ENVIRONMENTAL RESOURCE PERMIT APPLICANT'S HANDBOOK VOLUME II

FOR USE WITHIN THE GEOGRAPHIC LIMITS OF THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT

EFFECTIVE AUGUST 10, 2014

Volume II (including Appendices A, B, C, D and E)
is incorporated by reference in
Rule 40E-4.091(1)(a) and Rule 62-330.010, F.A.C.

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PART 1 – INTRODUCTION, ORGANIZATION, APPLICABILITY

1.0 INTRODUCTION

This **Applicant's Handbook Volume II** accompanies Chapter 62-330, Fla. Admin. Code (F.A.C.), and the "**Environmental Resource Permit Applicant's Handbook Volume I (General and Environmental)**" **(Applicant's Handbook Volume I)**. **Applicant's Handbook Volume I** is applicable to all environmental resource permit applications, and provides background information on the environmental resource permit (ERP) program, including:

- Points of contact;
- A summary of the statutes and rules that are used to authorize and implement the ERP program;
- A summary of the types of permits, permit thresholds, and exemptions;
- Procedures used to review exemptions and permits;
- Conditions for issuance of an ERP, including the environmental criteria used for activities located in wetlands and other surface waters;
- Erosion and sediment control practices to prevent water quality violations; and
- Operation and maintenance requirements.

This Volume is designed to be applicable only to those ERP applications that involve the design of a stormwater management system that requires a permit as provided in Chapter 62-330, F.A.C., or Section 403.814(12) F.S. This volume also contains South Florida Water Management District (District) specific appendices for regionally-specific criteria such as basin maps for cumulative impact assessments (see Applicant's Handbook Volume I, Section 10.2.8), mitigation bank service area determination (refer to Chapter 62-342, F.A.C), and above ground impoundments.

Projects that qualify for a general permit in Section 403.814(12), F.S., are not regulated under Chapter 62-330, F.A.C. However, **Applicant's Handbook Volume II** contains design and performance standards that are relevant to the design of projects that qualify for that general permit.

This Volume provides specific, detailed water quality and quantity design and performance criteria for stormwater management systems regulated by the District through the ERP program authorized under Part IV of Chapter 373, F.S. This Volume explains, and provides more detail on, the rule criteria for stormwater quality and quantity contained in Chapter 62-330, F.A.C. In cases where conflicting or ambiguous interpretations of the information in this Volume result~~s~~ in uncertainty, the final determination of appropriate procedures to be followed will be made using Chapters 120 and 373, F.S., applicable F.A.C. rule chapters, and best professional judgment of Agency staff.

Both Applicant's Handbook Volumes I and II are adopted by reference in Chapter 62-330, F.A.C. Applicant's Handbook Volume II is also incorporated in Rule 40E-4.091, F.A.C. Both Applicant's Handbook Volumes I and II are rules of the Department and the District. The term "Agency," where used in this Volume, shall apply to the Department, the District, or a delegated local government, as applicable, in accordance with the division of responsibilities specified in the Operating Agreements incorporated by reference in subsection 62-330.010(5) and Rule 40E-4.091, F.A.C., except where a specific Agency is otherwise identified. Volume II applies whether an ERP application is processed and acted on by the Department, a District, or a delegated local government. The Handbooks are written to provide more detail and clarity to the public in understanding the statutory and rule provisions that implement the ERP program.

1.1 Criteria Objectives

The criteria contained herein were established with the primary goal of meeting water resource objectives as set forth in Part IV of Chapter 373, F.S. Performance criteria are used where possible. Other methods of meeting overall objectives of the District and which meet the conditions for issuance set forth in Rules 62-330.301 and 62-330.302, F.A.C., will be considered. Compliance with the criteria herein constitutes a presumption that the project proposal is in conformance with the conditions for issuance set forth in Rules 62-330.301 and 62-330.302, F.A.C. Pursuant to Section 373.4131, F.S., if a stormwater management system is designed in accordance with the criteria in this Handbook or if a system is constructed, operated, and maintained for stormwater treatment in accordance with a valid Environmental Resource Permit or exemption under Part IV of Chapter 373, the discharges from the system are presumed not to violate applicable state water quality standards.

An applicant may propose alternative designs to those provided in this Volume for consideration by the Agency. However, reasonable assurance in the form of plans, test results, or other information must be provided by the applicant to demonstrate that the alternative design meets the conditions for issuance (Rules 62-330.301 and 62-330.302, F.A.C.).

1.2 District-Specific Thresholds

Within Miami-Dade County, an ERP is not required for the construction, alteration or operation of a stormwater water management system in uplands provided that system meets all of the conditions below:

1. The project area is less than 40 acres with positive stormwater outfall or the project area is less than 320 acres with less than 160 acres of impervious area, and no positive stormwater outfall;
2. The design plans and calculations are signed and sealed by a registered professional;
3. The system meets the criteria specified in Rules 62-330.301 and 62-330.302, F.A.C.; and
4. The system is not located in natural water bodies, wetlands, waters of the state, or

an Outstanding Florida Water as listed in Rule 62-302.700, F.A.C.

1.3 District-Specific Exemptions

There are no exemptions specific to the South Florida Water Management District geographical area. All applicable exemptions can be found in Rules 62-330.051-.0511, F.A.C.

PART II – GENERAL CRITERIA

2.0 General Criteria for all Stormwater Management Systems

This Volume applies to the design of stormwater management systems that require a permit under Chapter 62-330, F.A.C., or a general permit as provided under Section 403.814(12), F.S. Additional special basin criteria within SFWMD can be found in Chapter 40E-41, F.A.C (for Western C-9 Basin, Kissimmee River Basin, C-51 Basin, and the Water Preserve Area Basins of Palm Beach and Broward Counties), Chapter 40E-61 F.A.C (for the Lake Okeechobee Basin), and Chapter 40E-63, F.A.C (for the Everglades Agricultural Area).

2.1 Definitions

The definitions set forth in Applicant's Handbook Volume I, Section 2.0(a) are applicable to Volume II.

2.1.1 "Agency" - The Department of Environmental Protection or South Florida Water Management District or a delegated local government, as applicable, in accordance with division of responsibilities specified in the Operating Agreements incorporated by reference in subsection 62-330.010(5), and Rule 40E-4.091, F.A.C.

2.1.2 "Control device" - Element of a discharge structure which allows the gradual release of water under controlled conditions. It is sometimes referred to as the bleed-down mechanism, or "bleeder".

2.1.3 "Control elevation" - The lowest elevation at which water can be released through the control device.

2.1.4 "Department" - The Department of Environmental Protection.

2.1.5 "Detention" - The delay of stormwater runoff prior to discharge into receiving waters.

2.1.6 "Detention volume" - The volume of open surface storage behind the discharge structure between the overflow elevation and control elevation.

2.1.7 "District" - The South Florida Water Management District.

2.1.8 "Elevation" - Height in feet above mean sea level according to National Geodetic Vertical Datum (NGVD) or North American Vertical Datum 88 (NAVD).

2.1.9 "Exfiltration trench" - A subsurface retention system consisting of a conduit such as perforated pipe surrounded by natural or artificial aggregate which temporarily stores and infiltrates stormwater runoff.

2.1.10 "Historic discharge" - The peak rate at which runoff leaves a parcel of land by gravity in an undisturbed/natural state, or the legally allowable discharge in effect at the time of permit application.

2.1.11 "Impervious" - Land surfaces which do not allow, or minimally allow, the penetration of water. Examples include building roofs, normal concrete and asphalt pavements, and some fine grained soils such as clays.

2.1.12 "Mean annual higher high tide" - The arithmetic mean of the higher high water elevations observed at a location or tidal station over the National Tidal Datum Epoch. Only the higher high water of each pair of high waters of the tidal day is included in the mean.

2.1.13 "Overflow elevation" - Design elevation of a discharge structure at which, or below which, water is contained behind the structure, except for that which leaks out, or bleeds out, through a control device down to the control elevation.

2.1.14 "Regulated activity" - The construction, alteration, operation, maintenance, abandonment or removal of a surface water management system, including dredging and filling, regulated pursuant to Part IV, Chapter 373, F.S.

2.1.15 "Retention" - The prevention of stormwater runoff from direct discharge into receiving waters. Examples include systems which discharge through percolation, exfiltration, filtered bleed-down and evapotranspiration processes.

2.1.16 "Retention/detention area (dry)" - Water storage area with bottom elevation at least one foot above the control elevation of the area. Sumps, mosquito control swales and other minor features may be at a lower elevation.

2.1.17 "Retention/detention area (wet)" - A water storage area with bottom elevation lower than one foot above the control elevation of the area.

2.1.18 "Staff Report" - A written report prepared by Agency staff setting forth staff's conclusions and recommendations based on review of an application. The description of the project in the Staff Report shall take precedence over application data contained in Agency permit files, since numerous project changes are often made by applicants during application processing, the results of which may only be reflected in the Staff Report. Staff Reports serve as notice of proposed agency action.

2.1.19 "State water quality standards" – Water quality standards adopted pursuant to Chapter 403, F.S. [Section 373.403(11), F.S.], including standards composed of designated most beneficial uses (classification of waters), the numerical and narrative criteria applied to the specific water use or classification, the Florida anti-degradation policy (Rules 62-4.242, 62-302.300, F.A.C.), and the moderating provisions contained in Chapters 62-4 (5/9/2013) http://www.flrules.org/Gateway/reference.asp?No=Ref-02976, 62-302 (7/17/2013), http://www.flrules.org/Gateway/reference.asp?No=Ref-02982, 62-520 (7/12/2009) http://www.flrules.org/Gateway/reference.asp?No=Ref-02977,, and 62-550, F.A.C. (2/16/2012) http://www.flrules.org/Gateway/reference.asp?No=Ref-02978. Incorporated by reference herein and in Rule 40E-4.091, F.A.C. Copies of Chapters 62-4, 62-302, 62-520 and 62-550, F.A.C., are available at no cost by contacting the South Florida Water Management District Clerk's Office, 3301 Gun Club Road, West Palm Beach, FL 33406 (800) 432-2045, ext. 2087, or (561) 682-2087.

2.1.20 "Surface Water Management System" or "System" - A stormwater management system, dam, impoundment, reservoir, appurtenant work or works, or any combination thereof. The terms "surface water management system" or "system" include areas of dredging or filling as defined by Section 373.403(13) and (14), F.S., respectively.

2.1.21 "Tailwater" - The receiving water elevation (or pressure) at the final discharge point of the stormwater management system.

2.1.22 "Water management areas" - Areas to be utilized for the conveyance, treatment or storage of stormwater.

2.1.23 "Wet detention systems" - Permanently wet ponds which are designed to slowly release collected stormwater runoff through an outlet structure.

2.2 Professional Certification

All construction plans and supporting calculations submitted to the Agency for surface water management systems that require the services of a registered professional must be signed, sealed, and dated by a registered professional.

2.3 Water and Wastewater Service and Concurrent Processing

(a) Potable water, irrigation and wastewater facilities must be identified. An applicant for an environmental resource permit must provide documentation on how these services are to be provided. If wastewater disposal is accomplished on-site, additional information shall be requested regarding separation of waste and stormwater management systems.

(b) For environmental resource permits, if on-site consumptive water use withdrawals are also proposed for which a District water use permit is required, the environmental resource and water use permits must be

processed simultaneously. These requirements are dependent upon site specific water resource limitations. It is recommended that the applicant contact Agency staff prior to filing an application to determine whether the proposed project necessitates simultaneous environmental resource and water use permitting.

2.4 Retrofits of Existing Stormwater Management Systems

(a) A stormwater retrofit project is typically proposed by a county, municipality, state agency, or water management district to provide new or additional treatment or attenuation capacity, or improved flood control to an existing stormwater management system or systems. Stormwater retrofit projects shall not be proposed or implemented for the purpose of providing the water quality treatment or flood control needed to serve new development or redevelopment.

Example components of stormwater retrofit projects are:

1. Construction or alteration that will add additional treatment or attenuation capacity and capability to an existing stormwater management system;
2. Modification, reconstruction, or relocation of an existing stormwater management system or stormwater discharge facility;
3. Stabilization of eroding banks through measures such as adding attenuation capacity to reduce flow velocities, planting of sod or other vegetation, and installation of rip rap boulders;
4. Excavation or dredging of sediments or other pollutants that have accumulated as a result of stormwater runoff and stormwater discharges.

(b) Stormwater Quality Retrofits

1. The applicant for a stormwater quality retrofit project must provide reasonable assurance that the retrofit project itself will, at a minimum provide additional water quality treatment such that there is a net reduction of the stormwater pollutant loading into receiving waters. Examples are:

   a. Addition of treatment capacity to an existing stormwater management system such that it reduces loadings of stormwater pollutants of concern to receiving waters;
   b. Adding treatment or attenuation capability to an existing developed area when either the existing stormwater management system or the developed area has substandard stormwater treatment and attenuation capabilities, compared

to what would be required for a new system requiring a permit under Part IV of Chapter 373, F.S.; or

c. Removing pollutants generated by, or resulting from, previous stormwater discharges.

2. If the applicant has conducted, and the Agency has approved, an analysis that provides reasonable assurance that the proposed stormwater quality retrofit will provide the intended pollutant load reduction from the existing system or systems, the project will be presumed to comply with the requirements in Part IV of this Volume.

3. The pollutants of concern will be determined on a case-by-case basis during the permit application review based upon factors such as the type and intensity of land use, existing water quality data within the area subject to the retrofit, and the degree of impairment or water quality violations in the receiving waters.

(c) Stormwater Quantity (Flood Control) Retrofits

The applicant for a stormwater quantity retrofit project must provide reasonable assurance that the retrofit project will reduce existing flooding problems in such a way that it does not cause any of the following:

1. A net reduction in water quality treatment provided by the existing stormwater management system or systems;
2. Increased discharges of untreated stormwater entering adjacent or receiving waters;

If the applicant has conducted, and the Agency has approved, an analysis that provides reasonable assurance that the stormwater quantity retrofit project will comply with the above, the project will be presumed to comply with the requirements in Part III of this Volume.

(d) The applicant for any stormwater retrofit project must design, construct, operate, and maintain the project so that it:

1. Will not cause or contribute to a water quality violation;
2. Does not reduce stormwater treatment capacity or increase discharges of untreated stormwater. Where existing ambient water quality does not meet water quality standards the applicant must demonstrate that the proposed activities will not cause or contribute to a water quality violation. If the proposed activities will contribute to the existing violation, measures shall be proposed that will provide a net improvement of the water quality in the receiving waters for those parameters that do not meet standards.

3. Does not cause any adverse water quality impacts in receiving waters; or
4. Will not cause or contribute to increased flooding of adjacent lands or cause new adverse water quantity impacts to receiving waters.

2.5 Flexibility for State Transportation Projects and Facilities

With regard to state linear transportation projects and facilities the Agencies shall be governed by subsection 373.413(6), F.S. (2012).

PART III – STORMWATER QUANTITY/FLOOD CONTROL

3.1 General

This document refers to flood and drought frequency impacts interchangeably with rainfall frequency. Additional calculations may be required to identify other combinations of site conditions and rainfall frequencies which might result in impacts of the specified frequency. Examples include designs affected by spring tides, fluctuating tides and fluctuating receiving water stages.

3.2 Discharge Rate

Off-site discharge rate is limited to rates not causing adverse impacts to existing off-site properties, and:

(a) Historic discharge rates; or
(b) Rates determined in previous Agency permit actions; or
(c) Rates specified in District criteria (see Appendix A to this Volume).

3.3 Design Storm

Unless otherwise specified by previous Agency permits or criteria, a storm event of 3 day duration and 25 year return frequency shall be used in computing off-site discharge rates. Applicants are advised that local drainage districts or local governments may require more stringent design storm criteria. An applicant who demonstrates its project is subject to unusual site specific conditions may, as a part of the permit application process, request an alternate discharge rate.

3.3.1 Methodologies

An acceptable peak discharge analysis typically consists of generating pre-development and post-development runoff hydrographs, routing the post-development hydrograph through a detention basin, and sizing an overflow structure to control post-development discharges at or below pre-development rates. Acceptable design techniques also

include the use of grassed waterways, and any other storage capability that the particular system may have.

Peak discharge computations shall consider the duration, frequency, and intensity of rainfall, the antecedent moisture conditions, upper soil zone and surface storage, time of concentration, tailwater conditions, changes in land use or land cover, and any other changes in topographic and hydrologic characteristics. Large systems shall be divided into sub-basins according to artificial or natural drainage divides to allow for more accurate hydrologic simulations.

Peak discharge calculations must make proper use of the SCS Peak Rate Factor or K' Factor. The Peak Rate Factor reflects the effect of watershed storage on the hydrograph shape and directly and significantly impacts the peak discharge value. As such, K' must be based on the true watershed storage of runoff, and not on the slope of the landscape which is more accurately accounted for in the time of concentration. However, the average slope of natural watersheds is highly interrelated with the surface storage potential. Land development will generally result in a reduction of natural storage. As a result, the K' value should either increase or remain constant, but never decrease. In most cases, post-development conditions will include detention storage areas; this storage should be accounted for by routing the hydrograph based on a defined stage-storage-discharge relationship and should therefore not be considered in determining K'. However, in some cases where surface storage is maintained, K' may be reduced to same value used in the pre-development condition.

3.3.2 Aggregate Discharge

Where multiple off-site discharges are designed to occur, if the combined discharges meet all other requirements of Chapter 62-330, F.A.C., and discharge to the same receiving waterbody, the Agency will allow the total post-development peak discharge not to exceed the pre-development peak discharge for the combined discharges rather than for each individual discharge.

3.3.3 Upper Soil Zone Storage and Surface Storage

In most instances, the upper soil zone storage and surface storage capacities will have an effect on the pre-development and post-development peak discharges and shall be considered in these computations. Any generally accepted and well-documented method may be used to develop the upper soil zone storage and surface storage values.

(a) The soil zone storage at the beginning of a storm shall be estimated by using reasonable and appropriate parameters consistent with generally accepted engineering and scientific principles to reflect drainage practices, average wet season water table elevation, the antecedent moisture condition (generally AMC II) and any underlying soil characteristics that would limit or prevent percolation of storm water into the entire soil column.

The soil storage used in the computation shall not exceed the difference between the maximum soil water capacity and the field capacity (for example, gravitational water) for the soil columns above any impervious layer or seasonal groundwater table. Refer to Section 5.7.4.2 for additional soil storage criteria.

(b) Surface storage, including that available in wetlands and low-lying areas, shall be considered as depression storage. Depression storage shall be analyzed for its effect on peak discharge and the time of concentration. Depression storage can also be considered in post-development storage routing which requires development of stage-storage relationships. If depression storage is considered, then both pre-development and post-development storage routing must be considered.

3.4 Flood Protection of Building Floors

Building floors shall be at or above the 100 year flood elevations, as determined from the most appropriate information, including Federal Flood Insurance Rate Maps. Both tidal flooding and the 100 year, 3 day storm event shall be considered in determining elevations.

Lower floor elevations will be considered for agricultural buildings which are non-residential and are not routinely accessed by the public. For example, agricultural structures such as barns or equipment sheds normally qualify for a lower finished floor elevation. Applicants are cautioned that potential water quality impacts caused by flooding of contents housed in a structure will be considered in allowing a reduced finished floor elevation.

3.5 Flood Protection of Roads and Parking Lots

Many local governments have criteria for the protection of roads and parking lots from flooding.

(a) In cases where criteria are not specified by the local government with jurisdiction, the following design criteria for drainage and flood protection shall be used:

frequency - 5 years
duration - 1 day (road centerlines)
1 hour (parking lots served by exfiltration systems)

(b) If the local government with jurisdiction has set flood protection criteria for roads and parking lots within commercial projects, the Agency will not require the applicant to meet Agency road and parking lot flood protection criteria. This shall only be allowed for commercial projects which are to remain single owner projects. Such criteria may provide lesser degrees of flood protection than required under Agency criteria. Projects which are not permitted pursuant to Agency criteria will be special conditioned, as notice to the permittee and local government, that a substandard design

has been permitted. The applicant shall, however, meet Agency criteria for water quality, off-site discharge and building floor elevations.

(c) In each basin, the minimum roadway crown elevation shall be at least 2 feet higher than the control elevation, in order to protect the road subgrade.

3.6 Flood Plain Encroachment

No net encroachment into the floodplain, between the average wet season water table and that encompassed by the 100 year event, which will adversely affect the existing rights of others, will be allowed.

3.7 Historic Basin Storage

Provision must be made to replace or otherwise mitigate the loss of historic basin storage provided by the project site.

3.8 Offsite Lands

Onsite works such as swales and dikes shall be used to allow the passage of drainage from offsite areas to downstream areas. Diking of project development areas or other equivalent methods shall be used to contain water at or above stages identified in the project discharge computations.

3.9 Minimum Drainage

(a) Residential projects shall have systems with the calculated ability to discharge by surface flow or subsurface percolation at least 3/8 inch per day during or subsequent to the storm of the allowable discharge frequency and duration, so that lowering of the water surface elevations within the water management system to the maximum depth compatible with the environmental protection or other constraints as described in 3.10, will occur in 12 days or less.

(b) 1. Commercial and industrial projects to be subdivided for sale, where the initial permittee will not build the entire system, are required to have installed by the initial permittee, as a minimum,

a. The required water quality system for one inch of runoff detention or one half inch of runoff retention in the master system for the total developed site. The individual sites must provide the remainder (2.5" x % impervious - one inch) which may be in exfiltration trench. The master system must be in a legally defined common area. The master system cannot utilize exfiltration trench.

b. A stormwater collection and conveyance system to interconnect the retention/detention system with the outfall,

with access points to the system available to each individual lot or tract. The system shall be sized to limit discharge under design conditions to the allowable discharge.

2. Projects permitted in such manner will require deed restrictions which identify to lot or tract purchasers:
   a. The amount of additional on-site storm water management system necessary to provide flood protection for specific design events,
   b. Any additional retention/detention required for water quality purposes, and
   c. The assumed percent impervious, or impervious area used in design calculations.

3.10 Overdrainage and Water Conservation

Systems shall be designed to:

(a) maintain existing water table elevations in existing wellfield cones of depression;
(b) preserve site environmental values (see Section 10.0 of Applicant's Handbook Volume I);
(c) not waste freshwater;
(d) not lower water tables which would adversely affect the existing rights of others; and
(e) preserve site ground water recharge characteristics.

3.11 Detention and Control Elevations

Detention and control elevations shall be set to accomplish 3.10 and are subject to the following criteria:

(a) Wetland protection elevations;
(b) Consistency with surrounding land and project control elevations and water tables;
(c) Possible restrictions by other agencies to include tree protection and landscape ordinances;
(d) Consistency with water use permits; and
(e) A maximum depth of six feet below natural ground.

3.12 Lake-Wetland Separation

Lakes which potentially may adversely affect wetland areas shall be separated from the wetland preservation, creation, or restoration areas by a minimum distance as determined by the following criteria:

(a) A separation distance (shortest distance between the wetland jurisdictional line and the edge of water in the proposed waterbody at the proposed control elevation) producing a gradient less than or equal to 0.005 using the difference in the elevation of the jurisdictional boundary of the wetland and the basin control elevation to calculate the driving head. Staff will consider elevations differing from the jurisdictional boundary of the wetland to calculate the driving head. The applicant will be required to submit monitoring data or other relevant hydrologic data from the site to substantiate the reason for using a different starting elevation. Existing conditions alone will not be considered sufficient reason to use a different elevation if there is evidence that activities on or adjacent to the project site may be responsible for lowering water tables which may be currently having an adverse impact on the subject wetlands. In these cases, preservation of the wetlands cannot be assured by simply maintaining the existing conditions.

(b) If the gradient resulting from any separation distance and the driving head as defined above is between 0.005 and 0.015, then calculations will be required which demonstrate that the drawdown in the adjacent wetland(s) will be of a magnitude which will not result in adverse impacts on the wetland. A drawdown of more than 12 vertical inches in a 90-day period with no recharge shall be presumed to be an adverse impact.

(c) If the gradient is equal to or greater than 0.015, then construction of an impermeable barrier or other equivalent action must be taken to mitigate for the impact of the proposed excavation between the wetland and the excavation.

(d) The Agency will review modeling results which demonstrate that a gradient equal to or greater than 0.015 will not have an adverse impact on the adjacent wetland. Model input data shall be derived from a detailed soil profile constructed from a minimum of three separate sampling locations with permeability testing results on selected samples. Two-dimensional modeling may be necessary to represent the site geometry.

3.13 Water Supply Sources

An evaluation of the impact of the proposed surface water management system on sources of water supply must be submitted with the surface water management application. Cumulative impacts which may result from the construction and operation of the proposed surface water management system must be evaluated in conjunction with the cumulative withdrawals of existing legal uses of water.

PART IV – STORMWATER QUALITY

4.1 State Standards

Projects shall be designed and operated so that off-site discharges will meet State water quality standards.

4.1.1 How Standards are Applied

The quality of stormwater discharged to receiving waters is presumed to meet the surface water standards in Chapters 62-4 and 62-302, F.A.C., and the groundwater standards in Chapters 62-520 and 62-550 F.A.C., if the system is permitted, constructed, operated and maintained in accordance with Chapter 62-330, F.A.C., and Part III, Part IV, and Part V of this Volume. However, this presumption is rebuttable. The volume of runoff to be treated from a site shall be determined by the type of treatment system. If off-site runoff is not prevented from combining with on-site runoff prior to treatment, then treatment must be provided for the combined off-site and project runoff.

4.1.2 Erosion and Sediment Control Criteria for Stormwater Management Systems

Land clearing activities, including the construction of stormwater management systems, shall be designed, constructed, and maintained at all times so that erosion and sedimentation from the system, including the areas served by the system, do not cause violations of applicable state water quality standards in receiving waters. Further, because sedimentation of offsite lands can lead to public safety concerns, erosion and sediment controls shall be designed and implemented to retain sediment on-site as required by subsection 62-40.432(2), F.A.C. In particular, the erosion and sediment control requirements described in Part IV of Applicant's Handbook Volume I shall be followed during construction of the system.

4.1.3 Direct Discharges to Outstanding Florida Waters

Systems which have a direct discharge to an OFW, must provide an additional fifty percent of the required treatment.

4.1.4 Projects Discharging to Impaired Waters or to Outstanding Florida Waters

Systems discharging to a waterbody that has been identified as impaired by the Department of Environmental Protection pursuant to 403.067, F.S., or to an Outstanding Florida Water, shall be designed in accordance with the procedures in Appendix E.

4.2 Retention / Detention Criteria

4.2.1 Volumetric Requirements

(a) Retention, detention, or both retention and detention in the overall system, including swales, lakes, canals, greenways, etc., shall be provided for one of the three following criteria or equivalent combinations thereof:

1. Wet detention volume shall be provided for the first inch of runoff from the developed project, or the total runoff of 2.5 inches times the percentage of imperviousness, whichever is greater.

2. Dry detention volume shall be provided equal to 75 percent of the above amounts computed for wet detention.
3. Retention volume shall be provided equal to 50 percent of the above amounts computed for wet detention. Retention volume included in flood protection calculations requires a guarantee of long term operation and maintenance of system bleed-down ability. Examples of such guarantee include evidence of excellent soil percolation rates, such as coastal ridge sands, or an operations entity which specifically reserves funds for operation, maintenance and replacement (example: Orange County MSTU). (NOTE: Orange County subdivision regulation criteria for retention - published by Orange County in Orange County Subdivision Regulations - may be utilized for Orange County MSTU projects in lieu of Agency retention criteria where retention volumes exceed one half inch.

(b) Systems with inlets in grassed areas will be credited with up to 0.2 inches of the required wet detention amount for the contributing areas. Full credit will be based on a ratio of 10:1 impervious area (paved or building area) to pervious area (i.e. the grassed area) with proportionately less credit granted for greater ratios.

4.2.2 Land Use and Coverage Criteria

(a) Commercial or industrial zoned projects shall provide at least one-half inch of dry detention or retention pretreatment as part of the required retention / detention, unless reasonable assurances can be offered that hazardous materials will not enter the project's surface water management system. Such assurances include, for example, deed restrictions on property planned for re-sale, type of occupancy, recorded lease agreements, local government restrictive codes, ordinances, licenses, and separate containment systems designed to prevent discharge.

(b) Projects having greater than 40% impervious area and which discharge directly to the following receiving waters shall provide at least one half inch of dry detention or retention pretreatment as part of the required retention/detention. Receiving waters being addressed are:

1. Lake Okeechobee and the Kissimmee River.
2. Waterbodies designated as Class I or Class II waters by the Florida Department of Environmental Protection;
3. Canals back-pumped to Lake Okeechobee or to the Conservation areas, or proposed for back-pumping;
4. Other areas, such as the Savannas in St. Lucie and Martin Counties; the Six Mile Cypress Strand; the Big Cypress area of Collier County; and lands acquired by the District pursuant to Section 373.59, F.S. Water Management Lands Trust Fund (Save Our Rivers); and mitigation bank lands;

5. Outstanding Florida Waters as defined in Chapter 62-302, F.A.C.; and Aquatic Preserves as created and provided for in Chapter 258, F.S.; and
6. Waterbodies within a District permitted public water supply wellfield cone-of-depression which are not separated from the aquifer by strata at least ten feet thick and having an average saturated hydraulic conductivity of less than 0.1 foot per day; where the cone-of-depression is defined by one of the following:
   a. in those areas of the District where no local wellfield protection ordinance has been adopted by the local governing body, the one foot drawdown line as expressed in the water table aquifer under conditions of no rainfall and 100 days of pumpage at the permitted average daily pumpage rate (where significant canal recharge is indicated, canal recharge representative of a 1 in 100 year drought will be considered);
   b. Chapter 27, Article XIII, Wellfield Protection Ordinance, Broward County Code of Ordinances, last amended September 28, 1999, http://www.flrules.org/Gateway/reference.asp?No=Ref-00052. This information is incorporated by reference herein and in Rule 40E-4.091, F.A.C. Copies are available at no cost by contacting the South Florida Water Management District Clerk's Office, 3301 Gun Club Road, West Palm Beach, FL 33406 (800) 432-2045, ext. 2087, or (561) 682-2087.
   c. Dade County Wellfield Protection Ordinance contour showing maximum limits (Section 24-43 Protection of Public Potable Water Supply Wells; Chapter 24 Environmental Protection; Code of Metropolitan Dade County, Florida; Codified through Ordinance No. 11-01, enacted January 20, 2011 (Supp. No. 68)) http://www.flrules.org/Gateway/reference.asp?No=Ref-00053. This information is incorporated by reference herein and in Rule 40E-4.091, F.A.C. Copies are available at no cost by contacting the South Florida Water Management District Clerk's Office, 3301 Gun Club Road, West Palm Beach, FL 33406 (800) 432-2045, ext. 2087, or (561) 682-2087.

(c) Water surface and roofed areas can be deducted from site areas only for water quality pervious/impervious calculations. The water surface area meeting dimensional criteria may also be subtracted from the total site area when making final water quality treatment volume calculations.

(d) In cases of widening existing urban public highway projects, the District shall reduce the water quality requirements, if the applicant provides

documentation which demonstrates that all reasonable design alternatives have been considered, and which provides evidence that the alternatives are all cost-prohibitive.

(e) Pursuant to subsection 62-555.312(3), F.A.C., stormwater retention and detention systems are classified as moderate sanitary hazards with respect to public and private drinking water wells. Stormwater treatment facilities shall not be constructed within 100 feet of a public drinking water well, and shall not be constructed within 75 feet of a private drinking water well.

4.3 Incorporation of Natural Areas and Existing Waterbodies

Natural areas and existing waterbodies may be used for retention/detention purposes when not in conflict with environmental (see subsection 10.2.2.4 of Applicant's Handbook Volume I), water quality, (see Sections 10.2.4 through 10.2.4.5 of Applicant's Handbook Volume I) or public use considerations. Candidate areas for such purposes include:

(a) Previously degraded areas;
(b) Man-made areas such as borrow pits;
(c) Extensive areas which have the ability to absorb impacts easily; and
(d) Areas incorporated into a system with mitigation features.

4.4 Underground Exfiltration Systems

(a) Systems shall be designed for the retention volumes specified in Section 4.2.1 for retention systems, exfiltrated over one hour for retention purposes, prior to overflow, and based on test data for the site. (Note: such systems will not be acceptable on projects to be operated by entities other than single owners or entities with full-time maintenance staff.)
(b) A safety factor of two or more shall be applied to the design to allow for geological uncertainties.
(c) A dry system is one with the pipe invert at or above the average wet season water table.

4.5 Sewage Treatment Percolation Ponds

Above-ground percolation pond dikes shall not be within 200 feet of water management lakes or 100 feet of dry retention/detention areas, or the applicant must provide reasonable assurance that effluent will not migrate into the water management lakes or detention areas. Reasonable assurance may be provided by:

(a) Documentation of volume and rate of application of effluent to the percolation ponds, and
(b) Submittal of net flow analyses.

4.6 Criteria for Creation of Waterbodies

The creation of waterbodies shall meet both of the following criteria:

(a) Entrapped salt water, resulting from inland migration of salt water or penetration of the freshwater/salt water interface, will not adversely impact existing legal water users.

(b) Excavation of the water body shall not penetrate a water-bearing formation exhibiting poorer water quality for example, in terms of chloride concentrations.

4.7 Impervious Areas

Runoff shall be discharged from impervious surfaces through retention areas, detention devices, filtering and cleansing devices, or subjected to some other type of Best Management Practice (BMP) prior to discharge from the project site. For projects which include substantial paved areas, such as shopping centers, large highway intersections with frequent stopped traffic, and high density developments, provisions shall be made for the removal of oil, grease and sediment from storm water discharges.

4.8 Stagnant Water Conditions

Configurations which create stagnant water conditions such as hydraulically dead end canals are to be avoided, regardless of the type of development.

4.9 Water Quality Monitoring

All new drainage projects will be evaluated based on the ability of the system to prevent degradation of receiving waters and the ability to conform to State water quality standards.

4.9.1

(a) There are areas within the District where water quality considerations are extremely important, because of the sensitivity of the area. These areas include:

1. Lake Okeechobee and the Kissimmee River.
2. Waterbodies designated as Class I or Class II waters by the Florida Department of Environmental Protection.
3. Canals back-pumped to Lake Okeechobee or to the Conservation areas, or proposed for back-pumping.
4. Sensitive areas, such as the Savannas in St. Lucie and Martin Counties, the Six Mile Cypress Strand and Estero Bay Aquatic Preserve in Lee County and the Big Cypress area of Collier County.
5. Outstanding Florida Waters as defined in Chapter 62-302, F.A.C.

(b) New developments which plan to utilize sensitive areas for disposal of stormwater will be given more detailed evaluation by the Agency Staff. In addition, new projects entailing a more intensified land use, such as industrial parks, and planning to discharge to a sensitive receiving water, directly or indirectly, shall be required to institute a water quality monitoring program if the applicant is unable to provide adequate assurances (by such means as routing drainage of areas where polluting materials would be located away from the stormwater management system; developing restrictive covenants, or similar documents, which would have the effect of prohibiting polluting materials on the project site; or proposing other methods of assurance) that degradation of the receiving body water quality will not occur. The following listing of land use intensity is in ascending order.

1. Wetlands (including transition zones adjacent thereto)
2. Forested lands
3. Rangeland
4. Agricultural
5. Urban and built-up land

4.9.2 Monitoring is required for sites with high pollutant generating potential, such as industrial sites, and Class I and II solid waste disposal sites.

4.9.3 There are two reasons for requiring water quality monitoring by permittees, as follows:

(a) Such data can be used to determine if the pollution abatement practices incorporated into the design for the drainage system are functioning properly.

(b) In some cases there may be a real and immediate concern regarding degradation of quality in the receiving waters, regardless of the apparent pollutant removal efficiency of the drainage system.

4.9.4 The reason for the monitoring requirement will be stated in the Staff Report for each permit. Also included in the permit will be the monitoring and reporting schedules and the parameters of interest. Each monitoring program will be designed specifically for the land use or individual project in question and will include applicable surface and ground water sampling. Staff shall specify applicable project specific parameters such as those listed in Chapter 62-302, F.A.C. The applicant shall use a Florida Department of Health certified laboratory for all water quality analysis. It is recommended that the applicant submit final results from the laboratory. Examples of records to be supplied are as follows: sample date, sample location with D for discharge or N for no discharge, water discharge rates (cfs) and concentration values of indicated elements or compounds, date and time of analysis.

4.9.5 As a general rule, monitoring required of permittees will be confined to points within their boundaries. If additional sampling is needed in order to assess off-site impacts of the projects, the responsible party will be named in the permit. The determination of the responsible party will be based upon the accessibility of the monitoring site to the permittee.

4.9.6 Applicants are advised that Staff Reports written and Permits issued for projects not requiring monitoring at this time will normally include a statement to the effect that water quality monitoring may be required in the future. This should not be construed as an indication that the Agency is contemplating the implementation of a program of intensive water quality monitoring by all permittees. If water quality problems develop in specific areas, however, permittees will be put on notice in this manner that they may have to determine the quality of the water which they are discharging.

4.10 Solid Waste Facilities

(a) Stormwater management systems for Class I and II solid waste facilities, as defined by Chapter 62-701, F.A.C., shall be so designed, constructed, and operated as to maintain the integrity of the landfill at all times (during construction, operation, closure and post closure). Applicant must provide assurances that:
   1. All flows will be conveyed at non-erosive velocities;
   2. The project is designed to minimize erosion.

(b) Design features in support of this requirement include features such as:
   1. Slopes adequate to promote runoff but not affect slope stability;
   2. Intermediate benches or swales which reduce runoff velocities and limit erosion;
   3. Vegetation of closed portion of landfill.

(c) Class I and II landfill projects shall provide adequate assurance that leachate will not enter the stormwater management system. This assurance may be provided through affirmative demonstration that the requirement of Chapter 62-701, F.A.C. for design and emplacement of liners, leachate collection systems, and treatment and disposal of leachate will be met.

(d) Borrow pits shall not be included in the stormwater management system unless the applicant can affirmatively demonstrate that leachate will not enter the borrow pit, and that the water quality standards in Chapters 62-4 and 62-302, F.A.C.), will be met.

(e) Dewatering operations at active, unlined landfills will not be permitted.

(f) For Class I and II landfills the Agency shall require additional Best Management Practices, such as:
   1. Detention in excess of the quantities stated in Section 4.2;
   2. Dry detention areas;
   3. Dry conveyance swales with adequate dimensions to permit maintenance;

4. Filter mechanisms for additional water quality enhancement prior to discharge;
5. Skimmers in front of discharge structures to restrict discharge of floatable materials;
6. Screw gates on water control structures capable of restricting discharge of poor quality surface water; or

7. Vegetation of appropriate portions of the water management system, such as conveyance swales.

(g) To provide information for assessing the need for Best Management Practices at a specific site, Agency staff will require a hydrogeologic investigation that shall, at a minimum, provide information on:
1. The hydrogeologic properties of the formations underlying the landfill, including aquifer and characteristics, groundwater elevations and direction and rate of groundwater flow;
2. Location of existing wells within one-half mile of the site perimeter;
3. Locations and specifications of existing or proposed monitor wells;
4. The location and chemical composition of any known leachate plumes.

(h) Applicants should consult with Agency staff prior to or at pre-application meetings to determine the specific requirements which will apply for a particular project.

PART V – WATER MANAGEMENT SYSTEM DESIGN AND CONSTRUCTION CRITERIA

5.1 Discharge Structures

(a) All design discharges shall be made through structural discharge facilities. Earth berms shall be used only to disperse or collect sheet flows from or to ditches, swales or other flow conveyance mechanisms served by discharge structures.

(b) Discharge structures shall be fixed so that discharge cannot be made below the control elevation, except that emergency devices may be installed with secure locking devices. Use of emergency devices must be coordinated with Agency personnel prior to opening or as soon as possible thereafter. The Agency's Executive Director or secretary is authorized to specify the use of emergency devices pursuant to Rule 40E-1.611, F.A.C.

(c) Discharge structures must be non-operable unless approved otherwise.

(d) It is recommended that discharge structures include gratings for safety and maintenance purposes. The use of trash collection screens is desirable.

(e) Discharge structures shall include a baffle system to encourage discharge from the center of the water column rather than the top or bottom. Discharge structures from areas with greater than 50 percent impervious

area or from systems with inlets in paved areas shall include a baffle, skimmer, or other mechanism suitable for preventing oil and grease from discharging to or from retention/detention areas. Designs must assure sufficient clearance between the skimmer and concrete structure or pond bottom to ensure that the hydraulic capacity of the structure is not affected.

(f) Direct discharges, such as through culverts, stormdrain, and weir structures, will be allowed to receiving waters which by virtue of their large capacity, or configuration are easily able to absorb concentrated discharges. Such receiving waters include existing storm sewer systems and man-made ditches, canals and lakes.

(g) Indirect discharges, such as overflow and spreader swales, are required where the receiving water or its adjacent supporting ecosystem might be degraded by a direct discharge. The discharge structure would therefore discharge, for example, into the overflow or spreader swale, which in turn would release the water to the actual receiving water. Such receiving waters include, for example, natural streams, lakes, wetlands and land naturally receiving overland sheetflow. Spreader swales shall be of a length sufficient to reduce discharge velocities to the receiving waters to historic rates or rates less than two feet per second.

(h) Pumped systems will only be allowed for single owner or governmental agency operation entities, unless perpetual operation ability can be assured.

5.2 Control Devices/Bleed-down Mechanisms for Detention Systems

(a) Agency criteria require that gravity control devices shall be sized based upon a maximum design discharge of one half inch of the detention volume in 24 hours. The devices shall incorporate dimensions no smaller than 6 square inches of cross sectional area, two inches minimum dimension, and 20 degrees for "V" notches. Systems which are limited by a discharge structure with an orifice no larger than the minimum dimensions described herein shall be presumed to meet the discharge quantity criteria except for projects which are required to have zero discharge. Applicants are advised that local drainage districts or local governments may have more stringent gravity control device criteria.

(b) Gravity control devices shall be of a "V" or circular shaped configuration whenever possible, to increase detention time during minor events.

(c) Pumped control devices, if pump discharge is permitted, shall be sized based on a design discharge of 20 percent of the detention volume in one day.

5.3 Retention systems

5.3.1 Description

Stormwater retention works best using a variety of retention systems throughout the project site. Examples of retention systems include:

- Man-made or natural depressional areas where the basin bottom is graded flat and turf is established to promote infiltration and stabilize the basin slopes;
- Shallow landscaped areas designed to store stormwater; and
- Vegetated swales with swale blocks or raised inlets.

Soil permeability and water table conditions must be such that the retention system can percolate the desired runoff volume within a specified time following a storm event. After drawdown has been completed, the basin shall not hold any water, thus the system is normally "dry." Unlike detention basins, the treatment volume for retention systems is not discharged to surface waters.

Besides pollution control, retention systems can be utilized to promote the recharge of ground water to prevent saltwater intrusion in coastal areas or to maintain groundwater levels in aquifer recharge areas.

5.3.2 Retention Basin Construction

Since stormwater management systems are often exposed to poor quality surface runoff during construction and fine particles of clay, silt, and organics at the bottom of a retention basin create a poor infiltrating surface, retention basin construction methods and the overall sequence of site construction must retain the effectiveness of retention basins and assure that the basin is not rendered inoperable prior to completion of site development.

5.3.3 Dry Retention/Detention Areas (Not Applicable to Natural or Mitigation Wetland Areas)

(a) Dry retention/detention areas shall have mechanisms for returning the groundwater level in the area to the control elevation. The bleed-down rate for these systems is the same as in section 5.2.(a), herein.

(b) Mosquito control ditches or other appropriate features for such purpose, shall be incorporated into the design of dry retention/detention areas.

(c) The design of dry retention/detention areas shall incorporate considerations for regular maintenance and vegetation harvesting procedures.

5.4 Wet Detention Design and Performance Criteria

5.4.1 Pond Configuration

The flow path of water from the inlets to the outlet of the pond must be maximized to promote good mixing with no dead spots, minimize short circuiting, and maximize pollutant removal efficiency and mixing.

If short flow paths are unavoidable, the effective flow path can be increased by adding diversion barriers such as islands, peninsulas, or baffles to the pond. Inlet structures shall be designed to dissipate the energy of water entering the pond.

5.4.2 Wet Retention/Detention Area Dimensional Criteria (As Measured at or from the Control Elevation)

(a) Area - 0.5 acre minimum

(b) Width - 100 feet minimum for linear areas in excess of 200 feet length. Irregular shaped areas may have narrower reaches but shall average at least 100 feet.

(c) Depth - Shallow, littoral areas are desirable for water quality enhancement purposes. Such areas are defined for purposes of this criteria as the portion of wet retention/detention bodies shallower than 6 feet as measured from below the control elevation. The minimum shallow, littoral area shall be the lesser of 20 percent of the wet retention/detention area or 2.5 percent of the total of the retention/detention area (including side slopes) plus the basin contributing area.

(d) Side slopes for wet retention/detention and attenuation areas - for purposes of public safety, water quality enhancement and maintenance, all wet retention /detention areas shall be designed with side slopes no steeper than 4:l (horizontal:vertical) from top of bank out to a minimum depth of two feet below the control elevation, or an equivalent substitute. Constructed side slopes steeper than 3.5:1 (horizontal:vertical) shall be considered a substantial deviation during the consideration of operation permit issuance. Side slopes shall be topsoiled, and stabilized through seeding or planting from 2 feet below to 1 foot above the control elevation to promote vegetative growth. Side slope vegetation growth survival shall be a consideration of operation permit issuance. Side slope dimensional criteria for above ground impoundments are set forth in Appendix B.

(e) Alternative Side Slope Criteria for Golf Course Wet Retention/Detention Areas Adjacent to Tee Areas, Bunkers, and Greens - The design and final constructed side slopes adjacent to tee areas, bunkers, and greens contiguous to golf course wet retention/detention areas shall be no steeper than 2:1 (horizontal:vertical) for the area above the permitted

control elevation. For purposes of this rule, the tee area is limited to an area specifically constructed and designated as the location from which a golfer makes his/her first shot toward a designated hole. The green is the area of shortest grass around the hole. Bunkers (sand traps) consist of a prepared area of ground, often a hollow, from which turf or soil has been removed and replaced with sand-like material.

For those portions of the wet retention/detention areas adjacent to tee areas, bunkers, and greens with final constructed side slopes steeper than 3.5:1 (horizontal:vertical), the final constructed side slopes below the control elevation shall not be steeper than 8:1 (horizontal:vertical) to a depth of two feet below the control elevation or equivalent substitute. Side slopes shall be topsoiled and stabilized through seeding or planting from 2 feet below to 1 foot above the control elevation. Side slope vegetation growth survival shall be a consideration of operation permit issuance.

(f) Bulkheads - Bulkheads shall be allowed for no more than 40 percent of the shoreline length, but compensating littoral zone must be provided based on appropriate maximum allowable side slope including local government requirements.

5.5 Maintenance Access and Easements

Minimum perimeter maintenance and operation easements of 20 feet width at slopes no steeper than 4:l (horizontal:vertical) shall be provided beyond the control elevation water line. These easements shall be legally reserved to the operation entity and for that purpose by dedication on the plat, deed restrictions, easements, or other equivalent documents, so that subsequent owners or others may not remove such areas from their intended use. Water management areas, including 20 foot wide maintenance easements at a minimum, shall be connected to a public road or other location from which operation and maintenance access is legally and physically available.

5.6 Exfiltration Systems

5.6.1 Description

In an exfiltration system, stormwater shall pass through a perforated pipe and infiltrate through the trench walls and bottom into the shallow groundwater aquifer thereby increasing the storage available in the trench and promoting infiltration by making delivery of the runoff more effective and evenly distributed over the length of the system.

When an exfiltration trench is utilized, soil permeability and water table conditions must be such that the trench system can percolate the required stormwater runoff treatment volume within a specified time following a storm event. The trench system shall be returned to a normally "dry" condition when drawdown of the treatment volume is

completed. Like retention basins, the treatment volume in exfiltration trench systems shall not be discharged to surface waters.

Besides pollution control, exfiltration trench systems can be utilized to promote the recharge of ground water and to prevent saltwater intrusion in coastal areas, or to maintain groundwater levels in aquifer recharge areas.

5.6.2 Construction

During construction, measures must be taken to limit the parent soil and debris entering the trench. The use of an aggregate with minimal fines is recommended.

Exfiltration systems must conform with the following requirements:

(a) Pipe diameter - 12" minimum;
(b) Trench width - 3' minimum;
(c) Rock in trench must be enclosed in filter material, at least on the top and sides; and
(d) Maintenance sumps in inlets.

5.7 REQUIRED DESIGN INFORMATION AND ASSUMPTIONS

5.7.1 Antecedent Conditions

Antecedent conditions shall be average wet season elevations for water table or other water surfaces.

5.7.2 Rainfall

Distributions and intensities should be consistent with one or more of these Reference Sources:

(a) Appendix C of this Handbook, Isohyetal Maps from SFWMD Technical Memorandum, *Frequency Analysis of One and Three Day Rainfall Maxima for central and southern Florida*, Paul Trimble, October 1990, and the following distribution table:

Time (hours)	Cumulative Percentage of Peak One Day Rainfall
0	0
24	14.6
48	35.9
58	57.2
59	62.8
59.5	67.8
59.75	82.8
60	101.5
60.5	108.8
61	112.6
62	117.7
72	135.9

100% One Day Rainfall

(b) Actual gage data analyzed by accepted statistical methods;

(c) U.S. Department of Agriculture, Soil Conservation Service, "Rainfall Frequency Atlas of Alabama, Florida, Georgia and South Carolina for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 years" (1978), http://flrules.org/Gateway/reference.asp?No=Ref-02975, incorporated by reference herein and in Rule 40E-4.091, F.A.C.

(d) Florida Department of Transportation "Drainage Manual, Appendix B: IDF Curves, Precipitation Data, Rainfall Distributions" (August 2001) http://flrules.org/Gateway/reference.asp?No=Ref-02981, incorporated by reference herein and in Rule 40E-4.091, F.A.C.

Copies of the materials incorporated by reference in (c) and (d) above are available at no cost by contacting the South Florida Water Management District Clerk's Office, 3301 Gun Club Road, West Palm Beach, FL 33406, (800) 432-2045, ext. 2087, or (561) 682-2087.

5.7.3 Evapotranspiration

Amounts can be estimated as follows:

(a) Groundwater depth 0 to 1' - 0.3" ET/day
(b) Groundwater depth 1' to 2.5' - 0.2" ET/day
(c) Groundwater depth 2.5' to 4' - 0.1" ET/day
(d) Groundwater depth below 4' - 0" ET/day

5.7.4 Storage

5.7.4.1 Open Surface

If open surface storage is to be considered in the review, the Applicant shall submit stage-storage computations. If open surface storage plus discharge is to be considered, the stage- discharge computations shall also be submitted. Actual rather than allowable discharges shall be used in routing. For the more extreme events, such as 100 year frequency, discharge should be ignored because the high tail water stage in the receiving water effectively prevents any but a negligible discharge. In such cases a mass accounting of on-site water will suffice, if the applicant can demonstrate that no adverse impacts will occur to adjacent areas.

5.7.4.2 Ground

The Soil Conservation Service has made the following estimate of soil storage capability for the normal sandy soils found within the District in their average natural state:

Depth to Water Table	Cumulative Water Storage
1'	0.6"
2'	2.5"
3'	6.6"
4'	10.9"

(a) For the same sandy soils which have been compacted intentionally or incidental to earthwork operations, the cumulative storage shall be reduced 25 percent. An applicant may submit site-specific soil storage capability data.

(b) Groundwater storage beneath impervious surfaces generally appears impractical to any great degree because of the trapped air which water cannot displace. It further appears impractical below four feet depths, except in high sandy coastal ridge areas, because of the relationship between infiltration rates and runoff rates in most parts of south Florida.

5.7.5 Infiltration and Percolation

5.7.5.2 Subsurface

Subsurface exfiltration will be reviewed only on the basis of representative or actual test data submitted by the Applicant. Test parameters such as elevation, location, and soils, shall be consistent with those of the designed system. The Dade County Department of Environmental Resource Management and Florida Department of Transportation are suggested as reference sources to Applicants for test procedures and design and maintenance performance of subsurface exfiltration systems.

5.7.6 Runoff

The usual methods of computation are as follows:

(a) Rainfall minus losses and storage.
(b) U.S. Department of Agriculture, Natural Resources Conservation Service, "National Engineering Handbook, Section 4, Part 630, Chapter 10 – 2004 http://flrules.org/Gateway/reference.asp?No=Ref-02983. Peak factors used for natural systems shall not exceed "257" unless project specific site conditions warrant use of a larger peak factor.
(c) Rational method, for water quality retention/detention purposes.

Copies of the material referenced in (b) above is available at no cost by contacting the South Florida Water Management District Clerk's Office, 3301 Gun Club Road, West Palm Beach, FL 33406, (800) 432-2045, ext. 2087, or (561) 682-2087.

5.7.7 Receiving Water Stage

(a) Tailwater for Water Quantity Design
Stormwater management systems must consider tailwater conditions. Receiving water stage can affect the amount of flow that will discharge from the project to the receiving water. This stage may be such that tailwater exists in portions of the project system, reducing the effective flow or storage area.

The stage in the receiving water shall be considered to be the maximum stage which would exist in the receiving water from a storm equal to the project design storm. Lower stages may be used if the applicant can show that the flow from his project will reach the receiving water prior to the time of maximum stage in the receiving water.

(b) Regulated Systems
Applicants are advised that design and maintained stage elevations are available either from the respective local jurisdiction or the Agency. Stages for the Agency's system for frequencies other than the design will be estimated by the Agency upon request from the Applicant.

(c) Non-regulated Systems
It is recommended that the Applicant compute receiving water stages for such systems from the best available data and submit the results to the Agency for review and concurrence before utilizing such results in further computations.

(d) Any System
Variable tailwater stages shall be considered if they have a significant influence on the design.

5.7.8 Runoff Coefficient and Curve Number for Stormwater Management Ponds

Stormwater management ponds, including dry retention ponds, detention ponds with filtration, dry detention ponds with underdrains, and wet detention ponds, shall be considered as impervious area for calculating composite runoff coefficients (C), and composite curve numbers.

5.8 Inspection and Maintenance

Inspection and maintenance standards are described in **section 12.4 of Volume I** and Rule 62-330.311, F.A.C. See **Appendix B** for inspection and reporting requirements for above-ground impoundments.

APPENDICES

Appendix A	SFWMD - Allowable Discharge Formulas
Appendix B	Above Ground Impoundments
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Appendix A: SFWMD - ALLOWABLE DISCHARGE FORMULAS

Canal	Allowable Runoff	Design Frequency
C-1	$Q = (\frac{112}{\sqrt{A}} + 31)\,A$	10 year
C-2	Essentially unlimited inflow by gravity connections southeast of Sunset Drive: 54 CSM northwest of Sunset Drive	200 year +
C-4	Essentially unlimited inflow by gravity connections east of S.W. 87th Avenue	200 year +
C-6	Essentially unlimited inflow by gravity connections east of FEC Railroad	200 year +
C-7	Essentially unlimited inflow by gravity connection	100 year +
C-8	Essentially unlimited inflow by gravity connection	200 year +
C-9	Essentially unlimited inflow by gravity connection east of Red Road; 20 CSM pumped, unlimited gravity with development limitations west of Red Road or Flamingo Blvd.	100 year +
C-10	----------	200 year +
C-11	20 CSM west of 13A;40 CSM east of 13A	----------
C-12	90.6 CSM	25 year
C-13	75.9 CSM	25 year
C-14	69.2 CSM	25 year
C-15	70.0 CSM	25 year
C-16	62.6 CSM	25 year
C-17	62.7 CSM	25 year
C-18	41.6 CSM	25 year
C-19	57.8 CSM	----------
C-23	31.5 CSM	10 year
C-24	30.25 CSM	10 year
C-25	$Q = (\frac{47}{\sqrt{A}} + 28)\,A$ (Under Review)	10 year
C-38	31.1 CSM (subject to restrictions of Basin Rule)	10 year
C-40, 41, 41A	35.4 CSM	10 year
Hillsboro Canal (east of S-39)	35 CSM	25 year
North New River (east of S-34)	70.8 CSM	25 year
Everglades Ag. Area (all canals)	20 CSM	5 year
L-28	11.8 CSM	----------
C-51	35 CSM east of Turnpike; 27 CSM west of Turnpike (subject to restrictions of Basin Rule)	10 year
C-100, 100A, 100B, 100C, 100D:	$Q = (\frac{104}{\sqrt{A}} + 43)\,A$	10 year
C-102	$Q = (\frac{119}{\sqrt{A}} + 25)\,A$	10 year
C-103N, C103-S	$Q = (\frac{107}{\sqrt{A}} + 39)\,A$	10 year

C-110	$Q = \left(\frac{137}{\sqrt{A}} + 9\right) A$	10 year
C-111	$Q = \left(\frac{117}{\sqrt{A}} + 29\right) A$	10 year
C-113	$Q = \left(\frac{104}{\sqrt{A}} + 3\right) A$	10 year

Definitions:

Q = Allowable runoff in cfs (cubic feet per second) CSM = cfs per square mile
A = Drainage area in square miles

APPENDIX B: ABOVE GROUND IMPOUNDMENTS

1.0 INTRODUCTION

1.1 Purpose

This Appendix to the Applicant's Handbook Volume II for use within the geographic limits of the South Florida Water Management District has been prepared to elaborate on the criteria and standards applicable to above ground impoundments in accordance with the definition and requirements for "dams" in Part IV of Chapter 373, F.S. The content herein is not intended to be all inclusive of all possible situations, but is intended to provide guidelines and basic performance criteria wherever possible on design criteria for the situations commonly encountered for most typical south Florida situations. Because dam performance is a function of construction, operation and maintenance as well as design, information on those subjects is included. The basic responsibility for dam performance remains vested in the owner or permittee through appropriate representation by his registered professional in accordance with State laws.

1.2 Classification

Upon request or application receipt District staff will classify impoundments or dams as "Major" or "Minor" for application review purposes in accordance with the following provisions:

1.2.1 Major - Impoundments located where failure would cause significant damage to the property of other than the permittee, could involve loss of human life, would create a public health hazard, or would cause irreversible environmental or water quality damage; maximum water depths above surrounding ground levels would generally exceed four feet.

1.2.2 Minor - Impoundments generally located in rural areas where failure would generally limit significant damage to the property of the permittee, would not involve loss of human life, would not create a public health hazard, and would not cause irreversible environmental or water quality damage; maximum water depths above surrounding ground levels would generally be limited to four feet, except where dam break analysis influence lines (six inch depth and two feet per second velocity) are limited to the land of the permittee and others, including the public, are not involved. It may be necessary that the permittee's land be legally restricted by such means as a unity of title to insure perpetual single ownership.

1.3 Certification responsibility

1.3.1 Major impoundments are considered to be individually engineered structures involving the disciplines of geotechnical, soils, foundation, and/or structural engineering and are therefore required to be certified in accordance with State law by registered professionals.

1.3.2 Minor impoundments are considered to be general site improvements and may therefore be certified in accordance with State law as part of the overall surface water management system by registered professionals.

1.4 Information submittals

1.4.1 Major impoundments require the submittal of all design, construction, operation and maintenance information necessary for complete review of the impoundment. Information to be submitted in addition to design calculations includes:

a. Proposed construction schedule
b. Safe filling and draining schedules
c. Design of seepage and water level monitoring programs
d. Operation and maintenance manual
e. Influence lines for dam break analysis (6 inch depth and 2 feet per second velocity)
f. Emergency response and evacuation plan (if appropriate)

Review by the District will be done for purposes of confirming that reasonable assurances are offered that the intent of District policies and general engineering principles will be met. The review is not intended to supplant the registered professional's initiative, judgment, expertise, experience and/or responsibility. When necessary the District may retain outside expertise to participate in the review.

1.4.2 Minor impoundments require only the submittal of the usual surface water management permit information. It is understood that the registered professional may perform calculations, tests, etc. for his/her own purposes or to meet State law and which may not be submitted.

2.0 DESIGN GUIDELINES

2.1 Major impoundments

2.1.1 Structural stability - All elements and appurtenant works for impoundments shall be designed for all possible conditions up to and including maximum water depths and in accordance with generally accepted engineering principles for such works, which include consideration of site preparation, construction materials, geological conditions, storm conditions, settlement, erosion, operation and maintenance and vandalism. More specific guidelines are as follows:

2.1.1.1 Dikes - shall be designed based on field test data of subsurface conditions and actual procedures and materials to be used in construction. Seepage and piping shall be considered and cutoff walls and toe drains included where necessary. Dimensions shall be such as to allow maintenance by normal equipment. Recommended side slopes for vegetated earth should be no steeper than 2 1/2:1 (horizontal to vertical) for external slopes and 3:1 (horizontal to vertical) for internal slopes. Top widths should be of sufficient width to allow safe vehicular access and no less than twelve feet. Dike toes should be continually accessible by vehicle by relatively level to berms of at least ten feet width. Dikes and toe berms should be widened at strategic points for vehicular turnaround or where necessary to load stockpiled material to be used for dike repair.

2.1.1.2 Structures - Discharge and other structures should be located to be accessible from the top of the dike during storm conditions for emergency operation and maintenance if necessary. They should be of permanent low maintenance materials, preferably reinforced concrete. The location and design should be such that dike integrity is maintained. Trash racks, seepage rings and vandalism protection should be included. A preferable design would consist of an inlet box which does not interfere with normal dike sideslopes and a conduit under the dike to an outfall endwall. Erosion protection, energy dissipators, etc. would be necessary at strategic points including the outfall.

2.1.2 Hydraulics - Unless more stringent criteria should apply because of other jurisdictional standards or unusual risks, the minimum District standards are as follows:

2.1.2.1 Maximum water depth as determined by routing a three day precipitation (distributed according to the Applicant's Handbook Volume II, Section 5.7.2) through the inflow and outflow structures with rainfall on the reservoir. Three day precipitation amounts may vary between thirty six and fifty six inches depending on site specific conditions and risk management considerations. District staff will advise on request.

2.1.2.2 Design water depth - As determined by routing the project allowable discharge design event through the inflow and outflow structures with rainfall on the reservoir. The three day 25 year event should typically be used as a minimum.

2.1.2.3 Minimum freeboard above maximum water depth - Three feet minimum or that required to prevent overtopping or failure due to hurricane force winds as derived from the South Florida Building Code.

2.1.2.4 Discharge structure – Applicant's Handbook Volume II allowable discharge for reservoir at maximum water depth with 100 year tailwater flood elevation, or Applicant's Handbook allowable discharge for reservoir at design water depth and non-limiting tailwater, unless more accurate site specific tailwater elevations are applicable and substantiated by the applicant.

2.1.2.5 Return overflow - Impoundments must contain an outflow discharge structure which returns water to the area from which inflow occurs. Therefore a separate structure will be necessary for pump filled impoundments to allow return flow under the conditions of maximum or design water depths in the reservoir with pumps continuing to operate. For gravity filled impoundments this structure will actually be the inflow structure since reservoir and project stages will be the same.

2.1.2.6 Emergency discharge gates - Discharge structures should include emergency gates which can only be opened with District permission. Return overflow structures must include emergency gates to be operated at the discretion of the permittee or at the direction of the District.

2.1.2.7 Pumps-The pumps used to fill impoundment serving multiple owners, when allowed, should be multiple pumps of the same sizes to allow interchange of parts. Electric pumps should have standby fuel operated power systems.

2.1.2.8 Seepage collection systems - A safety factor of three shall be utilized for hydraulic conveyance design purposes.

2.1.3 Floodplain encroachment and setbacks - Impoundments shall not be located within floodplains or shall otherwise provide compensation and setbacks as provided in Section 3.6 in the Applicant's Handbook Volume II. Impoundments located in flat areas of diffused flow shall have the toe of dikes set back at least fifty feet from property lines to allow historic sheet flow to move around the impoundments. Greater dimensions or swale construction may be required if steep slopes, very large contributing areas, etc. would cause that dimension to be inadequate. Smaller dimensions may be allowed if the applicant can demonstrate smaller dimensions will suffice.

2.1.4 Environmental and water quality - The provisions of the Applicant's Handbook Volume I and Volume II apply. Since many impoundments are utilized for wetland management and/or mitigation, it may be necessary to set control elevations and emergency gate bottoms above natural ground levels in order to prevent wetland overdrainage.

2.1.5 Emergency repair material - Appropriate amounts of type, quantity and location of emergency repair materials shall be included in design plans.

2.2 Minor impoundments

2.2.1 Structural stability - The same general comments apply as for Major impoundments with specific guidelines as follows:

2.2.1.1 Dikes - Designs shall be in accordance with commonly accepted engineering principles and State laws. Dikes external to the permittee's property shall meet the dimensional and access criteria for Major impoundments to the degree necessary to meet the intent of Section 1.2.1. Internal dikes may be of lesser standards, but sideslopes should be no steeper than 2:1 (horizontal to vertical) and top widths no less than five feet.

2.2.1.2 Structures - Discharge and other structures should be as for Major impoundments.

2.2.2 Hydraulics - The same general comments apply as for Major impoundments with specific standards as follows:

2.2.2.1 Maximum water depth - The maximum water depth equals the design water depth as described for Major impoundments.

2.2.2.2 Minimum freeboard above maximum water depth - Equal to the maximum water depth dimensions but not less than two feet, no more than three feet.

2.2.2.3 Discharge structure – Applicant's Handbook Volume II allowable discharge for reservoirs at design water depth and non-limiting tailwater, unless more accurate site specific tailwater elevations are applicable and substantiated by the applicant.

2.2.2.4 Return overflow - Same as for Major impoundments.

2.2.2.5 Emergency discharge gates - Same as for Major impoundments except installation is optional.

2.2.2.6 Pumps - Same as for Major impoundments.

2.2.2.7 Seepage collection systems - Optional.

2.2.3 Floodplain encroachment and setbacks - Same as for Major impoundments.

2.2.4 Environmental and water quality - Same as for Major impoundments.

2.2.5 Emergency repair material - Optional.

3.0 CONSTRUCTION

Construction certification is a requirement of all permits for both Major and Minor impoundments, and it is therefore the responsibility of the registered professional to satisfy himself/herself and the State laws as to construction compliance with design. Changes to permitted design would require the need for As-Built plans to satisfy certification. Major changes, including changes to permit authorization or special or

limiting conditions would require a permit modification prior to implementation. The District expects continual construction observation to be the minimum requirement necessary to evidence ability to perform certification on Major impoundments. Certification must indicate that construction has been satisfactorily completed so that routine operation and maintenance may commence.

4.0 OPERATION AND MAINTENANCE

4.1 Reporting

Inspection of impoundment conditions, repairs, etc. will be a continuing process required by permit special condition. Inspection reports are to be retained by the permittee and copies made available to the District upon request. It is the basic responsibility of the permittee to initiate interim reporting and/or more detailed reporting to the District as conditions change, emergencies or problems arise, etc. It is expected that Major impoundments will be reported in accordance with the operation and maintenance manual and emergency response and evacuation plan adopted at the time of permit issuance, with updates as necessary.

4.2 Primary subjects of interest

4.2.1 Major impoundments

4.2.1.l Dikes and seepage collection system

a. Vegetation conditions
b. Erosion
c. Evidence of boils, piping, unusual seepage
d. Slope stability, surface cracking
e. Settlement
f. Travelway conditions
9. High and low water marks
h. Presence of aquatic vegetation in supposed dry areas
i. Monitoring system condition and monitoring data
j. Adequacy and condition of emergency repair material
k. Short and long term repair and modification recommendations

4.2.1.2 Structures and pumps

a. Materials conditions
b. Operational conditions
c. Evidence of vandalism
d. Settlement and erosion
e. Freedom from trash problems
f. Short and long term repair and modification recommendations

4.2.1.3 Impoundment area

a. Vegetation changes
b. Evidence of encroachment and misuse of land

4.2.1.4 Emergency response plan

a. Land use changes in area of influence
b. Topographic changes causing change in area of influence
c. Changes in participants, addresses, phone numbers, etc. involved in emergency response plan
d. Evidence of contact update with involved emergency management officials

4.2.2 Minor impoundments

4.2.2.1 Dikes

a. Vegetation conditions
b. Erosion, settlement, cracking, stability
c. Short term repair and modification recommendations

4.2.2.2 Structures and pumps

a. Structural conditions
b. Operational conditions
c. Short term repair and modification recommendations

4.2.2.3 Impoundment area

a. Vegetation changes
b. Evidence of encroachment and misuse of land

4.3 Typical special condition

4.3.1 Upon completion of construction, and on an annual basis (in March of each year), the permittee shall have an inspection performed to assess the structural adequacy of all above-ground dikes, control structures, levees and berms behind which water is to be contained and where failure could impact off-site areas. A registered professional shall perform each inspection and prepare each report. These reports shall be signed and sealed by the registered professional performing the inspection, kept on file by the permittee and made available to the South Florida Water Management District (SFWMD) personnel upon request. If deficiencies are found that will affect the performance of the impoundment, a report which is signed and sealed by the registered professonal performing the inspection shall be submitted to the District

which includes, but is not limited to, the proposed technique and schedule for repair of any deficiencies noted.

5.0 REFERENCES

Agencies with impoundment experience and publications:

a. U.S. Army Corps of Engineers
b. U.S. Department of Interior, Bureau of Reclamation
c. U S Department of Agriculture, Soil Conservation Service

Appendix C: Isohyetal Maps
from SFWMD Technical Memorandum, *Frequency Analysis of One and Three Day Rainfall Maxima for central and southern Florida*, Paul Trimble, October 1990.

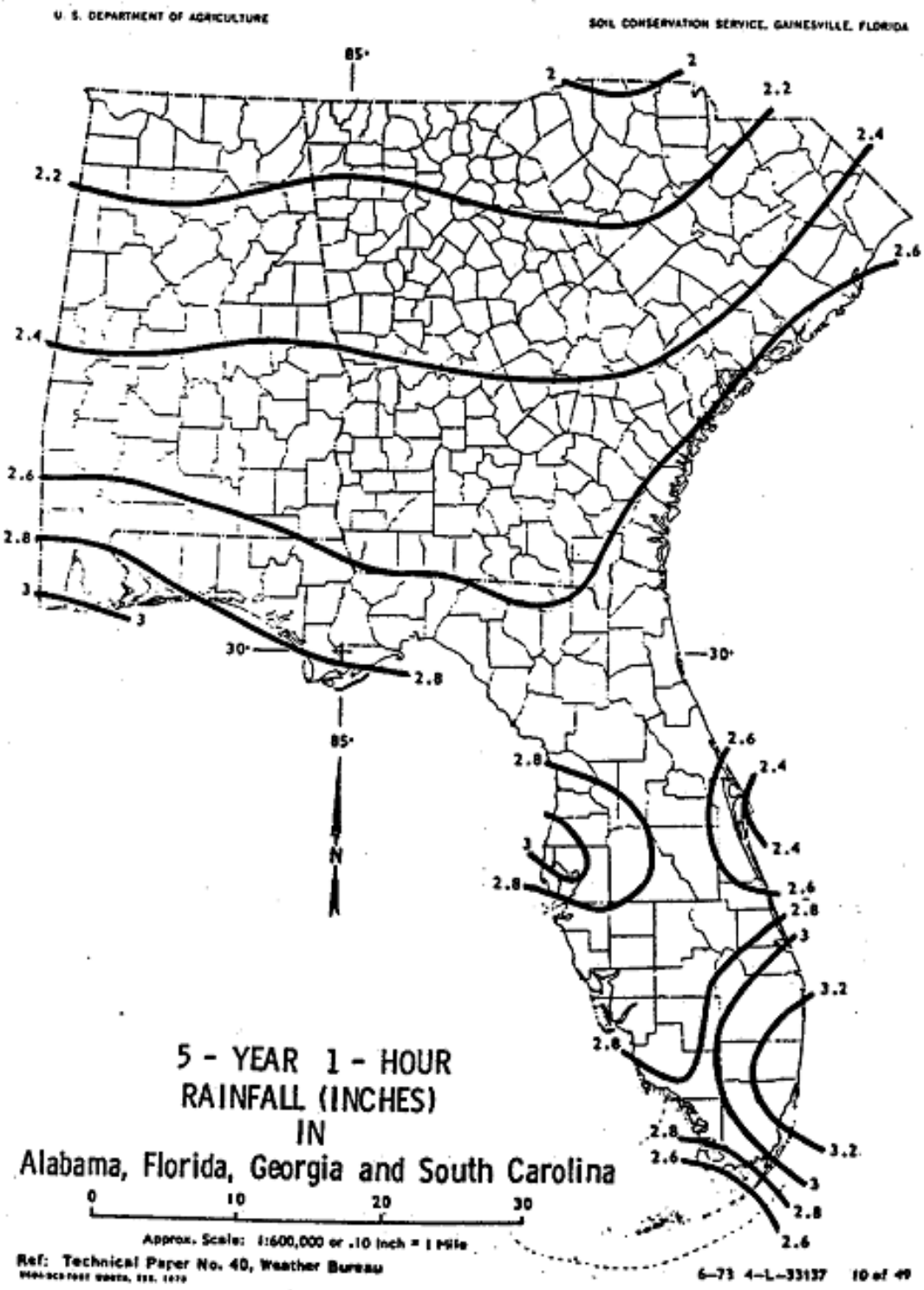


Figure C-1

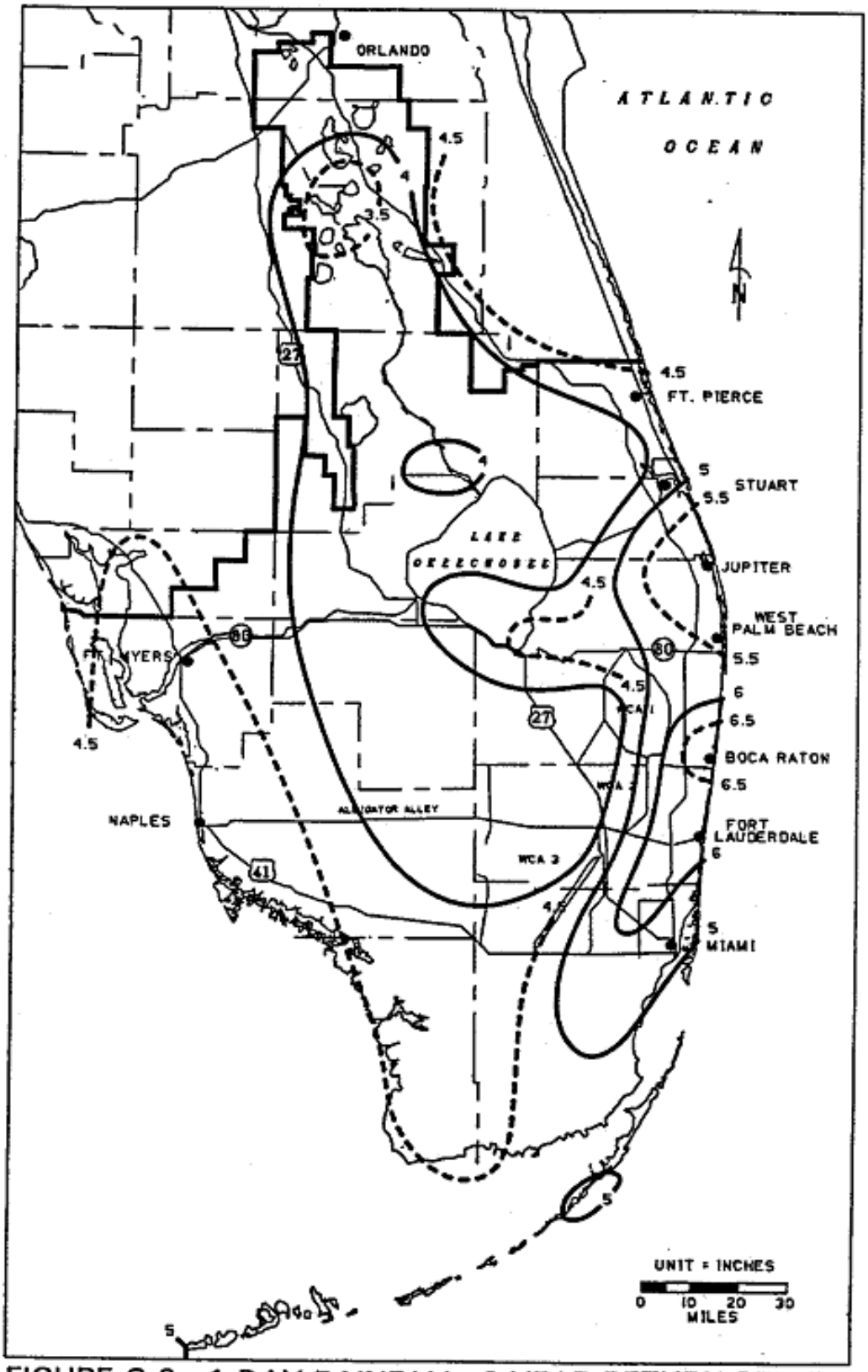


FIGURE C-2. 1-DAY RAINFALL: 3-YEAR RETURN PERIOD

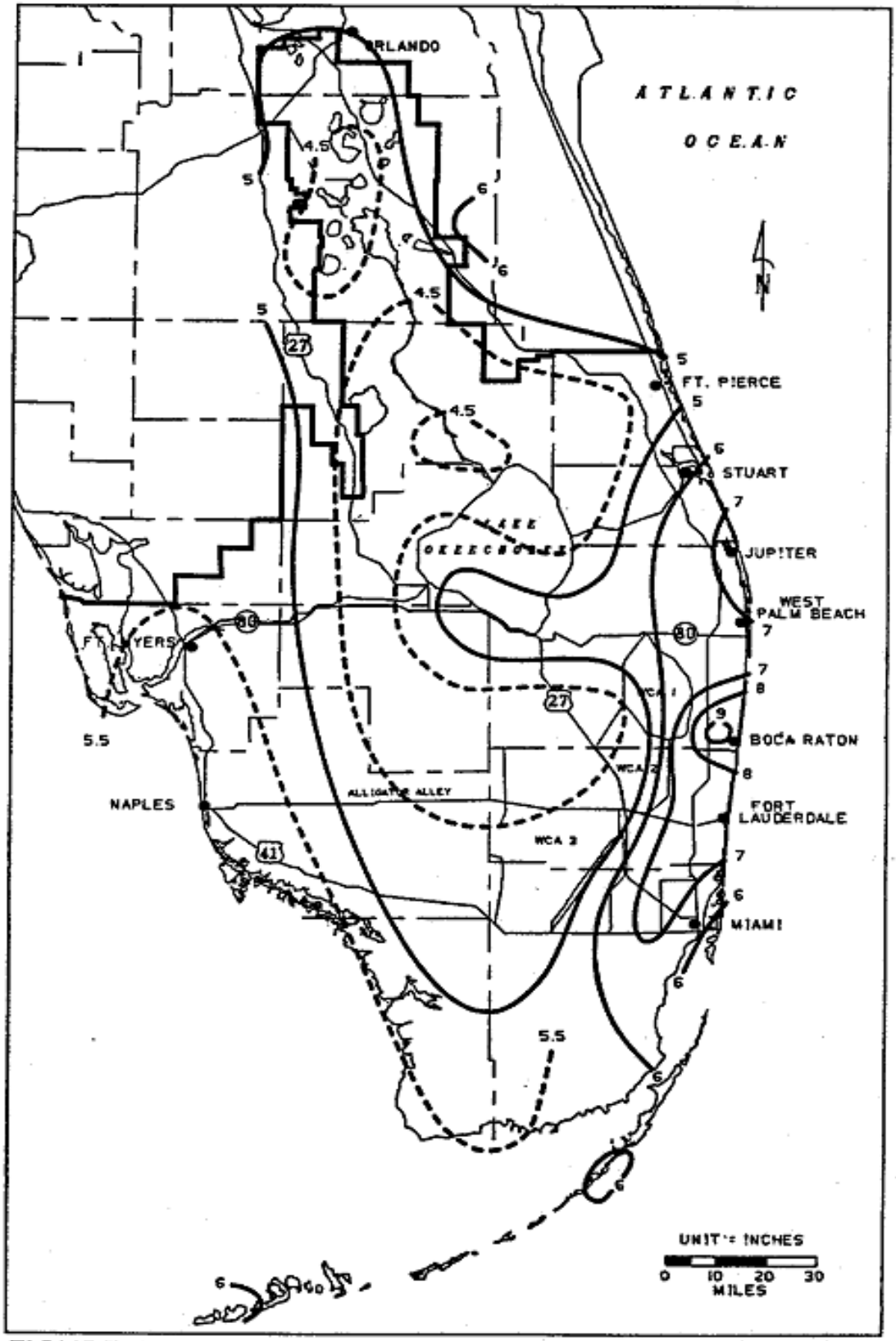


FIGURE C-3. 1-DAY RAINFALL: 5-YEAR RETURN PERIOD

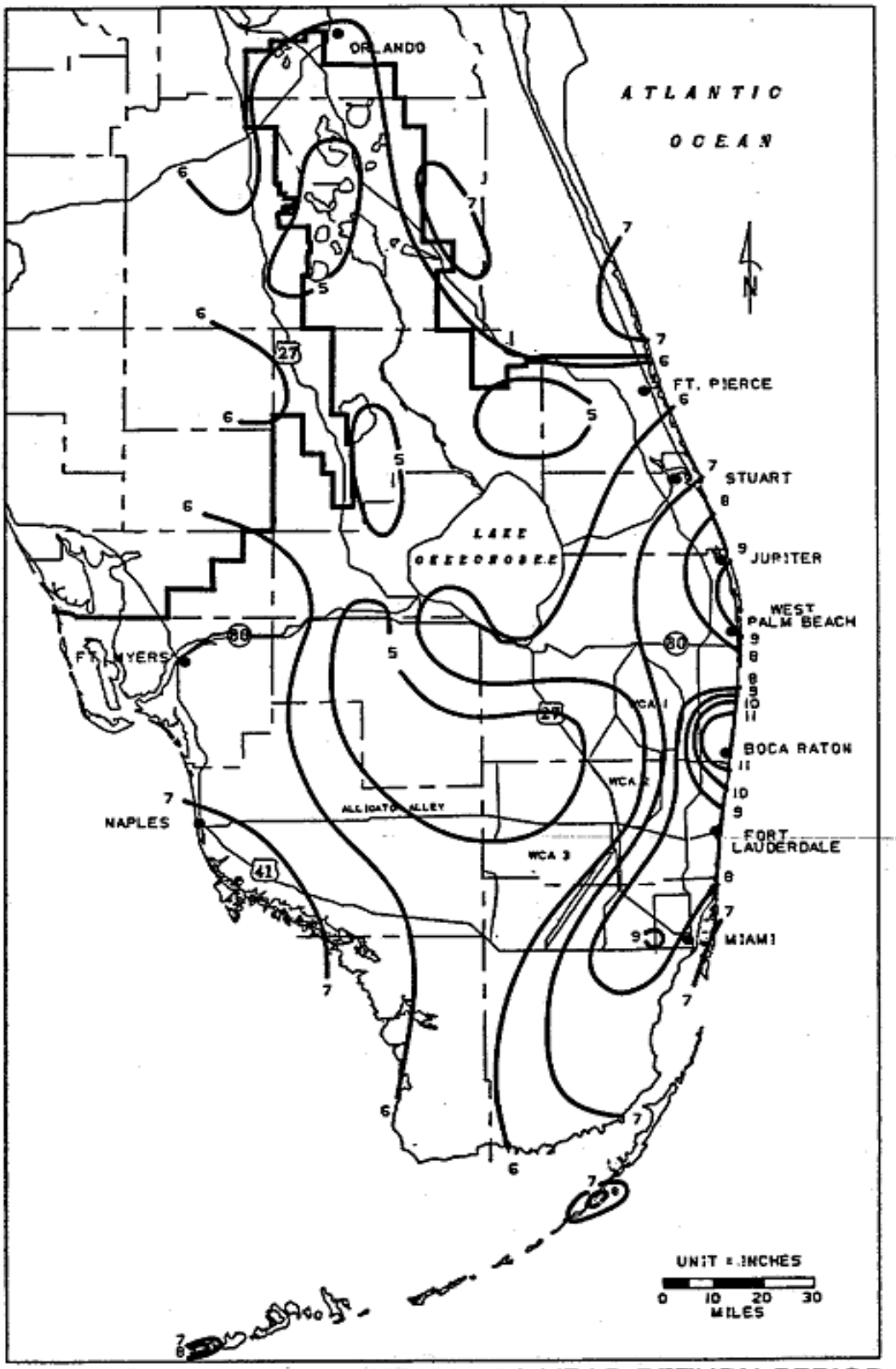


FIGURE C-4. 1-DAY RAINFALL: 10-YEAR RETURN PERIOD

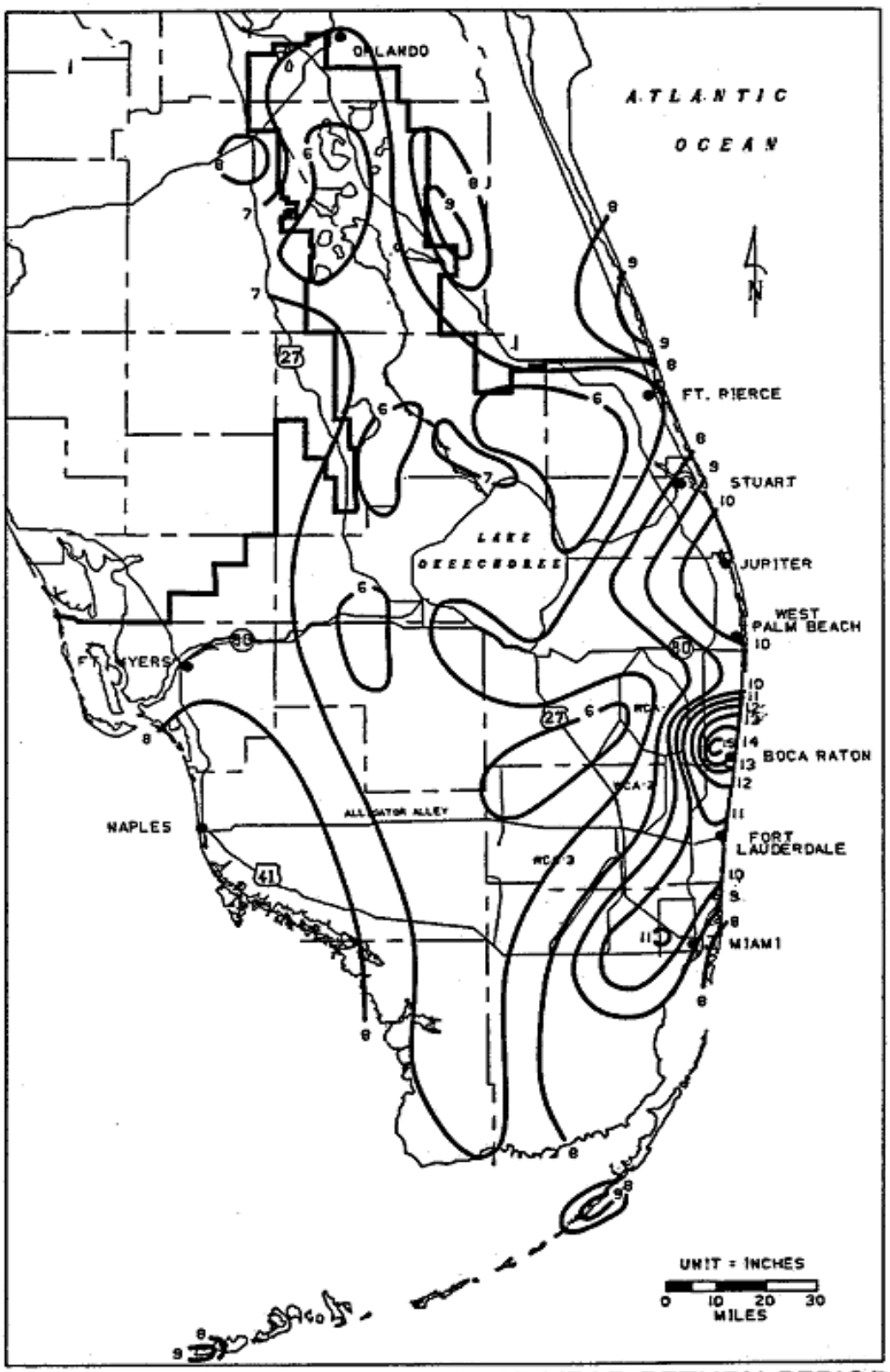


FIGURE C-5. 1-DAY RAINFALL: 25-YEAR RETURN PERIOD

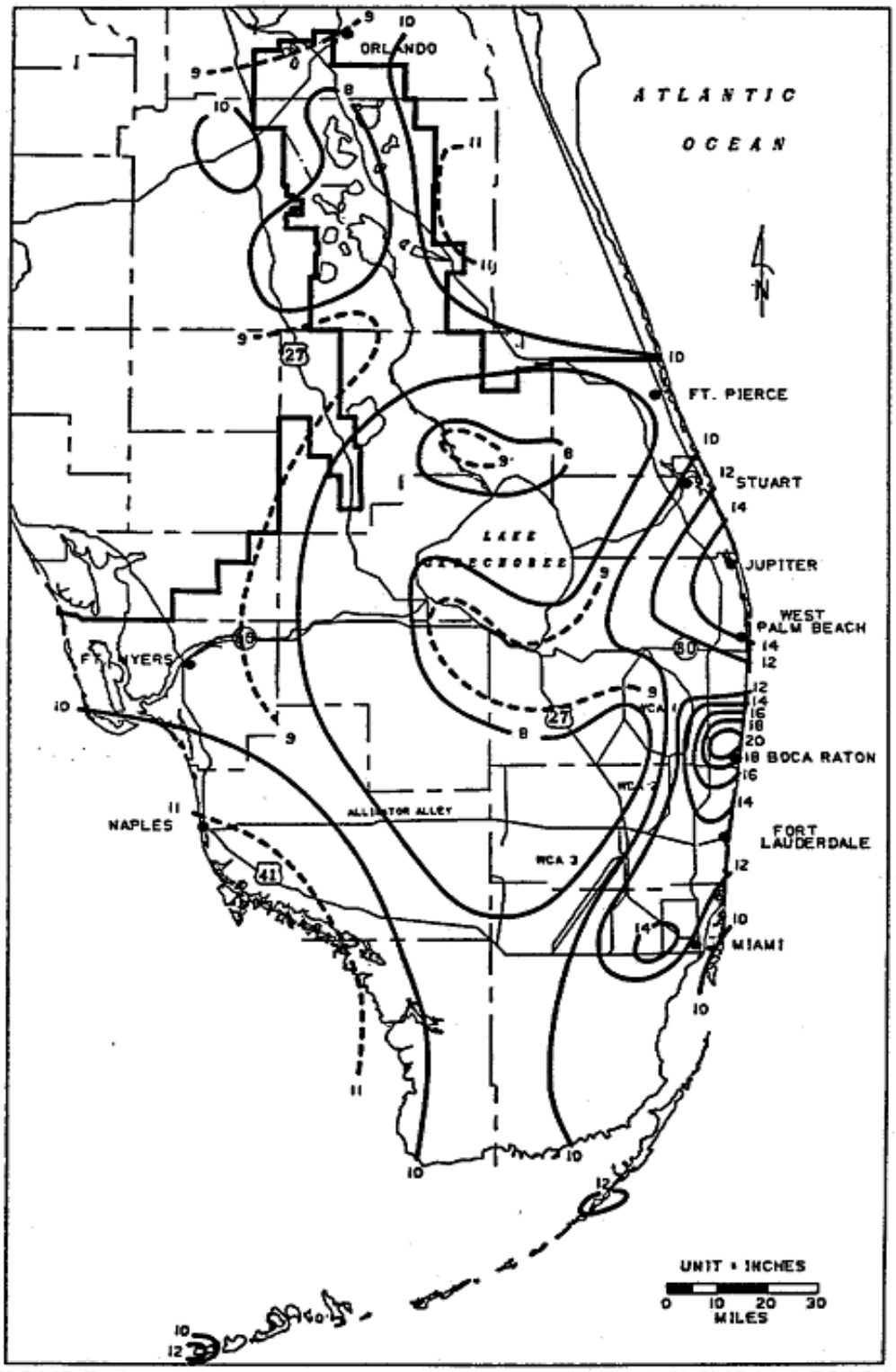


FIGURE C-6. 1-DAY RAINFALL: 100-YEAR RETURN PERIOD

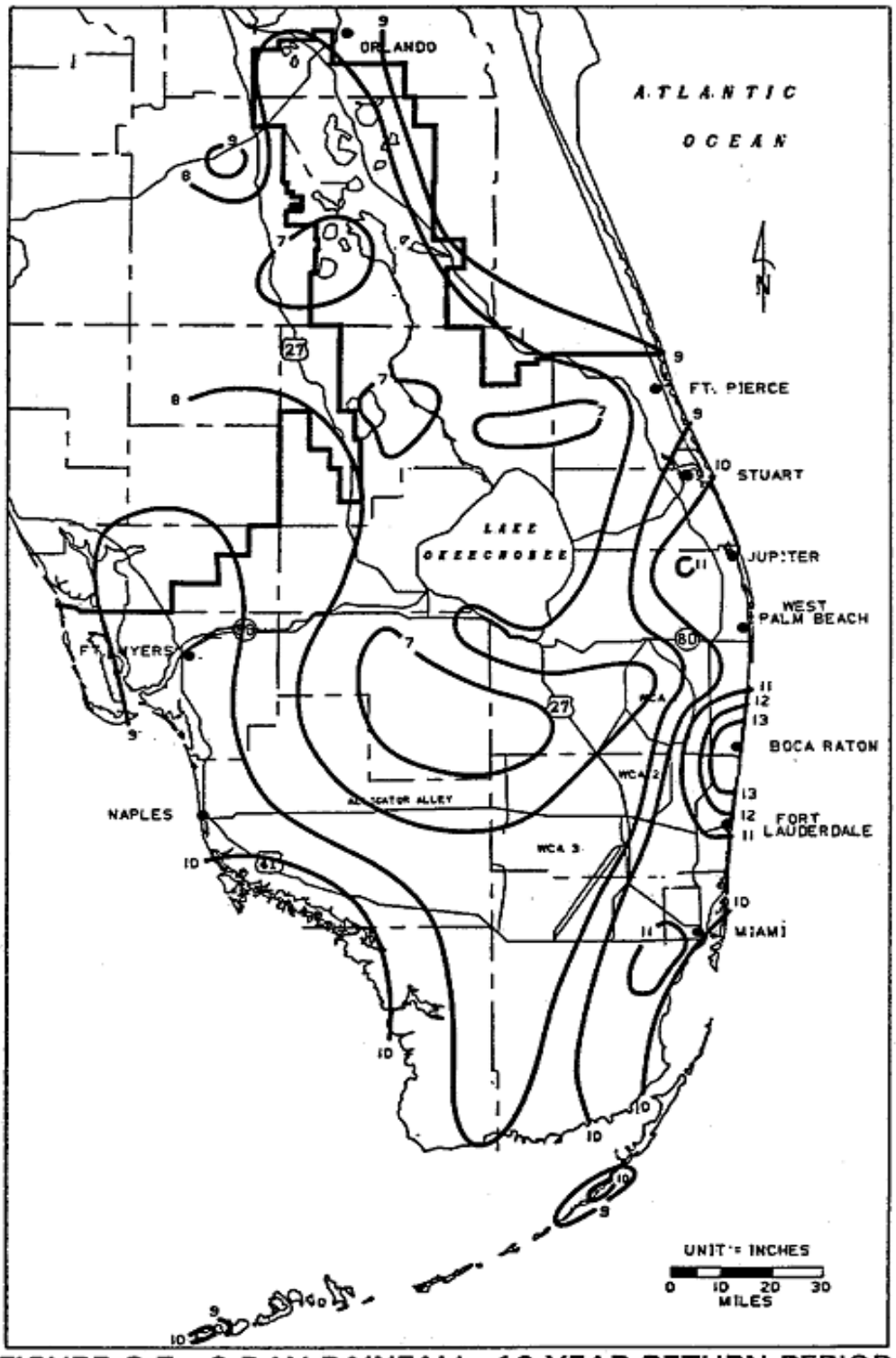


FIGURE C-7. 3-DAY RAINFALL: 10-YEAR RETURN PERIOD

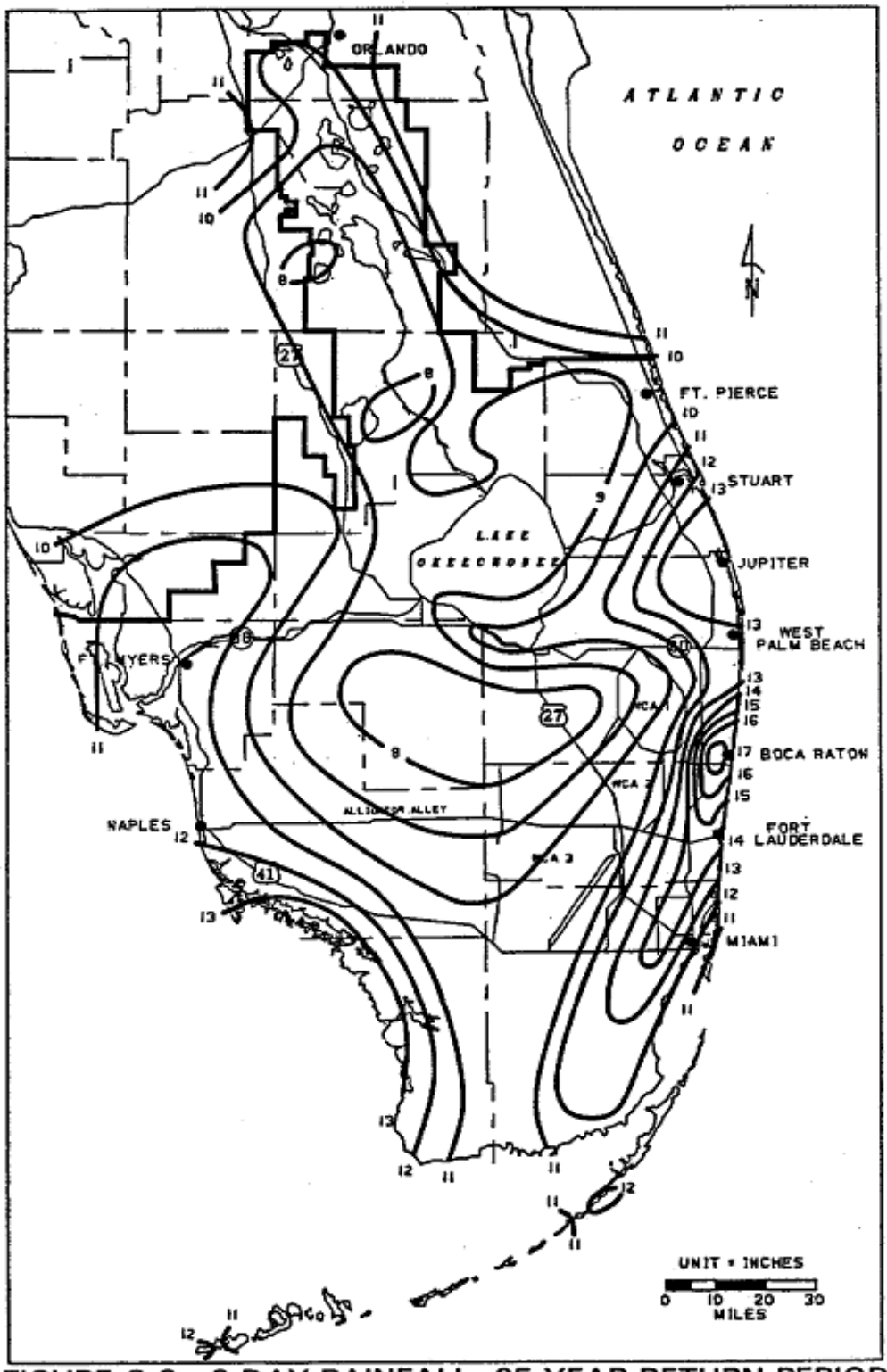


FIGURE C-8. 3-DAY RAINFALL: 25-YEAR RETURN PERIOD

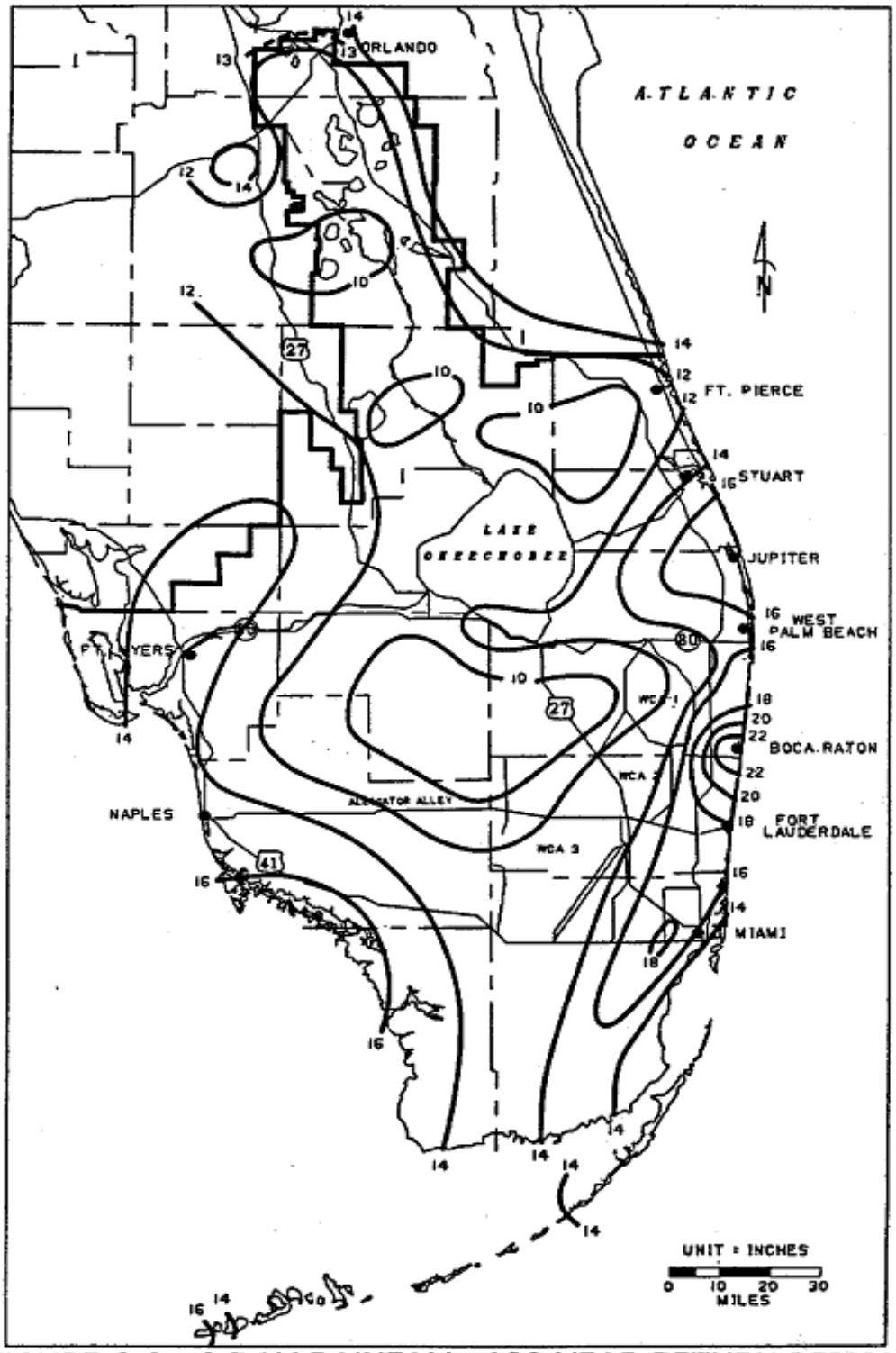
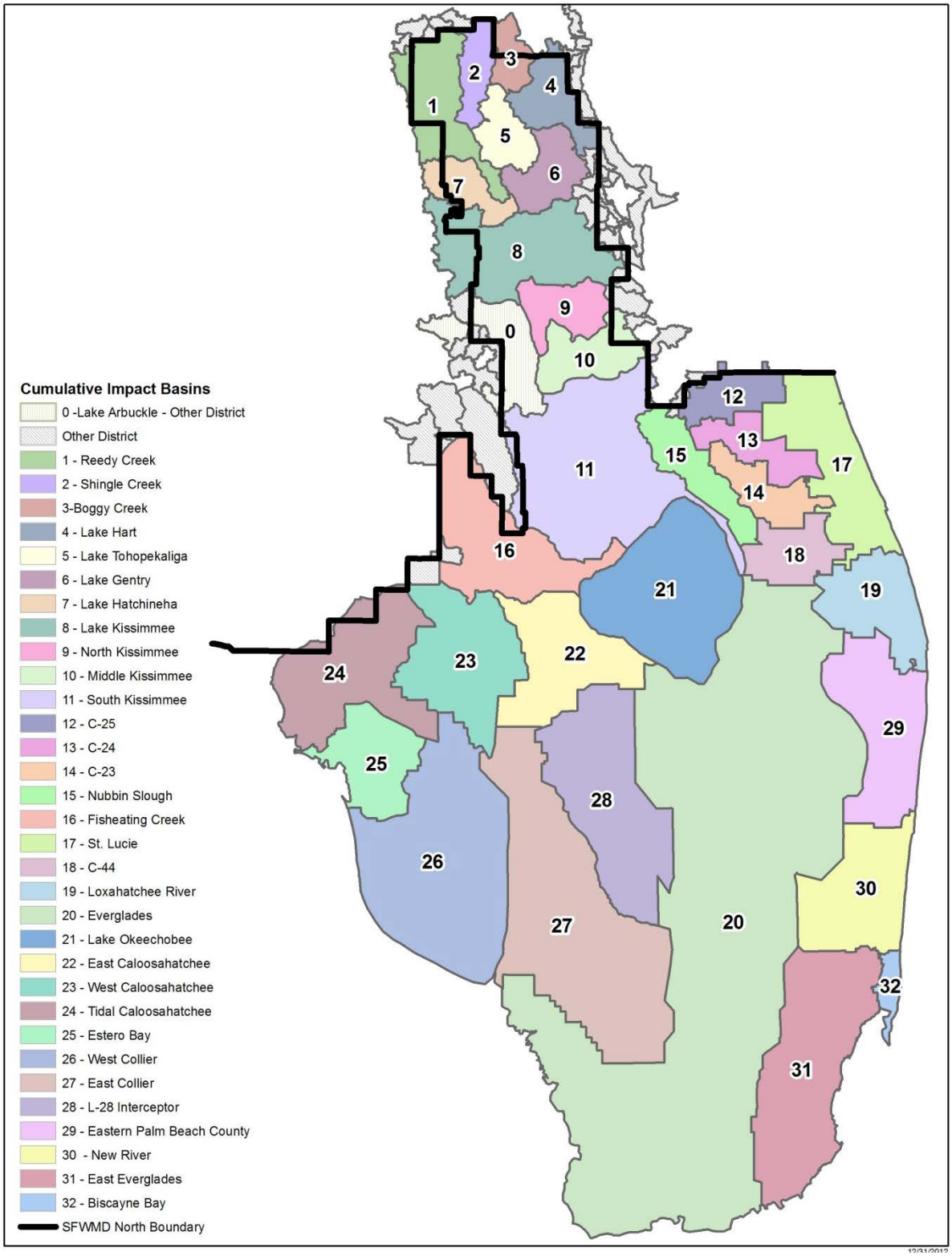


FIGURE C-9. 3-DAY RAINFALL: 100-YEAR RETURN PERIOD

APPENDIX D: SFWMD Basins
for Cumulative Impact Assessments & Mitigation Bank Service Areas



APPENDIX E
Procedure for Environmental Resource Permit Water Quality Evaluations for Applications Involving Discharges to Outstanding Florida Waters and Water Bodies that Do Not Meet State Water Quality Standards

This procedure shall be utilized in coordination with the "Environmental Resource Permit Applicant's Handbook Volume I: General and Procedural" (Volume I), incorporated by reference in Rule 62-330.010, F.A.C., and "Environmental Resource Permit Applicant's Handbook Volume II: For Use within the South Florida Water Management District" (District) (Volume II), incorporated by reference in Rule 40E-4.091, F.A.C. This procedure pertains to the application of existing District rules in the evaluation of permit applications for projects which discharge to Outstanding Florida Waters (OFWs) and water bodies that do not meet State water quality standards identified on the State's "Verified List" of impaired waters or water bodies that have a State adopted Total Maximum Daily Load (TMDL) (impaired water bodies).

"Impaired Water Bodies"
Chapter 62-303, Florida Administrative Code (F.A.C.), describes impaired water bodies. Water bodies that have been assessed and determined to be impaired by the Department of Environmental Protection (DEP) due to pollutant discharges are included on the "Verified List" adopted by DEP Secretarial Order. Water bodies on the "Verified List" can be determined from DEP's web site at: http://www.dep.state.fl.us/water/watersheds/assessment/a-lists.htm.

Relationship Between "Impaired Waters" and District Water Quality Rules
Chapter 62-303, F.A.C., does not limit the applicability of existing environmental resource permit (ERP) rules and other criteria under other provisions of Florida law. Consequently, the District implements its existing rules to ensure non-degradation of OFWs and prevent further degradation of impaired water bodies.

This procedure highlights the requirements in the existing District ERP rules to meet water quality criteria. This procedure also provides additional measures which shall be considered, on a project by project basis, as necessary to provide reasonable assurance that new activities regulated pursuant to Part IV of Chapter 373, Florida Statutes (F.S.) will not degrade an OFW or will not contribute additional causative pollutants to an impaired water body.

Existing ERP Water Quality Requirements and Evaluation
The design requirements in Section 4, Stormwater Quality, of Volume II are applied in conjunction with the water quality requirements in Section 8, Criteria for Evaluation and Section 10, Environmental Criteria, Volume I.

State surface water quality standards are outlined in Chapter 62-302, F.A.C., and require that reasonable assurances be provided to ensure that proposed discharges do not cause or contribute to violations of State water quality standards. As a part of the review of ERP applications, the District evaluates whether discharges from a project will

be directed to an OFW or a water body that has been identified as impaired pursuant Chapter 62-303, F.A.C. If a proposed project discharges to an OFW or an impaired water body, the District will require that additional protective measures be incorporated into the project's design and operation to provide reasonable assurance that the proposed discharge will not cause or contribute to violations of State water quality standards. The additional protective measures shall include a site-specific pollutant loading analysis and an additional 50% water quality treatment volume above the amounts required pursuant to Section 4.2.1, Volume II. Best management practices (BMPs), source controls or protective measures shall be considered as discussed below.

Section 4.1, Volume II requires that "projects shall be designed and operated so that off-site discharges will meet State water quality standards." Section 4.1.3, Volume II, states that "systems which have a direct discharge to an OFW, must provide an additional fifty percent of the required treatment." Section 4.9.1, Volume II specifies a more detailed evaluation by the District staff for new developments which outfall to sensitive receiving waters. Such sensitive receiving waters include all OFWs as well as other water bodies specifically named in this rule.

Section 10.2.4, Volume I states:

> An applicant must provide reasonable assurance that the regulated activity will not violate water quality standards.
> Reasonable assurance regarding water quality must be provided both for the short term and the long term . . . . The following requirements are in addition to the water quality requirements found in Sections 8.2.3 and 8.3 through 8.3.3.

In cases where a project will discharge to a water body that does not meet standards, Section 10.2.4.5, Volume I requires that:

> The applicant must demonstrate that the proposed activity will not contribute to the existing violation.

Section 10.2.4.5, Volume I also states, "If the proposed activity will contribute to the existing violation, mitigation may be proposed as described in subsection 10.3.1.4 (Volume I)."

In addition, where the applicant is unable to meet water quality standards because existing ambient water quality does not meet standards, Section 373.414(1)(b)3, F.S., states that the Governing Board shall:

> consider mitigation measures proposed by or acceptable to the applicant that cause net improvement of the water quality in the receiving body of water for those parameters which do not meet standards.

Required Analysis
The applicant must submit the following for each project:

Construction Phase Pollution Prevention Plan

A Stormwater Pollution Prevention Plan for construction activities resulting in greater than 1 acre of land clearing, soil disturbance, excavation, or deposition of dredge material. The plan shall be prepared in accordance with recognized design practices and shall identify the potential sources of pollution that shall reasonably be expected to affect the quality of stormwater discharge associated with the construction activity.

Operation Phase Pollution Prevention Plan

A Post-construction Pollution Prevention Plan to be submitted as part of the permit application, which provides details of controls and practices to be implemented after construction is completed to reduce or eliminate the generation and accumulation of potential stormwater runoff contaminants at or near their source. A Post-construction Pollution Prevention Plan shall include plans for surface water management system operation and maintenance, nutrient and pesticide management, solid waste management, and/or animal/livestock waste storage and disposal, if applicable. Records of maintenance, operation and inspection shall be kept by the permittee and shall be available for inspection and copying by the District staff upon request.

Site-Specific Water Quality Evaluation

In order to demonstrate that the proposed activities will not contribute to an existing impairment of a water body, will not degrade an OFW, or will provide a "net improvement," an applicant shall provide reasonable assurance based on site-specific information to demonstrate that discharges of the parameter or parameters which have caused the impairment do not have the potential to cause or contribute to water quality violations in the basin. This demonstration shall be accomplished through the use of a site-specific water quality evaluation.

Additional Source Controls, BMPs and Other Protective Measures
In addition to the extra 50% water quality treatment volume for discharges to OFWs or impaired water bodies, a site-specific water quality analysis is required. Before submitting an application, the applicant shall perform an initial site-specific water quality analysis. The initial analysis must demonstrate that the proposed project's stormwater management system will not degrade an OFW or will provide a net improvement in an impaired water body for any parameters which are impaired. If the site-specific water quality analysis does not demonstrate that an OFW will not be degraded or a net improvement will occur in an impaired water body, then additional protective measures are required. These protective measures shall consist of source controls, BMPs or other protective measures. The applicant must then submit a site-specific water quality analysis to the District that demonstrates that an OFW will not be degraded or that a net improvement will occur in an impaired water body of any parameter which is impaired.

Listed below are typical source and structural controls commonly incorporated into proposed project stormwater designs and site specific water quality analysis as a part of the evaluation of whether an applicant has provided reasonable assurance to demonstrate that a proposed activity will not degrade an OFW, or in the case of an impaired water body, will not contribute to a violation of the impaired parameter. Such evaluation must take into consideration the particular water quality parameter which is not being met in the water body and whether the proposed project will contribute to the continued violation. The listed additional protective measures are not considered exhaustive. The District will consider other protective measures proposed by the applicant which include the necessary detailed documentation to demonstrate reasonable assurance that water quality standards will not be violated during construction and during long term operation. A combination of protective measures must be based on the proposed project, receiving water body, and specific pollutant(s) causing or contributing to the impairment of the receiving water body. Examples of protective measures are:

Increased Hydraulic Residence Time

Increased average wet season hydraulic residence time of wet detention ponds to at least 21 days using a maximum depth of 12 feet from the control elevation to calculate the residence time.

Pollutant Source Controls

Source controls typically include reduced turf coverage; native landscape plantings; stormwater harvesting and recycling; rooftop runoff management and recycling; pervious pavement; and vegetated non-turf buffers around detention/retention ponds.

Conveyance and Pretreatment BMPs

Stormwater conveyance and pretreatment BMPs typically include filter strips; vegetated stormwater inlets; vegetated swales; sediment trap structures such as baffle boxes; and dry retention or detention pretreatment.

Water Quality Treatment Enhancement

Stormwater treatment system enhancements typically include the use of on-site created wetlands in a treatment train as a polishing cell after primary treatment; detention ponds with littoral berms, settling basins or phyto-zones within the detention areas; planted wetland filter marshes just upstream of project outfall structures; detention ponds with increased effective treatment time by use of internal levees and/or berms and/or location of inflow and outflow structures to increase the flow path distance.

Treatment Efficiency of BMPs in Series

If a stormwater treatment system is designed in series as part of a BMP treatment train to increase the pollutant removal efficiency of the overall system, the treatment efficiencies of BMPs in series must account for the reduced loading transferred to subsequent downstream treatment devices as well as irreducible concentrations of certain pollutants.

After treatment occurs in the first system, a load reduction occurs, which is a function of the type of treatment provided. After migrating through the initial treatment system, the remaining load consists of pollutant mass which was not removed in the initial system. This mass is then acted upon by the second treatment system with an efficiency associated with the particular type of BMP used until the irreducible concentration level is met.

Attention must be paid to the treatment efficiency used for each downstream BMP to account for the diminishing "treatability" of stormwater as concentrations are reduced.

Water Quality Mitigation

In cases where ambient water quality does not meet State water quality standards and it is determined that the proposed activity will contribute to the violation (e.g., the water body is impaired for nutrients and the proposed project will discharge an increased nutrient load), Section 373.414(1)(b)3, F.S., and the Section 10.3.1.4. Volume I include provisions for water quality mitigation that will cause a net improvement. Water quality mitigation can be accomplished in a variety of ways. The typical concept is to provide net improvement through implementation of a water quality treatment system or retrofit of an area that currently discharges untreated stormwater runoff to the same receiving body as the proposed project. The type of land use, runoff rates, removal efficiencies and the pollutants expected from the mitigation area all must be compared to the proposed activity to assure the proposed mitigation is sufficient to cause a net improvement in the receiving water. Any areas used for off-site treatment must include a perpetual easement for this purpose, over the off-site treatment area, which cannot be amended, altered, released or revoked without the prior written consent of the District.

Water Quality Monitoring

Section 4.9.1(b), Volume II of the Environmental Resource Permit Applicant's Handbook Volume II: For Use within the Geographic Limits of the South Florida Water Management District, incorporated by reference in Rule 40E-4.091, F.A.C., contains the rule on water quality monitoring.