0	0.0
NFNRSPUR004	No	2.5	2.6	2.8	2.8	2.6	2.8	2.8	0.0	0.0	0.1
NFNRSPUR005	No	2.5	2.8	2.9	2.9	2.7	2.9	3.0	-0.1	0.0	0.1
NFNRSPUR007	No	2.5	2.8	2.9	3.0	2.7	2.9	3.0	-0.1	0.0	0.0
NFNRSPUR009	No	2.5	2.8	3.0	3.1	2.8	3.0	3.2	0.0	0.0	0.1
NFNRSPUR010	No	2.5	2.8	3.0	3.1	2.8	3.0	3.2	0.0	0.0	0.0
OUT_IC015	N/A	N/R	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0
							Maximum:		**0.0**	**0.0**	**0.1**
							Minimum:		**-0.3**	**-0.3**	**-0.2**

Table 7F-8b. Victoria Park Alternative No. 4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 4 Peak Stages (ft NGVD)		Delta (Alt. 4 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
BRWRD-12AV	Yes	7.4	7.8	7.8	7.8	7.8	0.0	0.0
BRWRD-13AV	No	7.7	8.6	8.7	8.6	8.7	0.0	0.0
BRWRD-14AV	Yes	8.7	8.8	8.8	8.8	8.8	0.0	0.0
BRWRD-16AV	Yes	10.9	11.2	11.3	11.2	11.3	0.0	0.0
BRWRD-8AV	Yes	5.5	5.5	5.6	5.5	5.6	0.0	0.0
C13IC005	Yes	2.5	2.5	2.5	2.5	2.5	0.0	0.0
C13IC010	Yes	2.5	2.9	3.1	2.9	3.1	0.0	0.0
C13ICSPUR002	Yes	2.5	2.6	2.6	2.6	2.6	0.0	0.0
C13ICSPUR005	Yes	2.5	2.6	2.6	2.6	2.6	0.0	0.0
ESUNR-01	Yes	8.3	7.4	7.7	7.4	7.7	0.0	0.0
ESUNR-02	Yes	7.4	7.8	8.0	7.8	8.0	0.0	0.0
ESUNR-05	No	6.0	7.9	8.1	7.9	8.1	0.0	0.0
ESUNR-06	No	6.0	7.4	7.5	7.4	7.5	0.0	0.0
ESUNR-07	No	6.5	7.4	7.5	7.4	7.5	0.0	0.0
HYPK-E	No	6.0	7.3	7.5	7.3	7.5	0.0	0.0
HYPK-NE	No	5.6	7.4	7.5	7.4	7.5	0.0	0.0
HYPK-NW	No	4.0	7.4	7.5	7.4	7.5	0.0	0.0
HYPK-SE	No	6.3	7.7	7.8	7.7	7.8	0.0	0.0
HYPK-SW2	No	5.3	7.0	7.2	7.0	7.1	0.0	0.0
HYPK-W	No	5.4	7.0	7.2	7.0	7.2	0.0	0.0
NE16AV-9ST	No	6.8	7.9	8.1	7.9	8.1	0.0	0.0
NE16TR-2CT	No	9.7	10.5	10.6	10.5	10.6	0.0	0.0
NE17AV-5ST	No	7.7	9.1	9.3	9.1	9.3	0.0	0.0
NE17WY-10ST	No	7.6	9.0	9.0	9.0	9.0	0.0	0.0
NE17WY-7ST	No	7.2	9.3	9.5	9.3	9.5	0.0	0.0
NE17WY-8ST	No	8.8	9.4	9.4	9.4	9.4	0.0	0.0
NE2ST-12AV	Yes	7.9	8.1	8.2	8.1	8.2	0.0	0.0
NE2ST-7AV	No	5.3	6.3	6.4	6.3	6.4	0.0	0.0
NE3CT-16AV	No	6.0	7.7	8.0	7.7	8.0	0.0	0.0

Table 7F-8b. Victoria Park Alternative No. 4 Model Results

Model Node	5-Yr LOS Goals Met	Reference Elevation (ft NGVD)	Base Peak Stages (ft NGVD)		Alt. 4 Peak Stages (ft NGVD)		Delta (Alt. 4 - Base, ft)	
			25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour	25-year, 72-hour	100-year, 72-hour
NE3CT-17AV	No	5.3	7.7	8.0	7.7	8.0	0.0	0.0
NE4PL-14AV	No	7.8	8.5	8.6	8.5	8.6	0.0	0.0
NE4PL-16AV	No	7.9	8.5	8.6	8.5	8.6	0.0	0.0
NE4ST-14AV	No	6.3	7.7	7.8	7.7	7.8	0.0	0.0
NE4ST-16AV	Yes	7.4	7.7	8.0	7.7	8.0	0.0	0.0
NE4ST-7AV	No	5.0	6.6	6.8	6.5	6.8	0.0	0.0
NE5ST-7AV	No	5.1	6.6	6.8	6.5	6.8	0.0	0.0
NE8ST-16TR	No	7.9	8.7	8.7	8.7	8.7	0.0	0.0
NFED-55	Yes	7.1	7.3	7.4	7.3	7.4	0.0	0.0
NFED-60	No	6.0	7.3	7.3	7.3	7.3	0.0	0.0
NFED-65	No	6.2	7.1	7.2	7.1	7.2	0.0	0.0
NFED-67	No	6.1	7.0	7.1	7.0	7.1	0.0	0.0
NFED-70	Yes	5.7	6.4	6.6	6.4	6.6	0.0	0.0
NFED-72	Yes	5.6	6.5	6.8	6.5	6.7	0.0	0.0
NFED-75	Yes	6.0	6.9	7.2	6.8	7.2	0.0	0.0
NFED-80	Yes	6	6.2	6.4	6.2	6.4	0.0	0.0
NFED-BR	Yes	6	4.7	5.3	4.6	5.2	-0.1	-0.1
NFNRSPUR004	No	2.5	3.0	3.1	3.0	3.1	0.0	0.0
NFNRSPUR005	No	2.5	3.3	3.5	3.3	3.5	0.0	0.0
NFNRSPUR007	No	2.5	3.4	3.7	3.4	3.7	0.0	0.0
NFNRSPUR009	No	2.5	3.5	4.1	3.5	3.9	0.0	-0.1
NFNRSPUR010	No	2.5	3.5	4.2	3.5	4.0	0.0	-0.1
OUT_IC015	N/A	N/R	2.5	2.5	2.5	2.5	0.0	0.0
						Maximum:	**0.0**	**0.0**
						Minimum:	**-0.1**	**-0.1**