FLORIDA STORMWATER ASSOCIATION

Leadership in Stormwater Management and Utilities

PO Box 13688 - Tallahassee, FL 32317 - www.florida-stormwater.org - 888/221-3124 - info@florida-stormwater.org

December 28, 2022

Florida Department of Environmental Protection
ATTN: Borja Crane-Amores
3900 Commonwealth Boulevard
Tallahassee, FL 32399-3000
Submitted via email: Stormwater2020@floridadep.gov

RE: Proposed Revisions Updating the Stormwater Design and Operation Regulations

Dear Mr. Crane-Amores:

The Florida Stormwater Association (FSA) appreciates the opportunity to submit comments to Department on the proposed revisions to the ERP Applicant's Handbook Volume I and the NWFWMD ERP Applicant's Handbook Volume II. This will be FSA's fifth set of comments and we continue ask that the Department consider all comments submitted to date.

FSA continues to support the work and recommendations of FDEP's Clean Waterways Act Stormwater Rulemaking Technical Advisory Committee (TAC) as contained in their Summary Report. The recommendations of the TAC came after many months of discussion and debate. We strongly urge the Department to incorporate the recommendations of the TAC unless there are sound, scientific reasons to do otherwise. In cases where the TAC's recommendations are not incorporated into the drafts of the proposed rule revisions, we request the Department to provide the specific reasons for departing from the TAC's recommendations as contained in the Summary Report.

FSA stands in support of the current effort and appreciates the Department's continued effort to ensure the successful adoption of updated regulations in time for ratification by the Legislature during the 2023 Session.

As always, we stand ready to assist the Department in that effort in any way possible.

Sincerely,
FLORIDA STORMWATER ASSOCIATION, INC.

Danielle Hopkins

ERP AH Vol I Section 2 (Draft 3)
FSA Comments 12-28-22

2.0 Definitions and Terms

(a) The definitions and terms below are used for purposes of Chapter 62-330, F.A.C., and this Volume I. **Section 2.1** of each District-specific Volume II contains additional definitions that apply to the design and performance standards and criteria for stormwater management systems, dams, impoundments, reservoirs, works, appurtenant works, and special basins as regulated in that District. Where a definition is in accordance with Florida Statutes, the statutory attribution is given as "[XX]."

1. through 8. No change.

9. "Aquitard" or "Confining Layer" means a layer of low permeability material, such as clay or rock, adjacent to an aquifer that functions to prevent the transmission of significant quantities of groundwater flow under normal hydraulic gradients.

9. through 10. Renumbered. No change

~~11.~~12. "As-Built drawings" or "record drawings" means plans certified by a registered professional that accurately represent the constructed condition of a project, including identifying any substantial deviations from the permitted design. See subparagraph 62-330.310(4)(a)1, F.A.C.

13. "Average annual nutrient load or loading" means the product of annual runoff volumes and event mean nutrient concentrations

14. "Best Management Practice (BMP) for sediment and erosion control" means a practice or combination of practices determined by the district, in cooperation with the department, based on research, field-testing, and expert review, to be the most effective and practicable, including economic and technological considerations, to prevent or reduce erosion processes and sediment transport downstream.

15. "Best Management Practice (BMP) for stormwater treatment" means a practice or combination of practices determined by the district, in cooperation with the department, based on research, field-testing, and expert review, to be the most effective and practicable, including economic and technological considerations, of improving water quality by reducing excess nutrients and other pollutant loads in water.

12. through 23. Renumbered. No Change.

FSA Comment: Please see FSA's previous suggested edits (sent 12-1-22) to Draft 2 of Section 2 for "#24 - Control elevation"

29. "Detention" means the collection and temporary storage of stormwater with subsequent gradual release of the stormwater downstream.

30. "Detention with filtration" means the selective removal of pollutants from stormwater by the collection and temporary storage of stormwater and the subsequent gradual release of the stormwater downstream through an appropriately sized engineered media or filter system.

24. through 25. Renumbered. No Change.

~~26. "Direct discharge" means a discharge without prior opportunity for mixing and dilution sufficient to prevent a lowering of the existing ambient water quality.~~

27. Renumbered as 33. No Change

34. "Directly connected impervious area," or "DCIA" means the area covered by a building, impermeable pavement, and/or other impervious surfaces, which drains directly into a conveyance system without first flowing across sufficient permeable vegetated land area, as referenced in section 9.X, to allow for infiltration of runoff.

28. through 30. Renumbered. No Change.

FSA Comment: See FSA's previous suggested edits (sent 12-1-22) to Draft 2 of Section 2, Keep #28-Discharge. This draft doesn't show if "Discharge" was removed or not.

38. "Downstream Hazard Potential" means the classification of a dam that indicates its potential adverse impact to the surrounding and downstream areas should the dam or its appurtenant structures fail or be mis-operated. The downstream hazard potential reflects probable loss of human life or impacts on economic, environmental, or lifeline interests, or other concerns, such as water quality degradation. The downstream hazard potential does not indicate the current condition of the dam or the risk of it failing.

31. through 34. Renumbered. No Change.

43. "Emergency Action Plan" means a plan of action to be taken to reduce the potential for loss of human life and impacts to economic, environmental, and lifeline interests, and other concerns, such as water quality degradation, from failure or mis-operation of a dam or its appurtenant structures.

35. through 49. Renumbered. No Change.

56. "Hydrologic Unit Code" or "HUC" means the hydrologic cataloging unit assigned to a geographic area representing a surface watershed drainage basin. A complete list of Hydrologic Unit codes, descriptions, names, and drainage areas, including subregions, can be found in the United States Geological Survey Water-Supply Paper 2294, entitled "Hydrologic Unit Maps". A nationally consistent watershed dataset that is subdivided into 6 levels (12-digit hucs or HUC 12) is available from the USGS and USDA-NRCS-National Cartographic and Geospatial Centers (NCGC) and on DEP's website here https://fdep.maps.arcgis.com/apps/mapviewer/index.html?webmap=ef1fbbf08fec46de8b1acaa8a8abcfae .

50. Renumbered as 57. No Change

~~51.~~58. "Impaired water" means a water body or water body segment that does not meet its applicable water quality standards as set forth in Chapters 62-302 and 62-4, F.A.C~~., as determined by the methodology in Part IV of Chapter 62-303, F.A.C.,~~ due in whole or in part to discharges of pollutants from point or nonpoint sources. Impaired waters include those waters on the verified list of impaired waters pursuant to Part IV of Chapter 62-303, F.A.C., waters with a Total Maximum Daily Load in Chapter 62-304, F.A.C., waters with an alternative restoration plan pursuant to Rule 62-303.600, F.A.C, as well as waters with other evidence demonstrating that

water quality standards are not being met. Pursuant to Rule 62-303.150, F.A.C., the inclusion of a water on the planning or study lists shall not be used as evidence of a waterbody failing to meet applicable water quality standards.

50. through 56. Renumbered. No Change.

66. "Levee" means an embankment whose primary purpose is to furnish flood protection from seasonal high water and which is therefore subject to water loading for periods of only a few days or weeks a year. Levees may be classified as urban levees that provide protection from flooding in communities, including their industrial, commercial, and residential facilities or as agricultural levees that provide protection from flooding in lands used for agricultural purposes. The primary purpose of a levee is to exclude flood waters from a portion of the floodplain, and may consist of embankments, floodwalls, pipes and associated drainage features, closures, pumping stations, floodways, and designed channels.

67. "Levee system" is composed of one or more levee segments and associated structures, and may include stormwater treatment areas, flow equalization basins that are less than 4 feet in water depth, and levees that bound water conservation and wildlife refuge areas. These are designed in accordance with USACE EM 1110-2-1913, *Engineering and Design, Design and Construction of Levees*, and constructed and operated in accordance with sound engineering practices.

68. "Lifeline" means systems that enable the continuous operation of critical business and government functions and is essential to human health and safety or economic security, e.g., evacuation roads, power stations, and drinking water treatment and supply facilities.

57. Renumbered as 69. No Change

70 "Littoral zone" means that portion of stormwater management system that is designed to contain rooted emergent plants.

58. through 71. Renumbered. No Change.

85. "Permanent pool" means that portion of a wet detention pond that normally holds water between the normal water level and the top of the anoxic zone or pond bottom excluding any water volume claimed as wet detention treatment volume.

72. through 74. Renumbered. No Change.

89. "Post-development condition" for nutrient loading determinations shall mean the average annual nutrient loading based on the proposed project area that would exist in accordance with the permitted project design.

90. "Predevelopment condition" for nutrient loading determinations shall mean the average annual nutrient loading based on the land use, land cover, and other site conditions that are legally in existence at the time of the application or at the time the TMDL was approved.

FSA Comment: Our recommendation addresses a concern of when a TMDL is in effect or when the BMAP allocations are determined. How will this be addressed? In nutrient reductions, stakeholders have to meet the reductions with the landuse that was used to determine the pollutant. If the definition is kept as-is, a development that was completed after the BMAP would use its current landuse instead of the landuse of when the BMAP was created. It would be hard

to meet reductions if not consistent with the BMAP. It's important that this be added to the definition.

75. through 80. Renumbered. No Change.

97. "Redevelopment" means the construction on sites having existing commercial, industrial, institutional, or residential land uses, excluding silviculture or agriculture, where all or part of the existing impervious surface ~~will be~~ is removed and replaced with new impervious surface which has the same or lesser total area ~~intense land use~~ as the existing impervious surface, and the same or lesser intense land use which ~~part of the proposed activity and~~ has not been previously permitted under Part IV of Chapter 373 F.S.

FSA Comment: The above definition of Redevelopment has been revised from our previous suggestion. We don't understand the transition from impervious surface to land use. Isn't it possible that a "less intense land use" could have greater impervious area? Our suggested edits address this concern. This is an important change.

81. through 94. Renumbered. No Change.

112. "Soil Survey" means a document prepared by the U.S. Natural Resources Conservation Service that provides soil maps and interpretations useful for guiding decisions about soil selection, use, and management

95. through 101. Renumbered. No Change.

FSA Comment: Please see FSA's previous suggested edits (sent 12-1-22) to Draft 2 of Section 2, #104-Seasonal high ground water table (SHGWT)"

120. "Stormwater treatment system" means a type of stormwater management system specifically designed, constructed, or implemented to reduce the discharge of pollutants in stormwater by incorporating methods to collect, convey, store, absorb, treat, use, or harvest stormwater

102. through 106. Renumbered. No Change.

~~107.~~126. "Swale" means a man-made trench that:

(a) Has a top width-to-depth ratio of the cross-section equal to or greater than 6:1, or side slopes equal to or greater than three feet horizontal to one foot vertical;

(b) Contains contiguous areas of standing or flowing water only following a rainfall event;

(c) Is planted with or has stabilized vegetation suitable for soil stabilization, stormwater treatment, and nutrient uptake; and

(d) Is designed to take into account the soil erodibility, soil percolation, slope, slope length, and drainage area so as to prevent erosion and reduce pollutant concentration of any discharge. [Section 403.803(14), F.S.]

~~Note: when a swale is used for stormwater treatment, it must meet the standards and criteria in Volume II.~~

108. through 124. Renumbered. No Change.

~~125.~~144. "Zone of discharge" means a volume underlying or surrounding the site and extending to the base of a specifically designated aquifer or aquifers, within which an opportunity for the treatment, mixture or dispersion of wastes into receiving ground water is afforded. ~~Generally, stormwater treatment systems have a zone of discharge 100 feet from the system boundary or to the project's property boundary, whichever is less.~~

FSA Comment: Is the reference to distance or property boundary deleted because it could potentially limit permit issuance such as in the cast of an urban infill project?

(b) No Change.

ERP AH Vol I Section 8 (Draft 3)
FSA Comments 12-28-22

PART II -- CRITERIA FOR EVALUATION (Draft 3)

8.0 Criteria for Evaluation

8.1 Purpose

The criteria explained in this part are those that have been adopted by the Agency in evaluating applications for individual and conceptual approval permits, with the exception of those individual permits described in ~~Rule~~ Subsection 62-330.054(4), F.A.C. The staff recommendation to approve any ~~individual or conceptual approval~~ permit application will be based upon a determination of whether reasonable assurance has been provided that the activity meets the criteria for evaluation, and whether the applicable permit fee has been submitted. In addition, the staff recommendation to resolve any violation under Chapter 62-330, F.A.C., also will be based upon a determination of whether reasonable assurance has been provided that the activity meets the criteria for evaluation in this part.

General permits are pre-issued, and already contain the limitations and criteria that must be met to qualify to use the specific general permit. Upon receipt of a notice to use a general permit, the Agency's review is limited to determining whether the notice complies with the terms and conditions of the pre-issued permit, in accordance with Chapter 62-330, F.A.C., and whether the applicable permit fee has been submitted. General permits shall meet the water quality treatment requirements for restoration plans that provide reduction allocations.

8.2 Criteria for Evaluation

8.2.1 To obtain an individual or conceptual approval permit, an applicant must provide ~~give~~ reasonable assurance in accordance with Rule 62-330.060, F.A.C., and reasonable assurance that the following ~~major~~ standards contained in Sections 373.042, .413, .414, .416, .426, .429, .4595, F.S., are met:

(a) through (d) No change

8.2.2 No change.

8.2.3 Activities Discharging into Waters That Do Not Meet Standards

In instances where an applicant is unable to meet water quality standards because existing ambient water quality does not meet standards, and the proposed activity will cause or contribute to this existing condition, mitigation for water quality impacts can consist of water quality enhancement or treatment that achieves a net improvement. In these cases, the applicant must propose and agree to implement mitigation measures that will cause net improvement of the water quality in the receiving waters for those contributed parameters that do not meet water quality standards. In addition to meeting the required performance standards in Section 8.3, the applicant shall also demonstrate said net improvement whereby the pollutant loads discharged from the post-development condition for the proposed project shall be demonstrated to be less than those discharged based on the project's pre-development condition. Such demonstration shall be provided for any project within a HUC 12 subregion or subwatershed containing an impaired water and located upstream of that impaired waterbody.

FSA Comments: Consider adding "Net Improvement" to definitions, Section 2 as the term is referenced often. Also, see our text edit suggestion below in Section 8.3.4 regarding last sentence.

8.3 Stormwater Quality Nutrient Permitting Requirements

8.3.1 Required Modeling or Calculation of Performance Standards

Each applicant shall demonstrate, through modeling or calculations, that their proposed system is designed to discharge to the required treatment level based on the Performance Standards described in sections 8.3.2 through 8.3.4 below.

8.3.2 Minimum Performance Standards for all sites

Except as provided below, all stormwater treatment systems shall provide a level of treatment sufficient to accomplish the greater of the following nutrient load reduction criteria:

(a) an 80 percent reduction of the average annual loading of total phosphorus (TP) and total nitrogen (TN) from the proposed projector; or

(b) a reduction such that the post-development condition average annual loading of nutrients does not exceed the predevelopment condition nutrient loading.

8.3.3 Minimum Performance Standards for Outstanding Florida Waters (OFWs)

Stormwater treatment systems located within a HUC 12 **s**ubwatershed containing an OFW and upstream of the OFW, shall provide a level of treatment sufficient to accomplish the greater of the following nutrient load reduction criteria:

(a) a 95 percent reduction of the average annual loading of total phosphorus (TP) and total nitrogen (TN) from the proposed project; or

(b) a reduction such that the post-development condition average annual loading of nutrients does not exceed the predevelopment condition nutrient loading.

8.3.4 Minimum Performance Standards for Impaired Waters

Stormwater treatment systems located within a HUC 12 **s**ubwatershed which contains an impaired water, or a watershed delineated in a BMAP or RAP for a waterbody and used to determine loading to the impaired waterbody, and located upstream of that impaired waterbody, shall provide a level of treatment sufficient to accomplish the greater of the following nutrient load reduction criteria:

(a) an 80 percent reduction of average annual loading of total phosphorus (TP) and total nitrogen (TN) from the proposed project;

(b) the post development condition average annual loading of those pollutants not meeting water quality standards are less than that of the predevelopment condition; and

(c) Stormwater treatment systems that are also located within a HUC 12 **s**ubwatershed which contains a waterbody with an adopted Total Maximum Daily Load (TMDL) or an approved alternative restoration plan pursuant to Rule 62-303.600, F.A.C., and the system is located upstream of that waterbody with a TMDL or alternative restoration plan, shall provide the level of treatment sufficient to accomplish the percent reduction and the load allocation of the adopted TMDL or alternative restoration plan for the pollutant(s) addressed therein.

Load reductions for nutrients shall not be required to result in loads that are less than those demonstrated for natural conditions for the project area.

FSA Comments:
Adding the FAC reference is a good addition. Is Rule 62-303.600, FAC the correct reference?

Please note that watersheds developed by FDEP during TMDL development for surface waterbodies may include HUCs that are tributaries of the impaired water. Limiting the applicability of this section to the HUC containing the impaired water and excluding the tributary HUCs seems inconsistent with restoration goals.

In addition, under the current rule text, new development in areas outside of the HUC containing the impaired water would be required to meet the requirements of 8.3.2. The intention of the current language in 8.3.2 appears to be to prevent future growth in nutrient loads. However, if this language is changed before rule adoption to allow for future nutrient load growth, then these future nutrient sources would become the responsibility of the local government when load reduction allocations are made during the BMAP process, unless 8.3.4 was also revised.

8.3.5 Alternative Performance Standards for Redevelopment

Stormwater treatment systems serving redevelopment activities shall meet the appropriate minimum level of treatment set forth above in 8.3.2 - 8.3.4. However, an applicant may request approval by the Agency for a lower level of treatment if the redevelopment project area is under three acres and does not fall within an area described in section 8.3.4 above. The minimum level of treatment allowable for these sites shall be as follows:

(a) an 80 percent reduction of the post-development average annual loading of TP and a ~~45~~ 55percent reduction of the post-development average annual loading of TN from the project area; or

(b) for stormwater systems located within a HUC 12 subwatershed containing an OFW, a 95 percent reduction of the post-development average annual loading of total phosphorus (TP) and a ~~50~~ 80 percent reduction of the post-development average annual loading of total nitrogen (TN) from the project area.

FSA Comment: FSA's above recommendation of 55% and 80% are based on the TAC's Report on performance standards requiring load reductions of 80% of TN and 95% reduction if TP in Outstanding Florida Waters, and a minimum of 55% reduction in TN and 80% reduction of TP in waters that are not impaired. Standing by the TAC's recommendation provides more than enough support to make this change. In addition, the listed percentages cause concern because these nitrogen reductions are below what was recommended in 2010. Further, with so many of Florida's coastal waters and springs impaired for nitrogen, nitrogen reductions should at a minimum be what was recommended by the TAC.

8.3.6 Exemption from Minimum Performance Standards for Redevelopment

Redevelopment sites that are under one acres that do not directly or indirectly discharge or affect a nutrient impaired water may qualify for an exemption as described in section 3.2.7 of this handbook if that site is not located within a HUC 12 subwatershed containing a nutrient impaired water body or OFW and is not upstream of that waterbody. An exemption will require the redevelopment site to promote infiltration. This exemption only applies to redevelopment sites that result in reduced impervious surface or reduced pollutant loading on a case-by-case basis. Requests to qualify for this exemption will require a technical analysis and shall include supporting information that demonstrates the performance standards cannot be met and shall be submitted in writing to the applicable Agency, and such activities shall not commence without a written determination from the Agency confirming qualification for the exemption.

FSA Comment: FSA's above recommendations are to show that the exemption contemplated needs more detail as to what constitutes a sufficient technical analysis and supporting information would be helpful. We also suggest that it should be clearly stated that this option is not available when the project discharges into watersheds of an impaired water.

8.4 Additional Criteria

8.4.1 ~~8.2.4~~ No change.

8.4.2 ~~8.2.4~~ No change.

8.4.3~~8.2.4~~ No change.
8.4.4 ~~8.2.4~~ No change.

8.4.5 Dam Systems

Dam systems are a critical part of Florida's infrastructure for stormwater and surface water management. The design and operation standards specified in this Volume and in the Volume II for each District are critical to manage water quality and quantity effectively and safely. These standards are intended to reduce the risk of dam and appurtenant structure failure and improper operation which may result in flooding that causes loss of human life, damage to offsite properties, the environment, and lifeline systems, or other potential concerns including water quality impacts.

Appendix L, *Additional Criteria for Dam Systems*, in this Volume contains four permitting criteria that apply when the proposed activity is for construction of a new dam or alteration of an existing dam, as defined in paragraph 2.0(a)23 in this Volume. This appendix does not apply to a levee or levee system, as defined in paragraphs 2.0(a)XX and XX, respectively, in this Volume. These criteria are intended to reduce potential damage from floods, degradation of water resources from uncontrolled releases of stormwater, and to otherwise promote the safety of dams regulated under Chapter 62-330, F.A.C. The four criteria require the applicant to: 1) provide dam system information for collection in a repository maintained by the Department, 2) establish a downstream hazard potential for each dam system denoting the probable surrounding and downstream consequences should the dam or appurtenant structures fail or be mis-operated, 3) develop an Emergency Action Plan for an owner of a dam system where failure or mis-operation would probably result in probable loss of human life or impacts on economic, environmental, or lifeline interests, or other concerns, such as water quality degradation, and 4) provide a Condition Assessment for each dam classified as High Hazard Potential or Significant Hazard Potential as defined in Appendix L.

8.4.6 Oil and Grease Control

Outlet structures from areas with greater than 50 percent impervious and semi-impervious area or from systems that receive runoff from directly connected impervious that are subject to vehicular traffic shall include a baffle, skimmer, grease trap or other mechanism suitable for preventing oil and grease from leaving the stormwater treatment system in concentrations that would cause a violation of applicable water quality standards for ground or surface waters of the state. Designs must ensure sufficient clearance between the skimmer and outlet structure or pond bottom to ensure that the hydraulic capacity of the structure is not affected.

8.4.7 Hazardous or Toxic Substances

Systems serving a land use or activity that produces or stores hazardous or toxic substances shall be designed to prevent exposure of such materials to rainfall and runoff to ensure that contact stormwater does not become contaminated by such materials. Stormwater treatment systems shall not result in violations of water quality standards for ground or surface waters of the state.

8.5 ~~8.3~~ State Water Quality Standards

8.5.1 ~~8.3.1~~ No change.

8.5.2 ~~8.3.2~~ Additional Permitting Requirements to Protect Ground Water

State water quality standards for ground water are set forth in Chapter 62-520, F.A.C. In addition to the minimum criteria, Class G-I and G-II ground water must meet primary and secondary drinking water quality standards for public water systems established pursuant to the Florida Safe Drinking Water Act, which are listed in Rules 62-550.310 and 62-550.320, F.A.C.

Only the minimum criteria for ground water under rule 62-520.400, F.A.C., shall apply within an applicable zone of discharge, as determined by rule 62-520, F.A.C.

Pursuant to rule 62-555.312, 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 sited or constructed within the setback distances for existing water supply wells as specified in accordance with rule 62-532, F.A.C.

To ensure protection of ground water quality, all stormwater treatment systems shall be designed and constructed to:

1. Ensure adequate treatment of stormwater so that a stormwater management system shall not result in a violation of ground water standards, outside an applicable Zone of Discharge, as determined in accordance with rule 62-520, F.A.C.; and

2. Avoid breaching an aquitard that would result in direct mixing of untreated water between surface water and an underground source of drinking water. Where an aquitard is not present, the depth of the stormwater treatment system shall be limited to prevent any excavation within three (3) feet of an underlying limestone formation which is part of a underground source of drinking water, as defined in rule 62-528, F.A.C.

8.5.3 ~~8.3.3~~ No change.

9.0 Stormwater Quality Treatment Requirements

9.1 Calculating Required Nutrient Load Reduction

Applicants are required to provide nutrient load reduction calculations in their application. To calculate the required stormwater nutrient load reduction for a project, the applicant should:

- Determine whether the site falls within the same HUC 12 or watershed delineated in a BMAP or RAP and used to determine loading to an impaired water as, and is upstream of, or contributes to an OFW or impaired water, and select the corresponding performance standard from Section 8.3 of this volume.
- Determine the pre-development average annual average mass loading of the project site for both total nitrogen (TN) and total phosphorus (TP) through modeling or as described in Section 9.2.
- Calculate the project site's post-development annual average mass loading without treatment for both TN and TP through modeling or as described in Section 9.2.
- Determine the percent TN and TP reduction needed as defined within Sections 8.3 and 9.3 of this volume. The greater percent load reduction will be the requirement for the project.
- Determine which BMPs will be used to meet the required TN and TP load reductions. Information on how to calculate nutrient load reduction for BMP Treatment Train is found in Section 9.5 of this volume.

FSA Comment: Suggested text in first bullet matches FSA's suggestion to minimum performance standards for impaired waters (Section 8.3.4.2)

9.2 Calculating Nutrient Loading

9.2.1 Calculating Predevelopment and Post development Hydrology

The applicant shall determine the pre-development and post development characteristics of the project site. If the project site encompasses multiple drainage basins or catchments, determine the predevelopment and post development characteristics for each within the project site. For the purposes of this analysis, estimates of annual runoff volumes shall be performed using the method described herein or another methodology based on modeling. If modeling is used to determine hydrology, at a minimum the applicant shall submit the program used, inputs, and outputs. The methodology to determine the hydrology of the site by hand is outlined in paragraphs a. through f. below.

a. This Handbook's methodology provides tabular solutions to a series of calculations for determining annual runoff volumes for each of the state's designated meteorological zones as outlined in Appendix M. Appendix M also lists the individual counties included in each meteorological zone. Use this table to determine the project's meteorological zone first and then continue to the determination of mean annual run off associated with the project location.

b. The percent of Directly Connected Impervious Area (DCIA) should be calculated for each land use type in the project area. DCIA consists of those impervious areas that are directly connected to the stormwater conveyance system. Impervious areas also are considered to be DCIA if stormwater from the area occurs as concentrated shallow flow over a short pervious area such as grass. Non-directly connected impervious (Non-DCIA) areas include all pervious areas and portions of impervious areas that flow over at least 10 feet of undisturbed pervious areas with HSG A or B soils and over at least 20 feet of undisturbed pervious area for other soil types unless demonstrated a narrower width would provide enough infiltration to disconnect the impervious area.

FSA Comment: We recommend this be more specific, will actual testing be required or will this be presumed values provide by geotech?

c. Appendix N provides a summary of calculated mean annual runoff coefficients ("ROC value") as a function of curve number and DCIA for each of the five designated meteorological zones. The values summarized in Appendix N reflect the average long-term ROC values for each of the five designated zones over a wide range of DCIA and curve number combinations. Determine the ROC value for each land use category in a catchment for the project area. Linear interpolation can be used to estimate annual runoff coefficients for combinations of DCIA and curve numbers that fall between the values in the Table. For "naturally occurring" undeveloped conditions, it should be assumed that the percent DCIA is equal to 0.0.

d. This method should be used for each catchment area on the site to provide the most accurate runoff volume.

e. To calculate hydrology and pollutant loading from a catchment area in the proposed project site, applicants can develop a table similar to Table 9.1 to summarize land use information.

Table 9.1 Example Land Use Categories Matrix to Calculate Loadings

Pre-development	Total watershed area	Non-DCIA CN	DCIA percentage	Calculated ROC Value
Low Density Residential				
Single Family				
Multi-Family				
Low Intensity Commercial				
High Intensity Commercial				
Light Industrial				
Highway				
Natural Vegetated Community				

Post-development	Total watershed area	Non-DCIA CN	DCIA percentage	Calculated C
Low Density Residential				
Single Family				
Multi-Family				
Low Intensity Commercial				
High Intensity Commercial				
Light Industrial				
Highway				
Natural Vegetated Community				

f. Determine the Annual Runoff Volume. The information contained in Table 9.1 and Appendix N is used to estimate the Annual Runoff Volume for a given catchment area under either predevelopment or post-development conditions. The Average Annual Rainfall should be obtained using the method described in

Section 9.4. To calculate the Annual Runoff Volume for the site; the area of the site, average annual rainfall, and the appropriate ROC value are multiplied. This is shown in equation 9-1:

Equation 9-1

$$Annual\ Runoff\ Volume\ (ac-ft.)\ = \\ Area\ (acres)\ x\ Average\ Annual\ Rainfall\ (inches)\ x\ ROC\ Value\ x\ (1ft/12in)$$

9.2.2 Calculation of Predevelopment and Post Development Stormwater Nutrient Loading

a. To calculate the predevelopment and post development annual mass loadings of TN and TP , multiply the predevelopment annual runoff volume (derived in Section 9.2.1) by the land use specific runoff characterization data (event mean concentrations or EMCs) for TN and TP. EMC Values are listed in Table 9.2 for different types of land use categories. These land use categories are described in Appendix O. EMC values for the land uses must consider cover, soils, and topography and be representative of the latest assigned Florida Land Use and Cover Classification System (FLUCCS) code. Wetlands, like waterbodies, are not to be considered nutrient load contributors, however, should concentrated flows from these regions contribute to a project site and co-mingle with onsite runoff, the nutrient load from upland contributing flows, and any subsequent nutrient reduction shall be included within the nutrient load calculations. Applicants must use the most up-to-date verified EMC values available for their project region when available. Applicants also must comply with the applicable special basin or geographic area criteria in chapter 62-330.301(1)(k), F.A.C. including any EMC values specified in the applicable Applicant's Handbook Volume II;

Table 9.2 Standardized Statewide Stormwater Nutrient EMC Values

Land Use Category	Total N (mg/l)	Total P (mg/l)
Low Density Residential	1.65	0.270
Single Family	2.07	0.327
Multi-Family	2.32	0.520
Low Intensity Commercial	1.13	0.188
High Intensity Commercial	2.40	0.345
Light Industrial	1.20	0.260
Highway	1.52	0.200
General Natural	1.22	0.213
General Agricultural	2.29	0.381
Pasture	3.03	0.593
Citrus	2.11	0.180
Row Crops	2.50	0.577

FSA Comments: Values in Table 9.2 may be different for those areas that have a BMAP/TMDL/RAP/PIP. It should be clear that this table includes values as a "backstop" if the applicant does not propose alternate values.

The "General Natural" EMCs in Table 9.2 are very high, especially compared to the developed land uses EMCs. In Harvey Harper's studies, General Natural EMC values are higher than study findings indicate. It seems like the General Natural EMCs in the rule are going to result in more nutrient loading than would actually be occurring.

b. At the time of the application, an applicant may propose to use TN and TP EMC values accepted by the Agency which denote EMC values derived from regional or local government studies . Any project-specific study conducted by an applicant must be submitted with the permit application for the Agency records. If EMC values from a project specific study are to be used, data collected must follow quality assurance provisions outlined in chapter 62-160, F.A.C., and include:

- Data collected at a representative variety of rainfall depths;

- Minimum of 7 rainfall events;
- Minimum of one~~two~~ year~~s~~ of data with seasonal variation;
- Use of autosamplers to allow for runoff to be sampled for a minimum of six hours or the duration of the rainfall event;
- Volume or time weighted composite samples;
- Sampling occurring near~~at~~ point of discharge and ~~just~~ upstream of any stormwater treatment on site;
- Minimum of three or more sites with this land use category depending on the variability of the land use category;
- Sample locations must be representative of site conditions; and
- ~~Data collected for all land use EMCs for the region.~~

FSA Comment: Section 9.2.2(b) suggestion is to allow the use of standardized EMCs (table 9.2), regional studies, and local government EMCs as accepted by DEP. If an applicant would like to use "project specific" EMCs they must follow QA 62-160 and the listed guidelines.

Also in third bullet above, consider reducing data requirement to one year. Many of our MS4 partners have good data without two years of study duration. The other conditions listed including requiring a minimum of 7-10 events, and requiring 3+ sites with the land use category should address concerns of significant meteorological differences.

Additionally, the contributing area to the sample site should represent a single land use type, and the results of the study should be reasonably consistent with other similar scientific studies and watershed plans. Depending on the site size, multiple sample locations may be required for individual land use types. ~~If this study is intended to be used for more than one site area, then this study will only be applicable for the region specified by the study area, not to exceed a HUC 8 area.~~

c. Determine the average annual mass loading. The average annual mass loading calculation is provided in Equation 9-2 below.

Equation 9-2

$$Annual\ Average\ Mass\ Loading\ =\ Annual\ Runoff\ Volume\ x\ EMC$$

The components of Equation 9-2 are expressed in different units and require some conversion factors, as provided below.

$$Annual\ Mass\ Loading\ (lb./year)\ =\ Annual\ Runoff\ Volume\ (ac-ft./year)\ *\ 43{,}560\ ft2\ /ac\ *\ 7.48\ gal/ft3\ x\ 3.785\ liter/gal\ *\ EMC\ (mg/l)\ *\ 1\ lb./453{,}592\ mg$$

9.3 Determination of required treatment efficiency

Predevelopment and post development loadings are calculated, and subsequently compared, based on the average annual loading of TN and TP discharged. Equation 9-3 calculates the treatment efficiency needed so that the post development average annual loading of nutrients equals the predevelopment nutrient loading:

Equation 9-3: Percent reduction calculation

$$\left(1-\left(\frac{Predevelopment\ loading}{Post\ development\ Loading\ before\ treatment}\right)\right)\times 100$$

Compare the result from equation 9-3 to the percent reduction required in the applicable paragraph of Section 8.3. The greater load reduction (the more protective) will be the requirement for the project. Once the load reduction has been determined, use Equation 9-4 to find the required treated loading rate for TN and TP for the project.

Equation 9-4: Post development maximum load to meet % treatment required

$$= (1 - Load\ Reduction) \times Post\ development\ Loading\ Before\ Treatment$$

Another method to determine the loading rate required for the project is to use the percent reduction required in Section 8.3 of this volume in Equation 9-4, where Load Reduction is the percent reduction expressed as a fraction, then compare the result to the predevelopment loading. If the resultant loading of Equation 9-4 is less than that of the predevelopment loading, then the percent reduction required in the applicable paragraph of Section 8.3 must be used in the stormwater design. If the resultant loading is greater than that of the predevelopment loading, than the applicant must treat the site to a level that would result in a post development loading equal to or less than that of the predevelopment loading.

FSA Comments:
This section is written to keep from increasing load, but it doesn't address if there is a BMAP/TMDL in place.

Regarding Equation 9-4, for a BMAP, the loading should be the pre-development load minus the required percent reduction times the pre-development load. Our understanding is that the reductions are based on pre-development not the post-development for a BMAP/TMDL/RAP/PIP.

9.4 Rainfall data

Calculations for the annual average mass loading will use the average annual rainfall data determined by National Centers for Environmental Information for the site area, as incorporated in Appendix M which displays isopleths for the average annual rainfall data. This rainfall data was developed from the a recent 30 year period of rainfall data.

FSA Comment: We continue to strongly suggest that NOAA Atlas 14 be utilized as they have a rainfall table. https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_maps.html. After some quick testing, the data source referenced is problematic, showing gaps in rainfall coverage. Relying on colored maps instead of data tables is problematic.

9.5 Best Management Practices (BMPs) for Stormwater Treatment

Once the pre-development and post-development loadings have been calculated and the required percent reduction of TN and TP have been established, the stormwater treatment system can be designed. Stormwater treatment can be achieved in a variety of ways. Best management Practices (BMPs) are an effective tool for achieving the treatment efficiencies required by Section 8. The applicant must show that the stormwater treatment system complies with the hydraulic and hydrologic general design requirements in the applicable AH Volume II. If the applicant chooses to use a BMP that is not listed in the applicable AH Volume II, Section 9.5.2 below describes the requirements for alternative designs. Methods to determine the treatment efficiencies of traditional BMPs for stormwater treatment are described in Appendix P.

If the post development maximum load for TN and TP are met with a single BMP, the applicant shall complete the design of the stormwater treatment system. If the maximum load is not met, the applicant shall either modify the selected BMP or incorporate additional BMPs to achieve the required TN or TP load reductions.

FSA Comment: Appendix P needs additional detail. Most of the methods referenced for determining treatment efficiency have been coded into BMPTrains or can be done by hand. This does potentially exclude other potential methods.

Overall, the alternative BMPs in Appendix P do not include the guidance needed. We suggest that removal rates for the alternative BMPs be provided to ensure a universal approach by all. One example, under the GSI

entry the Appendix refers to "additional removal based on plant, soil and media selections" but how much more?

Finally, Appendix P references the Harper Report when determining removal for retention systems. The Harper Report offers calculations for dry retention, but does not offer calculations for wet detention. FSA suggests addressing the calculation for wet detention to ensure a universal approach.

9.5.1 Treatment Train Nutrient Reduction

BMPs can be implemented in combination or in conjunction with one another in a series called a "BMP Treatment Train." If used, BMP Treatment Train efficiencies must account for the reduced loading transferred to subsequent downstream treatment devices. As stormwater pollutant concentrations are reduced in each BMP in the treatment train, the ability of a BMP Treatment Train to further reduce stormwater pollutant concentrations and loads is diminished. This is shown in Equation 9-5. This equation assumes each BMP acts independently of upstream BMPs and that upstream BMPs do not impact performance of downstream BMPs. If the BMP acts in combination with the upstream BMP, the designer will consider the use of another methodology to determine the resultant efficiency of the BMP Treatment Train.

Equation 9-5: Overall Treatment Train Efficiency for systems in series

$$Overall\ Treatment\ Train\ Efficiency = Eff1 + [(1 - Eff1)x\ Eff2] + [(1 - (Eff1 + Eff2))\ x\ Eff3\ ]$$

Eff1 = efficiency of initial treatment system
Eff2 = efficiency of second treatment system
Eff3 = efficiency of third treatment system

9.5.2 Alternative Designs

An applicant can propose alternative BMPs not listed in the AH Volume II Handbooks. These will be considered by the Agency as alternative designs and evaluated based on engineering plans, quality assurance plans, representative monitoring data in Florida, and test results for the specific site conditions of the project. Applicants must provide reasonable assurance that their proposed alternative designs provide the level of treatment that they claim and that will achieve the required performance standards in this Volume, either by the alternative design by themself or in conjunction with other BMPs. In determining whether the alternative design provides this reasonable assurance, the Agency will consider:

(a) Whether the alternative BMP has been appropriately tested and reviewed by scientific methods to substantiate its treatment efficiency claim; and
(b) Whether acceptable provisions have been made to ensure that the system will be effectively operated and maintained, as described in Section 12 of this volume.

9.5.3 Green Stormwater Infrastructure and Low Impact Design

The Agencies encourage the use of Low Impact Design (LID) approaches, such as Green Stormwater Infrastructure (GSI), which can be used to supplement or replace traditional stormwater infrastructure for managing the impacts of rain and stormwater runoff. GSI and LID mimic pre-development conditions ~~reduce pollution and treat stormwater~~ by detaining or retaining rainfall near its source ~~instead of directing~~. When applied early in the design process, low impact design techniques can reduce stormwater runoff volume and pollutants generated from project sites. Thus, the use of GSI and LID may reduce traditional stormwater treatment BMP size requirements. GSI and LID, depending on the technology, can also treat stormwater in a manner similar to a traditional BMP by treating TN and TP. Typical GSI and LID features are described in the Applicant's Handbook Volume IIs and BMP library.

FSA Comment: In highlighted text above, this is true as long as it is maintained properly. If GSI or LID is being utilized, it's important to consider inspection frequency. In Section 12, Table 12-1 could include a

reference to "systems using LID techniques to reduce stormwater treatment BMP size requirements" with a minimum frequency of once a year.

9.5.4 Airport Design

Airport projects that cannot use the General Permit for Construction, Operation, Maintenance, Alteration, Abandonment or Removal of Airport Airside Stormwater Management Systems, 62–330.449 FAC, including landside components of airports, may be planned, analyzed, designed, built, and maintained using the data and methodologies set forth in the *Statewide Airport Stormwater Best Management Practices Manual (April 27, 2013)* published by the Florida Department of Transportation - Aviation Office, which is incorporated herein by reference. The option to use this does not preclude using the data and methodologies set forth in other sections of this rule. Also, if this option is used, it shall comply with the nutrient loading criteria contained in Section 8 of this rule and shall use the latest EMC values for landside uses published by FDEP or in the various Water Management Districts' Applicant's Handbook - Volume II."

9.6 Off-site Stormwater

The volume of runoff to be treated from a site shall be determined by the minimum level of treatment set forth in Section 8 of this Volume; the type of treatment system (e.g., retention, wet detention, etc.); and the meteorological region (rainfall zone) where the project is proposed. If stormwater runoff from off-site areas is allowed to co-mingle with on-site runoff, then the effects of runoff from these off-site areas must be addressed in the load reduction calculations for the project site, unless the project is exempt from this provision under section 373.413(6), F.S.

9.7 Compensating Stormwater Treatment

Occasionally, applicants find that it is impractical to construct a stormwater management system to capture the runoff from a portion of the project site due to on-site conditions such as extreme physical limitations, availability of right-of-way, or maintenance access. Methods have been developed to compensate for the lack of treatment for a portion of a project. Each method is designed to furnish the same level of treatment as if the runoff from the entire project site was captured and treated in accordance with the provisions of this Volume.

The applicant is strongly encouraged to schedule a pre-application meeting with Agency staff to discuss the project if these alternatives are being considered. Other rule criteria, such as peak discharge attenuation, will still have to be met if the applicant utilizes these methods. Each alternative is described in more detail in the following sections.

9.7.1 Overtreatment

Overtreatment means to treat the runoff from the project area that flows to a treatment system to a higher level than the rule requires to make up for the lack of treatment for a portion of the project area. The average treatment efficiency of the treated and untreated areas must meet the pollutant removal goals of Section 8 outlined in this Volume. To meet these goals, the area not being treated generally must be small (less than 10% of total site area or less than one acre for pervious area or half an acre for semi-impervious/impervious area, whichever is less) in relation to the area which is captured and treated. Agency staff can aid in determining the proper level of overtreatment for a particular situation.

9.7.2 Off-site Compensation

Off-site Compensating Stormwater Treatment may be used when on-site treatment is not sufficient to meet the required performance standards. Off-site compensating stormwater treatment used to meet the requirements of Section 8 is ineligible for any water quality credit in the trading provisions/programs in Chapter 62-306, F.A.C.

The following criteria must be met when using off-site treatment, unless off-site treatment is explicitly allowed by section 311.106, F.S.:

(a) The proposed off-site area must be owned by the permittee and located within a HUC-12 subwatershed and BMAP/Restoration Area, if one exists, containing the proposed project. The proposed off-site area must be upstream of the proposed project and hydraulically connected to the same ~~water~~ waterbody as the proposed project, unless otherwise noted by the special basin criteria;

~~(a)~~(b) The proposed off-site area must be a developed site with the potential for BMPs to be retrofitted or further incorporated into the site. An applicant should not propose to treat runoff from an undeveloped location.

~~(b)~~(c) The applicant shall use modeling techniques to provide reasonable assurance that the off-site treatment system provides an equivalent amount of pollutant reductions at the point of discharge for the project as if all of the treatment was performed on-site;

~~(c)~~(d) The modeling must provide reasonable assurance that there will not be localized adverse impacts to the receiving waterbody or in downstream waters, which may require the application of adjustments based on location and,

~~(d)~~(e) Where the operation and maintenance entity does not own the area proposed to be used for off-site treatment, easement(s) shall be granted to the operation and maintenance entity, as required in Section 12.4 of this volume, for the area to allow for perpetual operation and maintenance access to the off-site treatment area.

9.7.3 Regional Stormwater Management Systems

Regional Stormwater Systems are designed, constructed, operated, and maintained to collect convey, store, absorb, inhibit, treat, use or reuse stormwater to prevent or reduce flooding, overdrainage, environmental degradation and water pollution or otherwise affect the quantity and quality of discharges from multiple parcels and projects within the drainage area served by the regional system. The term "drainage area" refers to the land or development that is served by or contributes stormwater to the regional system. This drainage area can be no larger than a HUC 12. Regional systems must be maintained in accordance with the provisions outlined in Section 12 of this volume.

(a) Records of stormwater treatment allocations for parcels and projects must be recorded, per Section 12.6(d), and kept by the permit holder of the regional stormwater system in perpetuity.

(b) Allocations of load reduction due to stormwater treatment must be measured in pounds or kilograms of pollutant removal.

(c) The regional system shall not allocate more load reduction than its permitted design.

(d) Discharges from parcels and projects within the drainage area must be connected to drainage collection facilities owned and operated by the permit holder of the regional stormwater system. These drainage collection facilities must be connected to the regional stormwater system and sized to prevent adverse impacts to adjacent properties.

9.7.4 Reserved - Water Quality Enhancement Areas Credit Trading

ERP AH Vol I Section 11 (Draft 2)
FSA Comments 12-28-22

PART IV -- EROSION AND SEDIMENT CONTROL

11.0 Erosion and Sediment Control

11.1 Overview

Uncontrolled erosion and sediment from land development activities can result in costly damage to aquatic areas and to both private and public lands. Excessive uncontrolled sediment movement blocks stormwater conveyance systems leading to surface area flooding, ~~plug culverts~~, fills navigable channels, impairs fish spawning, irritates ~~clogs~~ the gills of fish and benthic invertebrates, decreases water quality, reduces water clarity impacting submerged aquatic vegetation, and suppresses aquatic life.

FSA Comment: "Plug culverts" above is repetitive, suggest removing.

A plan for minimizing erosion and controlling sediment through the implementation of best management practices (BMPs) must be included with the application for a permit. In addition to the "erosion and sediment control plan" required by **section 11.2**, all projects that disturb one or more acres of land or disturb less than one acre but are part of a larger common plan of development or sale and ~~that~~ directly discharges to waters of the state or to ~~through~~ a permitted Municipal Separate Stormwater Sewer System (MS4) facility (i.e. stormwater pond) also will need to develop and implement a Stormwater Pollution Prevention Plan (SWPPP) to obtain coverage under Florida's National Pollution Discharge Elimination System (NPDES) Stormwater Construction Generic Permit. ~~Therefore, applicants are advised to comply with the erosion and sediment control requirements in **section 11.3.1, below**.~~

FSA Comment: For highlighted text above, suggest more specific language for "larger common plan of development or sale." Needs explanation and when it applies. An example to illustrate this – If a subdivision receives an ERP permit and closes out the permit prior to all parcels being developed, the undeveloped residential parcels could be under an acre. Do those parcels need a SWPP even though they won't need an ERP?

An effective sediment and erosion control plan is essential for controlling stormwater pollution during construction. An erosion and sediment control plan is a site-specific plan that specifies the location, installation, and maintenance of best management practices to prevent and control erosion and sediment loss at a construction site. The plan is submitted as part of the permit application and must be clearly shown on the construction plans for the development. Erosion and sediment control plans range from very simple for small, single-phase developments to complex for large, multiple phased projects. ~~If, because of~~Due to If, because of *[KEEP]* unforeseen circumstances such as extreme rainfall events or construction delays, the proposed erosion and sedimentation controls no longer provide reasonable assurance that water quality standards will not be violated, additional erosion and sediment control measures shall be required that must be ~~designed and~~ implemented to prevent violations of water quality standards. If these measures contain a hydrologic component, the Engineer of Record must approve additional measures before implementation.

FSA Comment: "Due to" does not match the tense of the sentence, "If because of" is better because it explains what extenuating circumstances may be needed.

11.2 Development of an Erosion and Sediment Control Plan

An Erosion and Sediment Control (E&SC) Plan must be submitted as part of the application as a way of providing reasonable assurance that water quality standards will not be violated during the construction phase of a project. The plan must identify the location, relative timing, inspection frequency, report requirements, and specifications for all erosion and sediment control and stabilization measures that will be implemented as part of the project's construction. The plan must provide for compliance with the terms and schedule of implementing the proposed project, beginning with the initiation of construction activities. The plan may be

submitted as a separate document or may be contained as part of the plans and specifications of the construction documents.

BMPs for erosion and sediment control are intended to prevent unauthorized off-site and on-site discharges of sediments and turbid waters. The BMPs for erosion and sediment control described in this permit are minimum requirements and may require revision, upgrading, relocation ~~moving~~, strengthening, or other modifications to serve their intended function while responding quickly to unanticipated changes in conditions onsite. Therefore, a permit modification is not required in order to modify the BMPs for erosion and sediment control used during construction and development, which serve to increase protection against unauthorized discharges, replace or repair components, or respond to emergency conditions. However, BMPs with a hydrologic component that are revised, upgraded, relocated, strengthened, or modified must be reviewed and approved by the Engineer of Record before implementation.

FSA Comment: For highlighted text above, we suggest the inclusion of a clause to notify DEP if any changes are made to the erosion and sediment control BMPs even though a permit modification is not required.

~~**11.1.1 Erosion and Sediment Control Requirements**~~

~~Erosion and sediment control BMPs shall be used as necessary during construction to **retain sediment on-site and assure that any discharges from the site do not cause or contribute to a violation of state water quality standards**. These management practices must be designed according to specific site conditions and shall be shown or clearly referenced on the construction plans for the development. At a minimum, the erosion and sediment control requirements described in this section shall be followed during construction of the project. Additional measures are required if necessary to protect wetlands or prevent off-site flooding. All appropriate contractors must be furnished with the information pertaining to the implementation, operation, and maintenance of the erosion and sediment control plan. In addition, sediment accumulation in the stormwater system from construction activities must be removed prior to final certification of the system to ensure that the designed and permitted storage volume is available.~~

~~11.1.2~~11.2.1 Erosion and Sediment Control Principles

Factors that influence erosion potential include soil characteristics, vegetative cover, topography, climatic conditions, timing of construction, and the areal extent of land clearing activities. The following principles must be considered in planning and undertaking construction and alteration of systems:

(a) Plan the development to fit topography, soils, drainage patterns, and vegetation;

(b) Minimize both the extent of area exposed at one time and the duration of exposure to no longer than 14 calendar days;

(c) Schedule activities during the dry season or during dry periods whenever possible to reduce the erosion potential;

(d) Apply erosion control practices such as temporary stabilization practices to minimize erosion from disturbed areas;

(e) Apply perimeter controls to protect disturbed areas from off-site runoff and to retain ~~trap~~ eroded material on-site to prevent sedimentation in downstream or off-site areas;

(f) Reduce ~~Keep~~ runoff velocities ~~low~~ and retain runoff on-site;

(g) Stabilize disturbed areas immediately after final grade has been attained or during interim periods of inactivity resulting from construction delays; and

(h) Implement a thorough and frequent inspection ~~maintenance~~ and follow-up program. Inspections of construction entrances and fueling areas should be inspected daily, structural controls inspected weekly

and after every half inch rain event during permit coverage, and final stabilization and vegetation practices monthly.

(i) BMPs are to be maintained or replaced if the BMP is damaged, installed incorrectly, or over half full fo sediment.

These principles are usually integrated into a system of vegetative and structural measures, along with other management techniques, that are included in an erosion and sediment control plan to minimize erosion and control movement of sediment. In most cases, a combination of limited clearing and grading, limited time of exposure, and a judicious selection of erosion control practices and sediment trapping systems will prove to be the most practical method of controlling erosion and the associated ~~production and~~ transport of sediment. Permit applicants, system designers, and contractors ~~can~~ shall refer to the *State of Florida Erosion and Sediment Control Designer and Reviewer Manual (July 2013)~~(June 2007)~~,* and the *Florida Stormwater, Erosion, and Sedimentation Control Inspector's Manual (FDEP July 2008)* the *Florida Stormwater Erosion and Sedimentation Control Inspector's Manual Tier I* (Florida Department of Environmental Protection, Division of Environmental Assessment and Restoration, Tallahassee, Florida, October 2018), and the *Florida Stormwater Erosion and Sedimentation Control Inspector's Manual Tier II* (Florida Department of Environmental Protection, Division of Environmental Assessment and Restoration, Tallahassee, Florida, October 2018 and subsequent updates), for further information on erosion and sediment control. These manuals provide guidance for the planning, design, construction, and maintenance of erosion and sediment control practices. ~~Both of these manuals are incorporated by reference in subparagraph 62-330.050(9)(b)(5)., F.A.C.~~

11.2.2 Erosion and Sediment Control Requirements

BMPs for erosion and sediment control shall be used during construction to **retain sediment on-site and ~~ensure that any~~ guard against discharges from the site do not cause or contribute to a violation of state water quality standards**. These management practices must be designed according to specific site conditions and shall be shown or clearly referenced on the construction plans for the development. At a minimum, the erosion and sediment control requirements described in this section shall be followed during construction of the project. When necessary, measures are required to protect wetlands or prevent off-site flooding. All appropriate contractors must be furnished with the information pertaining to the implementation, operation, and maintenance of the erosion and sediment control plan. In addition, sediment accumulation in the stormwater system from construction activities must be removed prior to final certification of the system to ensure that the designed and permitted storage volume is available.

FSA Comment: We suggest alternate language from "ensure," BMPs can't ensure that any discharges will not cause or contribute to a violation. For example, the EMC for residential violates the TMDL for TN and TP. A silt fence is not going to ensure that it meets the standard.

~~11.2 Development of an Erosion and Sediment Control Plan~~

~~An erosion and sediment control plan must be submitted as part of the application as a way of providing reasonable assurance that water quality standards will not be violated during the construction phase of a project. The plan must identify the location, relative timing, and specifications for all erosion and sediment control and stabilization measures that will be implemented as part of the project's construction. The plan must provide for compliance with the terms and schedule of implementing the proposed project, beginning with the initiation of construction activities. The plan may be submitted as a separate document, or may be contained as part of the plans and specifications of the construction documents..~~

11.3 Development of a Stormwater Pollution Prevention Plan (SWPPP) for NPDES ~~Requirements~~

~~Although t~~The requirement to develop and submit an SWPPP under a ~~National Pollution Discharge Elimination System (~~NPDES~~)~~ permit is not a requirement for a permit under Chapter 62-330, F.A.C., however applicants are advised that preparation and adherence to a SWPPP is required where the permitted activity also requires an NPDES construction permit pursuant to subsection 62-621.300(4), F.A.C. Both the SWPPP and E&SC plans must retain sediment on-site and ~~ensure that any~~ discharges from the site do not cause or contribute to a violation of state water quality standards. Changes to erosion and sedimentation controls can

be documented as part of a permittee's requirements under the NPDES Construction CGP SWPPP should one be required.

FSA Comments:

- **For "ensure that any" text, see suggestion 11.2.2 above. In 11.3 we understand that the term used should be stronger here, if something is designed to fail then the Engineer is automatically setting the Contractor up for a violation under State and Local codes and ordinances.**
- **For highlighted text above, need to move definition here and delete from next paragraph.**
- **For above "Both the SWPP and E&SC plans" see our comments below under 11.3.1**

~~Namely, **those c**~~**Construction activities resulting in greater than one acre of soil disturbance or disturb less than one acre but are part of a larger common plan of development or sale and discharging to waters of the state or a permitted MS4 must also apply for and receive coverage from DEP under Florida's NPDES Generic Permit for Stormwater Discharge from Large and Small Construction Activities (CGP) before disturbing the soil.** The applicant must adhere to the regulations and requirements of the CGP.~~This section of the Handbook is provided to help the design community develop a comprehensive erosion and sediment control plan that satisfies all state requirements and avoid having to revise the plan for the CGP and its associated SWPPP. For purposes **sections 11.3.1 through 11.4, below,** references to the term "applicant" shall mean an applicant for the NPDES permit.~~

FSA Comment: For highlighted text above, see previous comment from 11.1.

~~**11.3.1 Additional Requirements of the Construction Generic Permit**~~

FSA Comment: Recommend keeping Section 11.3.1 to aid in development of the E&SC plan. It could be renamed. The SWPPP and E&SC plans are supposed to accomplish the same goal, however their development takes place at different times. It should not be presumed that the person who develops the E&SC plan is familiar with the SWPPP requirements of the CGP. Also, in light of recent Phase 2 MS4 permit changes, which now require permittees to report their own DEP-issued CGP permits, tracking will be important.

~~(a) The following non-stormwater discharges are prohibited:~~

~~1. Wastewater from washout of concrete;~~

~~2. Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds, and other construction materials;~~

~~3. Fuels, oils, or other pollutants associated with vehicle and equipment operation and maintenance; and~~

~~4. Soaps or solvents used in vehicle or equipment washing or cleaning.~~

~~(b) Pollution Prevention Controls. The applicant must provide for the design, installation, implementation, and maintenance of effective pollution prevention measures to accomplish all of the following:~~

~~1. Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters. Treat wash waters using a treatment system so that they do not cause or contribute to violations of water quality standards;~~

~~2. Minimize the exposure of building materials, building products, construction wastes, trash,~~

landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, and other materials present on the site to precipitation and to stormwater;

3. Minimize the discharge of pollutants from spills and leaks; and implement chemical spill and leak prevention and response procedures;

4. Control wastes, such as discarded building materials, chemicals, litter, and sanitary waste, in accordance with all applicable state, local, and federal regulations;

5. Follow all applicable State and local waste disposal, sanitary sewer, and septic system regulations;

6. Use proper application rates and methods for fertilizers, herbicides, and pesticides. Set forth how these procedures will be implemented and enforced. Apply nutrients only at rates necessary to establish and maintain vegetation and consistent with all labeling requirements; and

7. Limit the application, generation, and migration of toxic substances; and properly store and dispose of toxic materials.

(c) Erosion and Sediment Controls. The applicant must provide for the design, installation, implementation, and maintenance of appropriate erosion and sediment controls to accomplish all of the following:

1. Control stormwater volume and velocity within the site to minimize soil erosion;

2. Control stormwater peak discharge rates and volume to minimize erosion at discharge outfalls and to minimize downstream channel and streambank erosion;

3. Minimize the amount of soil exposed during the construction activity;

4. Minimize the disturbance of steep slopes;

5. Minimize sediment discharges from the site. The design, installation, and maintenance of erosion and sediment controls shall address factors such as the amount, frequency, intensity, and duration of precipitation; the nature of the resulting stormwater; and soil characteristics, including the range of soil particle sizes expected to be present on the site;

6. Minimize off site vehicle tracking of sediments onto paved surfaces and the generation of dust. If sediment escapes the construction site, off site accumulations of sediment must be removed at a frequency sufficient to minimize off-site impacts;

7. Where feasible, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration and to provide and maintain natural buffers adjacent to surface waters of the state; and

8. Minimize soil compaction and preserve topsoil.

(d) Sediment Basins

1. For drainage basins with 10 or more disturbed acres at one time, a temporary (or permanent) sediment or wet detention basin providing 3,600 cubic feet of storage per acre drained, or equivalent control measures, shall be provided where attainable until final stabilization of the site. The 3,600 cubic feet of storage area per acre drained does not apply to flows from offsite areas and flows from onsite areas that are either undisturbed or have undergone final stabilization where such flows are diverted around both the disturbed area

and the sediment basin. For drainage basins with 10 or more disturbed acres at one time and where a temporary sediment basin providing 3,600 cubic feet of storage per acre drained, or equivalent controls is not attainable, a combination of smaller sediment basins, sediment traps, wet detention systems, and/or other BMPs shall be used. At a minimum, silt fences or equivalent sediment controls are required for all side slope and downslope boundaries of the construction area.

2. For drainage basins of less than 10 acres, sediment basins and/or sediment traps are recommended but not required. At a minimum, silt fences or equivalent sediment controls are required for all sideslope and downslope boundaries of the construction area.

3. Areas that will be used for permanent stormwater infiltration treatment (e.g., stormwater retention basins) shall not be used for temporary sediment basins unless appropriate measures are taken to assure removal of accumulated fine sediments, to avoid excessive compaction of soils by construction machinery or equipment, and to ensure that the design and permitted infiltration rate is achieved.

(e) Maintenance Requirements

The plan shall include a description of procedures that will be followed to ensure the timely maintenance of vegetation, erosion and sediment controls, stormwater management practices, and other protective measures and BMPs so they will remain in good and effective operating condition.

(f) Inspections

An inspector qualified in accordance with Part II.12. of with DEP Document No. 62-621.300(4)(a), effective February 17, 201509, incorporated by reference in paragraph 62-621.300(4)(a), F.A.C., (provided by the owner or operator) shall perform all required site inspections. Site inspections must include all points of discharge into surface waters or an MS4; disturbed areas of the construction site that have not been finally stabilized; areas used for storage of materials that are exposed to precipitation; structural controls; and locations where vehicles enter or exit the site. Site inspections shall be conducted at least once every seven calendar days and within 24 hours of the end of a storm that is 0.50 inches or greater. Inspections shall include:

1. Disturbed areas and areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the stormwater system. The stormwater management system and erosion and sediment control measures identified in the plan shall be observed to ensure that they are operating correctly. Discharge locations or points shall be inspected to ascertain whether erosion and sediment control and stormwater treatment measures are effective in preventing or minimizing the discharge of pollutants, including retaining sediment onsite pursuant to Rule 62-40.432, F.A.C. Locations where vehicles enter or exit the site shall be inspected for evidence of offsite sediment tracking.

2. Based on the results of the inspection, all maintenance operations needed to assure proper operation of all controls, BMPs, practices, or measures identified in the stormwater pollution prevention plan shall be done in a timely manner, but in no case later than 7 calendar days following the inspection. If needed, pollution prevention controls, BMPs, and measures identified in the plan shall be revised as necessary to assure proper operation of all controls, BMPs, practices, or measures identified in the stormwater pollution prevention plan. Such revisions shall provide for timely implementation of any changes to the plan within 7 calendar days following the inspection.

3. A report summarizing the scope of the inspection; name(s) and qualifications of personnel making the inspection; the date(s) of the inspection; rainfall data; major observations relating to the implementation of the stormwater pollution prevention plan; and actions

~~taken in accordance with the requirements of this permit, shall be made and retained as part of the stormwater pollution prevention plan. Such reports shall identify any incidents of non compliance. Where a report does not identify any incidents of non compliance, the report shall contain a certification that the facility is in compliance with the stormwater pollution prevention plan and the Generic Permit for Stormwater Discharge from Large and Small Construction Activities.~~

11.4 Sediment Sump Design Example

Example calculations for designing a sediment sump are provided in Section 3 of the "References and Design Aids" for Volume I, available at https://floridadep.gov/water/water/content/water-resource-management-rules#erp.

PART V – OPERATION AND MAINTENANCE-SPECIFIC REQUIREMENTS

12.0 Operation and Maintenance Requirements

12.1 Responsibilities

(a) In accordance with Rule 62-330.310, F.A.C., and except as provided in section 12.1.1, below, upon completion of a project constructed in conformance with an individual permit issued under Part IV of Chapter 373, F.S., the permit must be converted from the construction phase to an operation and maintenance phase.

(b) Responsibility for operation and maintenance of a regulated activity shall be an obligation in perpetuity as provided in Rule 62-330.310, F.A.C. ~~Such entity or entities must have the financial, legal, and administrative capability to perform operation and maintenance in accordance with Agency rules and permit conditions.~~

(c) Operation and maintenance entities must demonstrate that they have the financial, legal, and administrative capability to perform operation and maintenance in accordance with Agency rules and permit conditions. Legal and financial capability requirements for operation and maintenance entities are specified further in section 12.3 below.

(d)~~(c)~~ Conversion of a permit from the construction to the operation and maintenance phase shall follow the procedures in Rule 62-330.310, F.A.C., and **section 12.2 &, below**.

12.1.1 Exceptions

The operation phase of mining projects subject to the land reclamation requirements of Chapter 378, F.S., and that are used solely for and by the mine during its life shall be allowed to terminate, without the need to apply for abandonment of the permit, after the mine, or its subunits, has met the requirements described in the applicable paragraph 62-330.310(7)(a) or (b), F.A.C.

12.2 Procedures for Requesting Conversion from the Construction Phase to the Operation and Maintenance Phase

(a) Automatic Conversion —

1. In accordance with subsection 62-330.310(5), F.A.C., projects authorized in a General Permit shall automatically convert to an operation and maintenance phase upon completion of the permitted activities in conformance with all the terms and conditions of the permit.

2. For projects that serve an individual, private single family dwelling unit, duplex, triplex, or quadruplex that are not part of a larger plan of common development proposed by an applicant, the construction phase of the permit shall automatically convert to the operation and maintenance phase upon receipt of a completed Form 62-330.310(3), "Construction Completion and Inspection Certification for

Activities Associated with a Private Single-Family Dwelling Unit.," ~~the construction phase of the permit shall automatically convert to the operation and maintenance phase. However, if at any time the Agency determines that such an activity was not built in conformance with the terms and conditions of the permit, the permittee shall be subject to enforcement by the Agency and for all measures required to bring the activity into compliance with the permit.~~

3. If at any time the Agency determines that such activities as referenced in subparagraphs (a) 1. and (a) 2. above were not built in conformance with the terms and conditions of the permit, the permittee shall be subject to enforcement action by the Agency and for all measures required to bring the activity into compliance with the permit.

(b) For projects other than those specified in **sections 12.1.1** and **12.2(a), above** — The permittee shall submit ~~Submittal of~~ Form 62-330.310(1) "As-Built Certification and Request for Conversion to Operation Phase," in accordance with subparagraph 62-330.350(1)(f)2., F.A.C., ~~shall serve~~ to notify the Agency that the project, or independent portion of the project, is completed (other than long-term monitoring and any mitigation that will require additional time after construction or alteration to achieve the success criteria specified in the permit) and ready for inspection by the Agency.

1. Projects not requiring certification by a registered professional shall be certified by the permittee or their authorized agent. Projects designed by a registered professional shall be certified by a registered professional, unless exempted by law.

2. The permittee shall submit as-built drawings with Form 62-330.310(1). The person completing Form 62-330.310(1) shall inform the Agency if there are substantial deviations from the plans approved as part of the permit. ~~and include as-built drawings with the form.~~

   The plans must be clearly labeled as "as-built" or "record" drawings and shall consist of the permitted drawings that clearly highlight (such as through "red lines" or "clouds") any substantial deviations made during construction. The permittee shall be responsible for correcting the deviations [as verified by a new certification using Form 62-330.310(1)]. Non-substantial deviations do not require a permit modification. Substantial deviations shall be processed as a minor or major modification as described in section 6.2 of this handbook and under Rule 62-330.315, F.A.C. Such modification must be issued by the Agency prior to the Agency approving the request to convert the permit from the construction to the operation and maintenance phase.

3. The person certifying compliance with the permit shall submit documentation that demonstrates satisfaction of all permit conditions, other than long term monitoring and inspection requirements, along with Form 62-330.310(1).

(c) When projects authorized by a permit under this chapter are constructed in phases, each phase or independent portion of the permitted project must be completed prior to the use of that phase or independent portion. The ~~and the~~ permittee ~~Permittee~~ must ~~have~~ submit~~ted~~ Form 62-330.310(1) "As-Built Certification and Request for Conversion to Operation Phase," in accordance with subparagraph 62-330.350(1)(f)2., F.A.C., certifying as to such completion ~~for that phase or independent portion to be considered complete.~~ prior to the

use of that phase or independent portion of the project. The request for conversion to the operating phase for any phase or independent portion of the permitted project shall occur before construction of any future work that may rely on that infrastructure for conveyance and water quality treatment and attenuation. Phased construction can include a partial certification.

(d) Within 60 days of receiving Form 62-330.310(1), the Agency shall approve the request or ~~will~~ notify the permittee of any deficiencies that must be corrected prior to conversion to the operation and maintenance phase. If the Agency fails to take action on the request to convert the permit or notify the permittee of deficiencies, the conversion to operation and maintenance shall be deemed approved.

(e) If the Agency notifies the permittee of deficiencies that must be corrected, and if the permittee fails to correct those deficiencies in a timely manner, the project will be considered to be not operating in accordance with a permit issued under Chapter 62-330, F.A.C., and the permittee will be subject to enforcement action by the Agency. In such case<u>s</u>, the permittee will be responsible for any necessary permit modifications, alterations, or maintenance to bring the project into ~~such~~ compliance, and for submitting any new certifications and requests to convert the permit to the operation and maintenance phase as provided in this section.

(f) The requirements for submittal of an "as-built certification" contained in a permit issued under Part IV of Chapter 373, F.S., prior to October 1, 2013, the effective date of Chapter 62-330, F.A.C., shall continue to be followed in accordance with the existing permit unless the permittee obtains a modification using the procedures in Rule 62-330.315, F.A.C., to comply with the "as-built certification" requirements of Rules 62-330.310 and 62-330.350, F.A.C., and this section of Volume I.

12.2.1 Transfer to the perpetual operation and maintenance entity

(a) If the permittee is also the operation and maintenance entity, once the activity has been converted to the operation phase as described in **section 12.2, above,** no other action is required under this section.

(b) In accordance with subparagraph 62-330.350(1)(g)2., F.A.C., if the permittee is not ~~also~~ the operation and maintenance entity, a completed Form 62-330.310(2), "Request for Transfer of Environmental Resource Permit to the Perpetual Operation Entity" must be submitted to transfer the permit to the operation and maintenance entity. If the transfer is to the entity identified in the permit, the submittal of the form does not require a processing fee, and the review shall not require processing as a permit modification under Rule 62-330.315, F.A.C. The form must be signed by a person authorized to represent the operation and maintenance entity, and shall be submitted along with the following, as applicable:

1. A copy of the recorded transfer of title to the operation and maintenance entity for the common areas on which the stormwater management system, or other permitted works are located (unless dedicated by plat)<u>;</u>~~,~~

2. A copy of all recorded plats<u>;</u>~~,~~

3. Copies of recorded declaration of covenants and restrictions, amendments, and

associated exhibits;~~, and~~

4. A copy of the filed articles of incorporation and documentation of the operation and maintenance entity's active corporate status with the Department of State, Division of Corporations, if the entity is a corporation;~~.~~

5. A copy of the operation and maintenance plan, revised as necessary to be applicable to the stormwater management system as designed and permitted;

6. A copy of the cost estimate in accordance with Section 12.3.5 below; and

7. Documentation demonstrating financial capability in accordance with Section 12.3 below.

(c) The permittee shall ensure that all documents ~~Documents~~ that require recordation in the public records are ~~must be~~ recorded in the county where the project is located prior to any lot or unit sales within the project served by the system or work, or upon completion of construction of the system or work, whichever occurs first.

(d) Within 60 days of receiving a complete request to transfer the permit to the operation and maintenance entity, the Agency shall approve the request, or will notify the permittee that the documentation is insufficient to demonstrate compliance with **Section 12.3, below,** and permit conditions. The permittee shall remain liable until the permit is transferred to the operation and maintenance entity by the Agency. If the Agency fails to take action or notify the permittee of the insufficiencies within 60 days of the request, the transfer shall be deemed approved if the permit has already been certified and converted to the operation phase.

(e) If a permit modification is required to allow for a new entity or multiple entities to operate and maintain the project, the 60-day time period for Agency action shall not commence until the permit modification is issued.

12.3 Operation and Maintenance Entities

12.3.1 An acceptable operation and maintenance entity shall have the financial, administrative, and legal capability to access, monitor, operate, and maintain the permitted project. Typically, this is accomplished through ownership or control of all property on which the permitted project is located by one of the entities listed below. However, alternative methods of achieving the legal requirements necessary for operation and maintenance will be considered by the Agency. Drainage easements, cross drainage agreements, or similar documents may be required for connected systems or systems with common infrastructure to be operated by different entities.

The following entities are acceptable for ensuring that an activity will be operated and maintained in compliance with the requirements of Section 373.416(2), F.A.C., and Chapter 62-330, F.A.C.

(a) Local government units, including counties and municipalities, Municipal Service Taxing Units, or special taxing units;

(b) Water control districts created pursuant to Chapter 298, F.S., drainage districts created by special act, special districts defined in Chapter 189, F.S., Community Development Districts created pursuant to Chapter 190, F.S., Special Assessment Districts created pursuant to

Chapter 170, F.S., or water management districts created pursuant to Chapter 373, F.S.;

(c) State or federal agencies;

(d) Duly constituted communication, water, sewer, stormwater, electrical, or other public utilities;

(e) Construction permittees, subject to the restrictions below; or

(f) Non-profit corporations, including homeowners' associations, property owners' associations, condominium owners' or master associations, subject to the restrictions below.

12.3.2 If the proposed operation and maintenance entity falls within paragraph (a), (b), (c), or (d) above, a preliminary letter of intent or statement from such entity must be submitted to the Agency with the permit application, or in a permit modification request, indicating the entity's intention to accept responsibility for operation and maintenance of the permitted system. The letter of intent or statement must be submitted along with Form 62-330.301(#), "Certification of Financial Capability for Perpetual Operations and Maintenance Entities," and must clearly indicate what portions of the system will be operated and maintained by the entity, and whether any portions of the system are to be operated and maintained by another entity. If portions of the system are to be operated and maintained by another entity, similar letters of intent or statements must be received from those entities. Upon approval by the Agency, all such identified entities will be responsible for operation and maintenance of the system.

12.3.3 A construction permittee is an acceptable operation and maintenance entity, provided the property on which all of the permitted project is located will continue to be owned or controlled by the construction permittee. When a construction permittee intends to convey the property to a third party, the permittee will be an approved operation and maintenance entity from the time construction begins until the system is transferred to the established legal entity approved by the Agency. If a permittee intends to convey or transfer any portion of the property on which the permitted project is located, the permittee may continue to be the long-term operation and maintenance entity only if appropriate drainage easements, cross drainage agreements or similar documents that provide the entity with the legal capability and authority to operate and maintain the permitted project is approved as part of the permit application, are recorded in the official records of the applicable county, and are in effect prior to any conveyance or transfer of the property or conversion of the permit to the operation and maintenance phase, whichever occurs first. Where the property is leased or rented to a third party, the property owner shall continue to be the responsible operation and maintenance entity, unless the Lessor is the permittee.

12.3.4 Homeowners' associations, property owners' associations, and condominium owners' or master associations (collectively, "Associations") are acceptable operation and maintenance entities only if they have the financial, legal, and administrative capability to provide for the perpetual ~~long-term~~ operation and maintenance of the project. Accordingly, the applicant must:

(a) Submit draft Articles of Incorporation, Declaration, Restrictive Covenants, Deed Restrictions or other organizational and operation documents, or draft amendments thereto, that affirmatively assign responsibility to the Association for the operation or maintenance of the project. Model language for Declaration and Restrictive Covenants is included in section 7 of the "References and Design Aids" for Volume I. The Association documents must comply with Chapters 617, 718, 719, and 720, F.S., as applicable.

(b) Submit documentation that the Association will have sufficient powers (reflected in governing documents where applicable)~~,~~ to:

1. Own and convey property;

2. Operate and perform maintenance of the permitted project on common property as exempted or permitted by the Agency;

3. Establish rules and regulations governing membership or take any other actions necessary for the purposes for which the corporation or association was organized;

4. Assess members for the cost of operating and maintaining the common property, including the stormwater management system, and enforce the collection of such assessments;

5. Sue and be sued;

6. Contract for services to provide for operation and maintenance (if the association contemplates employing a maintenance company);

7. Require all owners of real property or units to be members of the corporation or association; and

8. Demonstrate that the land on which the system is located is owned or otherwise controlled by the corporation or association to the extent necessary to operate and maintain the system or convey operation and maintenance to another entity.

(c) Submit documentation that the following covenants and restrictions, will be or have been set forth in the Declaration of Restrictive Covenants, Deed Restrictions, Declaration of Condominium, or other recorded document setting forth the Association's rules and regulations:

1. That it is the responsibility of the Association to operate and maintain the system;

2. The system is owned by the Association or described therein as common property;

3. That there is a method of assessing and collecting the assessment for operation and maintenance of the system;

4. That assessments are such that they would cover, at minimum, the annual costs of operation and maintenance for the permitted stormwater systems, outlined in the cost estimate as described in section 12.3.5, and that those assessments are intended to be allocated sufficiently within the annual budget to cover projected operating expenses, including any operation and maintenance costs for the permitted stormwater systems for periodically required capital expenditures or deferred maintenance, that would be in addition to annual operating expenses pursuant to Chapter 720, F.S.;

5. ~~4.~~ That any proposed amendment to the Association's documents affecting the

system (including environmental conservation areas and the water management portions of the common areas) must be submitted to the Agency for a determination of whether the amendment necessitates a modification of the environmental resource permit. If a modification is necessary, the Agency will so advise the permittee. The amendment affecting the system may not be finalized until any necessary permit modification is approved by the Agency or the Association is advised that a modification is not necessary;

6. ~~5.~~ That the governing provisions of the Association must be in effect for at least 20 years with automatic renewal periods thereafter, and must state that the Association shall maintain governing provisions as needed to maintain compliance with any applicable local, state, or federal regulations for perpetual operation and maintenance of the permitted stormwater system;

7. 6. That the Association shall exist in perpetuity. However, should the Association dissolve, the operational documents shall provide that the system shall be transferred to and maintained by one of the entities identified in **sections 12.3.1(a) through (f), above**, who has the powers listed in **section 12.3.4(b)1. through 8., above**, the covenants and restrictions required in **section 12.3.4(c)1. through 9., herein**, and the ability to accept responsibility for the operation and maintenance of the system described in **section 12.3.4(d)1. or 2., below**;

8. ~~7.~~ If wetland mitigation monitoring is required by the permit and the operational entity will be responsible to carry out this obligation, the rules and regulations of the Association shall state that it will be the Association's responsibility to complete the task successfully, including meeting all conditions associated with mitigation maintenance and monitoring;

9. ~~8.~~ The Agency has the right to take enforcement action, including a civil action for an injunction and penalties, against the Association to compel it to correct any outstanding problems with the system facilities or in mitigation or conservation areas under the responsibility or control of the Association; and

10. ~~9.~~ A "Recorded Notice of Environmental Resource Permit," Form No. 62-330.090(1), shall be recorded in the public records of the County(s) where the project is located. The Registered Agent for the Association shall maintain copies of all permitting actions for the benefit of the Association.

(d) Submit documentation that the Association will ~~have the ability to accept responsibility for the operation and maintenance of the system~~:

1. Have the ability to accept responsibility for the operation and maintenance of the system for ~~F~~or future phases of the project, if the operation and maintenance entity is proposed for a project that will be constructed in phases, and subsequent phases will utilize the same system as the initial phase or phases; ~~or~~

2. Have, either separately or collectively, the responsibility and authority to operate and perform maintenance of the system for the entire project area, if the development scheme contemplates independent operation and maintenance entities for different phases, and the system is integrated throughout the project. That authority must include cross easements for surface water management and

the ability to enter and maintain the various portions of the system, should any sub-entity fail to maintain a portion of the system within the project area; and.

3. Have ownership or control of the reserve fund(s), if established by the construction permittee or a prior operation and maintenance entity, or provide other reasonable assurance that financial obligations of the system will be met.

12.3.5 All applicants for operation and maintenance phase activities must demonstrate that they have the financial capability to operate and maintain the stormwater management system as designed and permitted. All operation and maintenance entities shall provide a cost estimate for the perpetual operation and maintenance of the stormwater management system through the submission of the documents described herein.

(a) Cost estimates:

1. Cost estimates will be required for all stormwater management systems, except those that self-certify in accordance with the 10-2 general permit authorization under section 403.814(12), F.S.

2. The cost estimate shall be computed in current year dollars, to determine the annual operating expenses, including inspection costs, maintenance costs, for the estimated remaining useful life of the system accounting for replacement costs or deferred maintenance expenses for non-annual expenditures, for all components of the stormwater management system, including for each BMP in the stormwater management system.

3. The operation and maintenance entity may adjust replacement reserve assessments annually to take into account any changes in estimates of cost or useful life of a reserve item.

4. The applicant shall submit written cost estimates with verifiable bases for the estimates to the Agency along with the financial assurance. At the time of request for transfer the permittee shall submit an updated written cost estimate. The source of any cost estimates shall be indicated.

5. If more than one financial mechanism is proposed for perpetual operation and maintenance, the cost estimate shall specify the appropriate mechanism for each itemized cost.

b) Demonstration of Financial Capability for Operation and Maintenance:
Applicants for the operation and maintenance phase must provide Form 62-330.xyz, "Certification of Financial Capability for Perpetual Operations and Maintenance Entities,"

c) Associations which are subject to reporting and budgeting requirements under Chapter 720, F.S., shall provide the summary information reported on Form 62-330.301(#) to conform with the financial reporting and budget requirements of Chapter 720, F.S. Such certification shall provide reasonable assurance that the Association has the financial capability to operate and maintain the permitted system as designed and permitted. An Association may submit draft documentation, including information regarding a reserve account, to the Agency with the permit application. If it is a part of the Association's demonstration of financial capability as

approved by a permit, the reserve account must be executed and funded prior to the transfer to the operation and maintenance phase, unless another time frame is specified in the permit.

1. If the budget for an Association includes a reserve account for capital expenditures and deferred maintenance, the required funds for such shall be computed by a means consistent with the requirements of 12.3.5 (a) above.

2. The operation and maintenance entity may adjust replacement reserve assessments annually to take into account any changes in estimates of cost or useful life of a reserve item.

3. Reserve funds originally proposed to support operation and maintenance activities for a stormwater management system shall remain in the reserve account(s) and shall be used only for authorized operation and maintenance expenditures, unless their use for other purposes is approved in advance by the Association in accordance with the requirements of Chapter 720, F.S.

12.4 Minimum Operation and Maintenance Standards

(a) In accordance with Section 373.416(2), F.S., unless revoked or abandoned, all stormwater management systems, dams, impoundments, reservoirs, appurtenant works, or works permitted under Part IV of Chapter 373, F.S., must be operated and maintained in perpetuity. The operation and maintenance shall be in accordance with the designs, plans, calculations, and other specifications that are submitted with an application, approved by the Agency, and incorporated as a condition into any permit issued.

(b) Operation and Maintenance Access

An operation and maintenance entity shall provide documentation of legal authorization, such as access easements, deed restrictions, or other legal instruments, for the operation and maintenance entity to have and maintain sufficient access for operation and maintenance of the stormwater treatment system, except where the operation and maintenance entity has provided separate documentation of having ownership control of the related stormwater management system property. The following requirements shall apply to operation and maintenance access easements:

1. Access easements must cover at least the primary and high-maintenance components of the system (i.e., inlets, outlets, littoral zones, filters, pumps, etc.), including provisions for equipment to enter and perform the necessary maintenance on the system. Applicants may propose site-specific easements that meet this requirement.

2. Easements for stormwater management systems must:

   a. Include the area of the water surface measured at the control elevation;
   b. Extend a minimum of 20 feet from the top of bank and include side slopes or an allowance for side slopes calculated at no steeper than 4H:1V (horizontal to vertical) or an alternate allowance for installation and maintenance of a fence or other public access restriction, whichever is greater; and
   c. Be traversable by operation and maintenance equipment and personnel.

3. Easements for piped stormwater conveyance must be a minimum of the width of the pipe plus 4 times the depth of the pipe invert below finished grade.

4. Easements must provide a minimum access width of 20 feet, unless it can be demonstrated that smaller widths will provide sufficient access for equipment and personnel to enter and perform the necessary maintenance for the system. The easement(s) shall extend from a public road, public right-of-way or other location from which operation and maintenance access is legally and physically available and extend to provide access as needed for operation and maintenance for each stormwater management system component.

As an alternative, the applicant may propose other forms of legal authorization for provided operation and maintenance access provided the applicant affirmatively demonstrates that equipment and operators can enter and perform the required operation and maintenance activities on the stormwater management system.

12.4.1 Stormwater Management System Operation and Maintenance Plan

An applicant for construction, alteration, operation of a stormwater management system shall provide a written operation and maintenance plan (O&M Plan) at time of application. Such application shall be prepared and certified by a qualified registered professional, and shall specifically identify the O&M Plan activities that must be done to ensure the perpetual performance of the stormwater management system. The O&M Plan shall describe the overall inspection and maintenance requirements, including applicable operations and maintenance requirements as specified herein, and shall identify future capital and maintenance expenditures that are required to ensure that the stormwater management system continues to function as designed and permitted.

Applicants for systems where the operation and maintenance entity is or will be a Municipal Separate Storm Sewer System permittee subject to Chapter 62-624, F.A.C. (MS4 Entity), shall not submit a separate O&M plan hereunder and shall instead conduct operation and maintenance of the ERP-permitted stormwater management systems in accordance with their MS4 permit requirements and any associated stormwater management program requirements, MS4 Entities shall nonetheless ensure that operation and maintenance activities are sufficient to perpetually maintain the performance of the ERP stormwater management system so that it functions as designed and permitted hereunder.

FSA Comment: The MS4 exemption is a good change.

(a) The written O&M Plan for all operation and maintenance entities other than an MS4 Entity shall, at a minimum, include:

1. A list and details of all stormwater system components including their location, type, and other pertinent information;

2. A list and description of each of the identified maintenance and inspection tasks for each of the system's components and for the overall system, (refer to the BMP library for reference on procedures for BMPs);

3. All regular inspection and maintenance schedules;

4. Inspection checklists;

5. Copies or references for of the pertinent sections of all covenants, conditions, restrictions, and other association documents, permits, approvals, and agreements that govern the operation and maintenance of the stormwater management system; and

6. Permitted or as-built plans of the stormwater water management system.

(b) Once transferred to the operation and maintenance phase, as-built plans shall be included in the operation and maintenance plan upon completion of construction of each completed phase, if applicable. The operation and maintenance plan must also include or reference other pertinent facility information such as design limitations and replacement schedules for any components of the stormwater management system that are needed to maintain performance as originally designed and permitted, including those components where maintenance or replacement frequencies are less frequent that once per year. The O&M Plan should also include a list of after-hours telephone numbers of key maintenance personnel in case of emergencies and information necessary for reviewing copies of maintenance and inspection records.

(c) The operation and maintenance entity shall maintain a copy of the O&M Plan as submitted and approved in accordance with this Chapter 62-330, F.A.C. If a third-party entity performs operation and maintenance on behalf of the owner or permittee, the permittee shall remain responsible for all operation and maintenance requirements.

(d) The operation and maintenance plan should be periodically reviewed, at least at the time of inspections required under 12.5 below, to identify any new or additional required operation and maintenance activities. The operation and maintenance entity shall ensure that the plan is updated as needed with applicable contact information and any new operation and maintenance requirements to ensure that the stormwater system continues to function as designed and permitted. If any document is updated, the updated document(s) shall be available for inspection upon request by the permitting Agency.

12.5 Inspections

(a) The operation and maintenance entity for a stormwater management system shall conduct inspections at a minimum frequency as needed to ensure that the stormwater management system, and each component thereof, continues to function as designed and permitted. The operation and maintenance entity shall employ a qualified registered professional, or a qualified inspector as described in (c) below, to inspect the stormwater treatment system permitted under rule 62-330, F.A.C., and to submit a report to the Agency describing and certifying the results within 30 days of the inspection. The report shall certify that the stormwater treatment system is operating as designed and permitted. The results of required inspections shall be filed with the Agency using Form 62-330.311(1), "Operation and Maintenance Inspection Certification." Inspections under this section shall be performed and submitted within 30 days from the date of the stormwater management system inspection.

FSA Comment: The addition of "qualified inspector" is a great addition.

Also, most municipalities (and other entities) have established reporting and inspection processes using internal databases and forms. To make the process as efficient as possible we suggest that Department approve the inspection of SOPs. This allows the entity to develop efficient processes and reduces the Department's need to maintain current forms.

(b) In addition to subpart (a) above, the operation and maintenance entity shall perform stormwater management system inspections in accordance with the following frequencies:

1. an MS4 Entity shall conduct inspections of ERP-permitted stormwater management systems in accordance with their MS4 permit requirements and any associated Standard Operating Procedures (SOPs) required pursuant to Chapter 62-624, F.A.C.; and

2. all operation and maintenance entities other than an MS4 Entity shall, at a minimum, conduct stormwater management system inspections at a frequency specified pursuant to (g) below.

(c) For stormwater management system inspections conducted on or after {insert date for the effective date of rule, plus one year}, a qualified inspector for conducting, certifying, and submitting inspection reports must be, at a minimum, either: (i) be a registered professional, (ii) include documentation for the inspection that the inspection was conducted by a person while under the supervision of a registered professional, or (iii) be a person having documentation of training, completed within no more than ~~three years~~ five years prior to the date of a stormwater management system inspection hereunder that, at a minimum, covers the following:

1. The ability to read construction drawings, plans, specifications and modeling of recovery timeframes;
2. Principles of traditional BMPs, as listed in 62-330.311(3), for stormwater treatment, including functions that convey and remove pollutants from stormwater;
3. For traditional BMPs, the potential causes of failure or malfunction, replacement needs, and reduction in treatment efficiency;
4. Understanding of the purpose, design, and function of manufactured devices or non-traditional BMPs and the ability to ensure the device meets manufacturers' specifications and maintenance requirements; and
5. Performance of inspections, including field inspection experience and the completion of required reports and documentation, consistent with the requirements of Section 12 of Volume I, any relevant requirements of the applicable Applicant's Handbook, Volume II, and all other applicable rules and regulations.

FSA Comment: Based on FSA's experience training stormwater personal field staff (700+ individuals a year), we recommend a five-year timeframe for certifications and re-certifications. Repeating training every three years seems overly prescriptive.

(d~~b~~) Upon completion of the permitted stormwater management systems, dams, reservoirs, impoundments, appurtenant work, or works, the Agency may conduct ~~shall have~~ periodic inspections ~~made~~ to ensure the project was constructed and is being operated in compliance with the terms and conditions of the permit, and in a manner that protects the public health and safety and the natural resources of the state.

(e~~c~~) Inspections may be performed by Agency staff during and after construction and as~~. When~~ needed to ensure a project is being operated and maintained in perpetuity in compliance with permit conditions.~~, the permit may require the operation and maintenance entity to conduct the periodic inspections. The required inspection schedule for a specific project will be specified in the permit.~~

(fd) Some projects **that do not consist of or include a stormwater management system, dam, impoundment, reservoir, or appurtenant work,** whether designed by a registered professional or not, also may be required in the permit to be regularly inspected and monitored to ensure continued compliance with permit conditions and the functioning of the project. This may include individual permits issued for activities at a private residential single-family residence. For example, a residential fill pad may have been permitted with specific requirements for slope drainage or runoff. A dock located in waters with sensitive resources may have been permitted with conditions prohibiting mooring in certain locations, limiting the number or size of boats to be moored at the dock, or with requirements for handrailing or other associated structures. The permit will specify the periodic inspections that will be required, and how the results of the inspections are to be either retained by the permittee or reported to the Agency.

The following are examples of activities as discussed above that are subject to an initial inspection prior to conversion to the operation phase, and then subject to routine inspections during the operation and maintenance phase. The inspection frequency during the operation and maintenance phase will be determined in the permit:

- Single-family dock (to verify that: handrails are constructed and are maintained to prevent mooring of vessels in shallow waters);
- Multi-slip docking facility (to verify maintenance of manatee protection signs, sewage pumpout facilities, or over-water fueling operation);
- Single-family lot fill (to verify lawn grading and sloping is maintained to reduce discharges of nutrients from lawn runoff entering sensitive waters);
- Seawalls or rip rap (to verify integrity of system or shoreline plantings);
- Lands within a conservation easement (for encroachments, alterations, or exotic/nuisance vegetation removal) in accordance with a permit under this chapter;
- Mitigation sites (to determine compliance with success criteria, including the status of exotic species removals); and
- Other dredging or filling (for example, dredged material sites and dams to ensure functioning and stability of dikes and control structures).

~~(e) The efficiency of stormwater management systems, dams, impoundments, and most other projects normally decreases over time without periodic maintenance. For example, a significant reduction in the flow capacity of a stormwater management system often can be attributed to partial blockages of its conveyance system. Once flow capacity is compromised, flooding may result. Therefore, operation and maintenance entities must perform periodic inspections to identify if there are any deficiencies in structural integrity, degradation due to insufficient maintenance, or improper operation of projects that may endanger public health, safety, or welfare, or the water resources. If deficiencies are found, the operation and maintenance entity will be responsible for correcting the deficiencies so that the project is returned to the operational functions required in the permit and contemplated by the design of the project as permitted. The corrections must be done a timely manner to prevent compromises to flood protection and water quality.~~

(g)~~(f)~~ The applicant or permittee, for an operation and maintenance entity other than an MS4 Entity, shall propose a project specific minimum inspection frequency for a stormwater management system that is designed to ensure that the stormwater management system will perpetually function as designed and permitted. The proposed minimum inspection frequency shall include documentation on the considerations listed below. In the event of

a permit modification, a reduction of a permitted stormwater management system inspection frequency shall be considered a minor modification under Rule 62-330.315, F.A.C., where the proposed inspection frequency is either consistent with the applicable time frames specified in Table 12-1, or is reasonably expected to maintain equivalent performance of the stormwater management system based on the considerations listed below. The permitting Agency shall allow a minimum inspection schedule proposed by a registered professional where consistent with the applicable time frames specified in Table 12-1, or where an applicant has otherwise provided reasonable assurance that the proposed inspection schedule will ensure that the system is being operated and maintained as designed and permitted. A proposed minimum inspection frequency for a stormwater management system shall provide historical information on the operation and maintenance of any existing stormwater management system, as well as the specific operational and maintenance requirements of the site, which includes the following: ~~Inspection and reporting frequencies will be included as permit conditions based on site- specific operational and maintenance requirements, considering things as:~~

1. The type, nature, and design of the design and performance standards proposed, including any alternative designs such as pervious pavement, green roofs, cisterns, managed aquatic plant systems, stormwater harvesting, wetland treatment trains, low impact designs, alum or polymer injection systems;

2. The proximity of receiving waters classified as Outstanding Florida Waters in Rule 62-302.700, F.A.C., or impaired for constituents likely to be contained in discharges from the project;

3. The nature of the site, such as whether it is part of a port or landfill, whether it will impound more than 40 acre-feet of water, or will include above ground impoundments;

4. The topography, rainfall patterns, and adjacent development surrounding the activity site, including any special basin designations within the District in which the activity is located, as identified in paragraph 62-330.301(1)(k), F.A.C.;

5. The nature of the underlying soils, geology, ~~and~~ groundwater, and hydrology;

6. The potential for construction and operation of the project to cause harm to public health, safety, or welfare, or harm to water resources, water quality standards, or water quality; ~~and~~

7. Prior compliance history with the proposed design and performance type, including whether the activity characteristics are likely to pose more than a minimal risk for harm~~.~~; and

8. Type of BMPs in the system. Table 12-1 lists common BMPs and their recommended reduced inspection frequency. For stormwater systems with multiple BMPs in series, the most frequent inspection rate is recommended for the entire system. This listing is suggested as general guidance for reduced inspection frequencies and is not all inclusive. These frequencies can be altered by the permitting Agency based on considerations of 1-7 above and in accordance with this section of Volume 1.

Where an applicant's proposed minimum inspection frequency does not provide reasonable assurance that the minimum inspection frequency will ensure that the stormwater management system will continue to function perpetually as designed and permitted, the Agency shall require at least annual inspection frequencies in a specific permit condition for the operation and maintenance entity. Where a minimum stormwater management system inspection frequency is not included in a permit condition by the Agency for a permit issued or modified on or after {insert date for the effective date of rule, plus 90 days}, the permittee shall conduct inspections at a minimum frequency of at least once per year.

Table 12-1: Recommended Inspection Frequencies for common BMPs

TYPE OF SYSTEM	**INSPECTION FREQUENCY**
Dry Retention basins	Once every 5 years
Exfiltration trenches	Once every 2 Years
Underground retention	Once every Year
Sand or Media Filters	Once every Year
Underdrain System	Once every 2 Years
Underground vault/chambers	Once every Year
Swales (treatment)	Once every 5 years
Wet Detention systems	Once every ~~2~~ 3 years
Vegetated Natural Buffers	Once every 5 years

FSA Comment: Based on experience, we recommend inspection of wet ponds every three years. Also, refer to our comment in Section 9.5.3 regarding GI and LID designs.

12.5.1 Inspection Requirements

Operation and maintenance entities must ensure that inspections are being conducted to ensure that stormwater management systems are being maintained as designed and permitted. The efficiency of stormwater management systems, dams, impoundments, and most other projects normally decreases over time without periodic maintenance. For example, a significant reduction in the flow capacity of a stormwater management system often can be attributed to partial blockages of its conveyance system. Once flow capacity is compromised, flooding may result. Therefore, operation and maintenance entities must perform periodic inspections to identify if there are any deficiencies in structural integrity, degradation due to insufficient maintenance, or improper operation of projects that may endanger public health, safety, or welfare, or the water resources. If deficiencies are found, the operation and maintenance entity will be responsible for correcting the deficiencies so that the project is returned to the operational functions required in the permit and contemplated by the design of the project as permitted. The corrections must be done a timely manner to prevent flooding and protect water quality.

(a) ~~(g)~~ Special attention shall be made during inspections to ensure that:

1. All erosion is controlled, and soil is appropriately stabilized to prevent sediment discharge to waters in the state;

2. The system is kept free of debris, trash, garbage, oils and greases, floatables, and other refuse;

3. Stormwater management systems that include oil and grease separators, skimmers, or collection devices are working properly and do not allow the discharge of oils or greases. Oils and greases or other materials removed from such a device during routine maintenance shall be disposed of at a sanitary landfill or by other lawful means; and

4. All structures within stormwater management systems have not become clogged or choked with vegetative or aquatic growth to such an extent as to render them inoperable.;

5. System components have been maintained to remove sediments, debris, and other deleterious materials to ensure that the systems continue to perform as designed and permitted, and that their original permitted dimensions have not been altered substantially; and

6. All system components associated with nutrient or other pollutant removal are in good working order. Maintenance logs and records are reviewed to ensure devices are functioning properly and are being replaced at intervals recommended in the operation and maintenance plan.

(b) Inspection checklists shall be used for reporting and supplemented with other forms as appropriate. Inspection checklists shall be used for the permitted inspections after the project has been transferred to the operation and maintenance phase, to ensure that all system components are functioning as originally permitted and constructed.

FSA Comment: We feel that Section (b) is redundant and overly prescriptive. FDEP has previously outlined what needs to be considered. Entities should be allowed to develop systems that work with their specific resources.

(c) (h) Unless otherwise specified in the permit, the operation and maintenance entity must maintain a record of each inspection, including the date of inspection, the name and contact information of the inspector, whether the system was functioning as designed and permitted, and make such record available upon request of the Agency, in accordance with **section 12.612.5, below**.

(i) The inspection and reporting requirements contained in a permit issued under Part IV of Chapter 373, F.S., prior to October 1, 2013, the effective date of Chapter 62-330, F.A.C., which implements Section 373.4141, F.S., shall continue to be followed in accordance with the existing permit unless the permittee obtains a modification using the procedures in Rule 62-330.315, F.A.C., to comply with the inspection and reporting requirements of Rule 62-330.311, F.A.C., and this section of the Handbook.

12.6 12.5Reporting

(a) All forms required for reporting can be submitted to the respective Agency Internet site. If the permittee does not use the electronic forms provided on that site, they shall be responsible for retaining records of the inspections and for delivering such records within 30 days of request to the requesting Agency, unless a more rapid delivery is requested for such reasons as the potential for the activity harm to water quality, water resources, public health, or public safety.

(b) Operation and maintenance entities, other than an MS4 Entity, responsible for a stormwater

management system shall submit an inspection report to the agency describing and certifying the results of the inspection within 30 days of the date of the inspection. A qualified inspector shall certify the results of all such inspections. The permittee shall submit inspection reports with the Agency using Form 62-330.311(1), "Operation and Maintenance Inspection Certification." Reports shall also include, as applicable:

FSA Comment: The exemption of MS4 entities is a great addition. See comments above in Section 12.5 regarding the use of a specific reporting form.

1. Form 62-330.311(3) "Inspection Checklists",
2. Any updated operation and maintenance cost estimates as described in Section 12.3.5,
3. A summary of updates to the operation and maintenance plan described in Section 12.4.1, and
4. Any monitoring reports as may be required by a permit specific condition.

(c)~~(b)~~ Within 30 days of any failure of a stormwater management system or deviation from the permit, a report shall be submitted electronically or in writing to the Agency using Form 62-330.311(1), "Operation and Maintenance Inspection Certification," describing the remedial actions taken to resolve the failure or deviation.

(d)~~(c)~~ The operation and maintenance entity of a regional stormwater management systems must notify the Agency on an annual basis, using Form 62-330.311(2), "Regional Stormwater Management System Annual Report," of all new systems and their associated stormwater volumes that have been allowed to discharge stormwater into the regional system, and confirming that the maximum allowable treatment volume of stormwater authorized to be accepted by the regional stormwater management system has not been exceeded.

(e) The inspection and reporting requirements contained in a permit issued under Part IV of Chapter 373, F.S., prior to October 1, 2013, the effective date of Chapter 62-330, F.A.C., which implements Section 373.4141, F.S., shall continue to be followed in accordance with the existing permit unless the permittee obtains a modification using the procedures in Rule 62-330.315, F.A.C., to comply with the inspection and reporting requirements of Rule 62-330.311, F.A.C., and this section of the Handbook.

(f)~~(d)~~ A listing of all the forms that are incorporated by reference in Chapter 62-330, F.A.C., is contained in Appendix C and Appendix L of this Volume; copies of which may be obtained from the Agency, as described in Appendix A of this Volume and subsection 62-330.010(5), F.A.C.

12.7~~12.6~~ Recording of Operation and Maintenance Documents and Notice of Permit

(a) Operation and maintenance documents required by **section 12.3.3 above**, must be submitted to the Agency for approval prior to recording. Such documents must be recorded in public records of the county where the project is located prior to any lot or unit sales within the project served by the system, or upon completion of construction of the system, whichever occurs first. ~~For those systems that are to be operated and maintained by county or municipal entities, final~~ Final operation and maintenance documents must be received by the Agency when maintenance and operation of the system is accepted by the operation and maintenance ~~local government~~ entity. Failure to submit the appropriate final documents will result in the permittee remaining liable for carrying out maintenance and

operation of the permitted system.

(b) Permittees are advised that the Agency shall cause a "Recorded Notice of Environmental Resource Permit," Form No. 62-330.090(1), to be recorded in the public records of the county where the property is located in accordance with subsection 62-330.090(7), F.A.C., upon issuance of a permit, except for certain types of activities identified in that subsection.

12.8 ~~12.7~~ Subsequent Transfers

Transfers of the permitted activity or the real property on which the permitted activity is located once a permit is in the operation and maintenance phase are governed by the procedures described in Rule 62-330.340, F.A.C., and **section 6.3 of this Volume**.

FSA Comment: Our review occurred during the comment window leading up to and during the holidays. In several instances we made the assumption that content was deleted by the Department because it is included in other sections/volumes. Under that assumption, we are reserving the right to make future comments on deleted content. Of note, it would be extremely helpful if the reasons for removal could be included in the January rulemaking workshop.

PART I — INTRODUCTION, ORGANIZATION, APPLICABILITY

1.0 Introduction

This is **Volume II** of a two-volume "**Environmental Resource Permit Applicant's Handbook**. It accompanies **Applicant's Handbook—Volume I** (General and Environmental). The Handbook Volumes have been developed to assist persons in understanding and applying the rules, procedures, standards, and criteria implementing the environmental resource permit (ERP) program under Part IV of Chapter 373 of the Florida Statutes (F.S.). The ERP program regulates all types of projects, including stormwater management systems, dams, impoundments, reservoirs, appurtenant work, or works, and dredging or filling, as those terms are defined in Sections 373.403(13) and (14), F.S., or any combination thereof. These terms are defined in Sections 373.019 and 373.403, F.S., and in **Section 2.0 of Handbook Volume I**.

1.1 Applicability

Volume I (General and Environmental), applies statewide to the Department of Environmental Protection ("Department" or "DEP") and all the water management districts ("WMDs" or "Districts").

This **Volume II** is applicable only within the geographic boundaries of the Northwest Florida Water Management District (NWFWD). It is incorporated by reference in paragraph 62-330.010(4)(b)1., F.A.C., and therefore operates as a rule of DEP and NWFWMD in accordance with Section 373.4131, F.S. Separate **Volume IIs** have been adopted by each of the other WMDs for use within the geographical boundaries of each District. Each of those other **Volume IIs** also are incorporated by reference in paragraph 62-330.010(4)(b)2. through 5., F.A.C., and therefore operate as rules of DEP and each applicable District within the geographical area of that District for activities regulated under Chapter 62-330, F.A.C.

Volume II is applicable only to those ERP activities that involve the design of a stormwater management system that requires a permit under Chapter 62-330, F.A.C. More specifically, it provides specific, detailed design and performance methodologies designed to meet the water quality and quantity requirements of stormwater management systems. It also will assist persons who are designing activities to comply with the general permit in Section 403.814(12), F.S.

This Volume also contains District-specific appendices for regionally-specific criteria applicable to such things as Sensitive Karst areas. There is a separate document titled "[References and Design Aids]" that contains example calculations and design aids for stormwater systems within the Florida Panhandle. The Design Aids Document is for reference and to provide examples, but it is not adopted by rule.

A stormwater management system is defined in Sections 373.403(10) and 403.031(16), F.S., and in Section 2.0 of Handbook **Volume I,** as a system that is designed and constructed or implemented to control discharges which are necessitated by rainfall events, incorporating methods to collect, convey, store, absorb, inhibit, treat, use, or reuse water to prevent or reduce flooding, overdrainage,

environmental degradation, and water pollution or otherwise affect the quantity and quality of discharges from the system.

Volume II generally is not applicable to projects that generate no more than an incidental amount of stormwater runoff, such as:

- Dredging and filling to construct such things as most "stand-alone" seawalls, docks and "in water" types of activities, such as channel dredging. This would not include dredging and filling in wetlands or other surface waters to construct such things as bridges or culverted road crossings, parking areas, building sites, or land fill which may or may not contain structures;
- Pervious (e.g., slatted decking) piers that do not convey vehicular traffic.
- An overwater pier, dock, or a similar structure located in a deepwater port subject to subsection 373.406(12), F.S. This would not include activities landside of a wharf bulkhead at a port facility;
- Construction of an individual, single family residence, duplex, triplex, or quadruplex dwelling unit that is not part of a larger plan of development;
- "Stand-alone" dredging, including maintenance dredging; or
- Activities that do not add new impervious surfaces, such as the installation of overland and buried electric and communication transmission and distribution lines.

Only **Volume I** would apply to most of the above projects because, unless specifically exempt, the above projects are still subject to regulation under Chapter 62-330, F.A.C.

In cases where conflicting or ambiguous interpretations of the information in this Volume result in uncertainty, the final determination of appropriate procedures to be followed will be made using Chapters 120 and 373, F.S., applicable rule chapters, and best professional judgment of Agency staff. The term "Agency", where used in this Volume, shall apply to DEP, the District, or a delegated local government, as applicable, in accordance with division of responsibilities specified in the Operating Agreements incorporated by reference in Chapter 62-113, F.A.C., except where a specific Agency is otherwise identified.

1.2 District-Specific Thresholds

There are no permitting thresholds under Chapter 62-330, F.A.C., that are specific to the NWFWMD.

1.3 District-Specific Exemptions

A permit under Chapter 62-330, F.A.C., is not required for those agricultural and silvicultural activities within the Northwest Florida Water Management District that are regulated under Chapter 40A-44, F.A.C.

There are no other exemptions specific to the NWFWMD geographical area, except those established under Section 373.4145(6), F.S. All applicable exemptions are in Rules 62-330.051 and .0511, F.A.C.

PART II — GENERAL CRITERIA

2.0 General Criteria for all Stormwater Management Systems

2.0.1 General Criteria

All stormwater management systems must be designed, constructed, operated, and maintained in accordance with the stormwater quality criteria of **Part II, Part IV ,and Part V of ~~this~~ Volume I and Part V of Volume II**. In addition, ***systems that exceed any of the following thresholds,*** whether a stand-alone system or a system that is part of a larger common plan of development or ownership, must also be designed, constructed or altered, operated and maintained to comply with the stormwater quantity/flood control criteria of **Part III of this Volume**:

(a) Systems that serve projects of 40 or more acres of total land area;

(b) Systems that provide for the placement of 12 or more acres of impervious surface, which also constitutes more than 40 percent of the total project area; or

(c) Systems that are capable of impounding a volume of water exceeding 40 acre-feet, as measured at the top of the berm.

Activities that require a stormwater management system under this Volume shall additionally meet all the general design and performance criteria requirements of **Part II of this Volume**.

2.0.2 Criteria for Evaluation – Reasonable Assurance

An applicant for an individual permit must provide reasonable assurance that a stormwater management system, dam, impoundment, reservoir, works, or appurtenant work will meet the criteria in Rules 62-330.301 and .302, F.A.C. This includes a determination that the activity:

(a) Will not cause adverse water quantity impacts to receiving waters and adjacent lands;

(b) Will not cause adverse flooding to on-site or off-site property;

(c) Will not cause adverse impacts to existing surface water storage and conveyance capabilities;

(d) Will not cause or contribute to a violation of the water quality standards set forth in Chapters 62-4, 62-302, 62-520, 62-522, and 62-550, F.A.C., including the provisions of Rules 62-4.243, 62-4.244, and 62-4.246, F.A.C., the antidegradation provisions of paragraphs 62-4.242(1)(a) and (b), F.A.C., subsections 62-4.242(2) and (3), F.A.C., and Rule 62-302.300, F.A.C., and any special standards for Outstanding Florida Waters (OFWs) and Outstanding National Resource Waters (ONRWs) set forth in subsections 62-4.242(2) and (3), F.A.C.;

(e) Will not cause adverse secondary impacts to the water resources, and will not otherwise adversely impact the maintenance of surface or ground water levels or surface water flows established pursuant to Section 373.042, F.S.;

(f) Will be capable, based on generally accepted engineering and scientific principles, of being performed and of functioning as proposed;

(g) Will be conducted by an entity with the financial, legal, and administrative capability of ensuring that the activity will be undertaken in accordance with the terms and conditions of the permit, if issued; and

(h) Will comply with any applicable special basin or geographic area criteria rules incorporated by reference in subparagraph 62-330.301(1)(k)1., F.A.C., including meeting any applicable Sensitive Karst Area Basin requirements in ~~section~~ **Section 13.0 of this Volume**.

(i) Will not adversely impact the value of functions provided to fish and wildlife and listed species by wetlands and other surface waters.

Specific to a stormwater management system that is either "stand alone" and does not involve any activities in wetlands or other surface waters, or a component of a larger surface water management system that involves work in wetlands and other surface waters, a showing by the applicant that the a stormwater management system has been designed in accordance with the following provisions of the Applicant's Handbook creates a presumption that reasonable assurance has been provided that the stormwater management system component of the activity meets the following specific conditions for issuance as listed above:

FSA Comment: Grammatical fix needed in blue highlight above.

Compliance with:	**Creates a presumption of compliance with:**
Part III, Volume II	Sections 2.0.2(a), (b), (c), and (e)
Part IV, Volume II	Section 2.0.2(d)
Part II, Volume I	Section 2.0.2(d)
Part V, Volume I	Section 2.0.2(f)
Part V, Volume I	Section 2.0.2(g)

A stormwater management system that complies with the above identified design and performance criteria does not necessarily provide that other components of a project associated with the stormwater management system, including any work in, on, over, or adjacent to wetlands and other surface waters, will meet the Conditions for Issuance or the Additional Conditions for Issuance in Rules 62-330.301 and .302, F.A.C. This is why compliance with those design and performance criteria does not create a presumption of compliance with ~~section~~ **Sections 2.2(h) and (i), above**; the entire project as a whole must be evaluated for compliance with Rules 62-330.301 and .302, F.A.C.

2.0.3 Agriculture and Silviculture

Agricultural and silvicultural activities that are not exempt from permit requirements under Section 373.406(2) or (3), F.S. or Rule 62-330.0511, F.A.C., are regulated under Chapter 40A-44, F.A.C.

2.1 Definitions

(a) The definitions and terms below are used for purposes of Chapter 62-330, F.A.C., and this Volume. **Section 2.0 of Volume I** contains most of the definitions that apply to the ERP program.

1. "100-year flood/One Percent Annual Chance of Flood," means that flood which has a one percent probability of recurrence in any one year. The 100-year flood elevation is the highest elevation of flood waters during the 100-year flood and is calculated or estimated from the best available information. The 100-year flood elevation shall not include coastal storm surge elevations unless such elevations have been developed in an approved Federal Emergency Management Agency Flood Insurance Study and such approved storm surge elevations have been accepted for implementation by the appropriate unit of local or state government.

2. ~~"Aquitard" means a layer of low permeability material, such as clay or rock, adjacent to an aquifer that functions to prevent the transmission of significant quantities of groundwater flow under normal hydraulic gradients.~~

3. "Control elevation" means the lowest elevation at which water can be released through a control device.

4. "Floodway" means the permanent channel of a stream or other watercourse, plus any adjacent floodplain areas that must be kept free of any encroachment in order to discharge the 100 year flood without cumulatively increasing the water surface elevation more than a designated amount (not to exceed one foot except as otherwise established by the Department or District or established by a Flood Insurance Rate Study conducted by the Federal Emergency Management Agency [FEMA]). For purposes of this Handbook, this term does not have the same meaning as the term "floodway" or "regulatory floodway" as defined and implemented by FEMA in 44 C.F.R. Chapter I, Part 9.4 (October 1, 2002), 44 C.F.R. Section 59.1 available at https://www.fema.gov/library/viewRecord.do?id=3064, or 44 C.F.R. Part 60 available at: http://www.gpo.gov/fdsys/pkg/CFR-2002-title44-vol1/pdf/CFR-2002-title44-vol1-part9.pdf (October 26, 1976).

5. "Littoral zone" means that portion of a stormwater management system that is designed to contain rooted emergent plants.

6. "Off-line" means the storage of a specified portion of the stormwater such that runoff in excess of the specified volume of stormwater does not flow into the area storing the treatment volume.

7. "On-line" means the storage of a specified portion of the stormwater such that runoff in excess of the specified volume of stormwater flows into or through the area storing the treatment volume.

8. "Permanent pool" means that portion of a wet detention pond that normally holds water (e.g., between the normal water level and the pond bottom), excluding any water volume claimed as wet detention treatment volume as shown in **Figure 8.1-1 of this Volume**.

9. "Tailwater" means the receiving water elevation (or pressure) at the final discharge point of a stormwater management system.

10. "Wetlands stormwater management system" means a stormwater management system that incorporates those wetlands described in ~~section~~ **Section 10.2 of this Volume** into the stormwater management system to provide stormwater treatment.

(b) Definitions and terms that are not defined above shall be given their ordinary and customary meaning or usage of the trade or will be defined using published, generally accepted dictionaries, together with any rules and statutes of the Agencies that have additional authority over the regulated activities.

~~2.2 Existing Ambient Water Quality~~

In instances where an applicant is unable to meet water quality standards because existing ambient water quality does not meet standards and the system will contribute to this existing condition, mitigation for water quality impacts can consist of water quality enhancement. In these cases, the applicant must implement mitigation measures that are proposed by or acceptable to the applicant that will cause net improvement of the water quality in the receiving waters for those parameters which do not meet standards.

FSA Comment: The above paragraph does not match Section 8.2.3 (ERP AH Volume I, Draft 3)

2.~~3~~2 Professional Certification

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

~~2.4 Maintenance Access~~

~~Regular maintenance is crucial to the long-term effectiveness of stormwater management systems. Such systems must be designed to allow personnel and equipment access and to accommodate regular maintenance activities. For example, high-maintenance features such as inlets, outlets, and pumps should be easily accessible to maintenance equipment and personnel.~~

~~Legal authorization, such as an easement, deed restrictions, or other instrument must be provided establishing a right-of-way or access for maintenance of the stormwater management system unless the operation and maintenance entity wholly owns or retains ownership of the property. The following are requirements for specific types of maintenance access easements:~~

~~(a) Easements must cover at least the primary and high-maintenance components of the system (i.e., inlets, outlets, littoral zones, filters, pumps, etc.), including provisions for equipment to enter and perform the necessary maintenance on the system. Applicants may propose site-specific easements that meet this requirement, or easements that meet the criteria in **sections 2.4(b), (c), (d), or (e), below,** are allowed.~~

~~(b) Easements for waterbodies, open conveyance systems, stormwater basins, and storage areas that:~~

~~1. Include the area of the water surface, measured at the control elevation;~~

~~2. Extend a minimum of 20 feet from the top of bank and include side slopes or an allowance for side slopes calculated at no steeper than 4H:1V (horizontal to vertical), whichever is greater, and~~

~~3. Are traversable by maintenance equipment.~~

~~(c) Easements adjacent to water control structures must be a minimum of 20 feet wide.~~

~~(d) Easements for piped stormwater conveyance must be a minimum of the width of the pipe plus 4 times the depth of the pipe invert below finished grade.~~

~~(e) Access easements that are 20 feet wide from a public road or public right-of-way to the stormwater management system.~~

2.5<u>3</u> Legal Authorization

Applicants who propose to utilize offsite areas that are not under their ownership or control must obtain sufficient legal authorization prior to permit issuance to use the area in order to satisfy the requirements for issuance listed in Rules 62-330.301 and 302, F.A.C., and ~~section~~ **<u>Section</u> 2.0.2 of this Volume.** For example, an applicant who proposes to locate the outfall pipe from the stormwater basin on an adjacent property owner's land must obtain a recorded drainage easement or other appropriate legal authorization from the adjacent owner. Other appropriate legal authorization must include a binding reservation on the land, that is recorded such that the provisions "run with the land" and are not subject to change if the property is sold. Further, any alteration to stormwater discharges to adjacent private properties resulting from permitted activities such as increase of flow, concentration of flow, or change of discharge location also requires appropriate legal authorization from adjacent owners receiving the discharge. A copy of the legal authorization must be submitted with the permit application.

Legal authorization generally is not required for systems that discharge to public rights-of-way; waters of the state such as a natural lake, creek, or wetland, except if located on state-owned submerged lands; or large multiple-owned systems; provided there is capacity to accept flows without causing harm to the water resources, or adverse impacts to property owners. However, any such discharge must also have appropriate down-gradient energy dissipaters and erosion protection. Such discharges may also require the written permission of the receiving system owner in the case of a department of transportation, county, or city conveyance system.

2.6<u>4</u> Public Safety

2.6<u>4</u>.1 Side Slopes

Detention, retention, and normally dry basins that are capable of impounding more than two feet of water, must contain side slopes that are no steeper than 4H:1V (horizontal to vertical) extending to a depth of 2 feet below the control elevation. As an alternative, the basins can be fenced or otherwise restricted from public access if the slopes must be deeper due to space limitations or other constraints.

2.6<u>4</u>.2 Basin Side Slope Stabilization

All stormwater basin side slopes shall be stabilized by either vegetation or other means or materials to minimize erosion of the basin due to flow velocity and runoff from the banks. Good engineering

practices shall be employed, taking into consideration soil, flow, and drainage characteristics. The retardation of overland runoff and soil stabilization using naturally occurring vegetation coverage shall be considered before paving, riprap, lining, energy dissipation and other structural measures are employed. Guidance on erosion and sedimentation best management practices during the construction phase is contained in **Part IV of Applicant's Handbook Volume I**.

2.~~6~~4.3 Control Structures

Control structures that are designed to contain more than two feet of water within the structure under the design storm and have openings of greater than one-foot minimum dimension must be restricted from public access.

2.~~7~~5 Tailwater Considerations

"Tailwater" refers to the receiving water elevation (or pressure) at the final discharge point of the stormwater management system. Tailwater is an important component of the design and operation of nearly all stormwater management systems and can affect any of the following management objectives of the system:

(a) Peak discharge from the stormwater management system;

(b) Peak stage in the stormwater management system;

(c) Level of flood protection in the project;

(d) Recovery of peak attenuation and stormwater treatment volumes; and

(e) Control elevations, normal water elevation regulation schedules, and ground water management.

2.~~7~~5.1 Tailwater for Water Quality Design

Stormwater management systems designed in accordance with **Part II of Volume I and Part IV of this Volume,** must provide a gravity or pumped discharge that effectively operates (i.e., meets applicable rule criteria) under tailwater conditions. Acceptable criteria for demonstrating effective tailwater conditions include criteria such as:

(a) Maximum stage in the receiving water resulting from the two-year, 24-hour storm. This rainfall depth is shown on the isopluvial map in **Figure 2.~~7~~5-1**. Generally, applicants utilizing this option would model the receiving waters utilizing standard hydrologic and hydraulic methods for the two-year, 24-hour storm to determine peak stages at various points of interest. Lower stages may be utilized if the applicant demonstrates that flow from the project will reach the receiving water prior to the time of maximum stage in the receiving water.

(b) Mean annual high tide for tidal areas. This elevation is the average of all the high tides for each year. This elevation may be determined from tide charts or other similar information.

(c) Mean annual wet-season high water elevation. This elevation may be determined by water lines on vegetation or structures, historical data, adventitious roots or other hydrological or

biological indicators, design of man-made systems, or estimated by a registered professional using standard hydrological methods based on the site and receiving water characteristics.

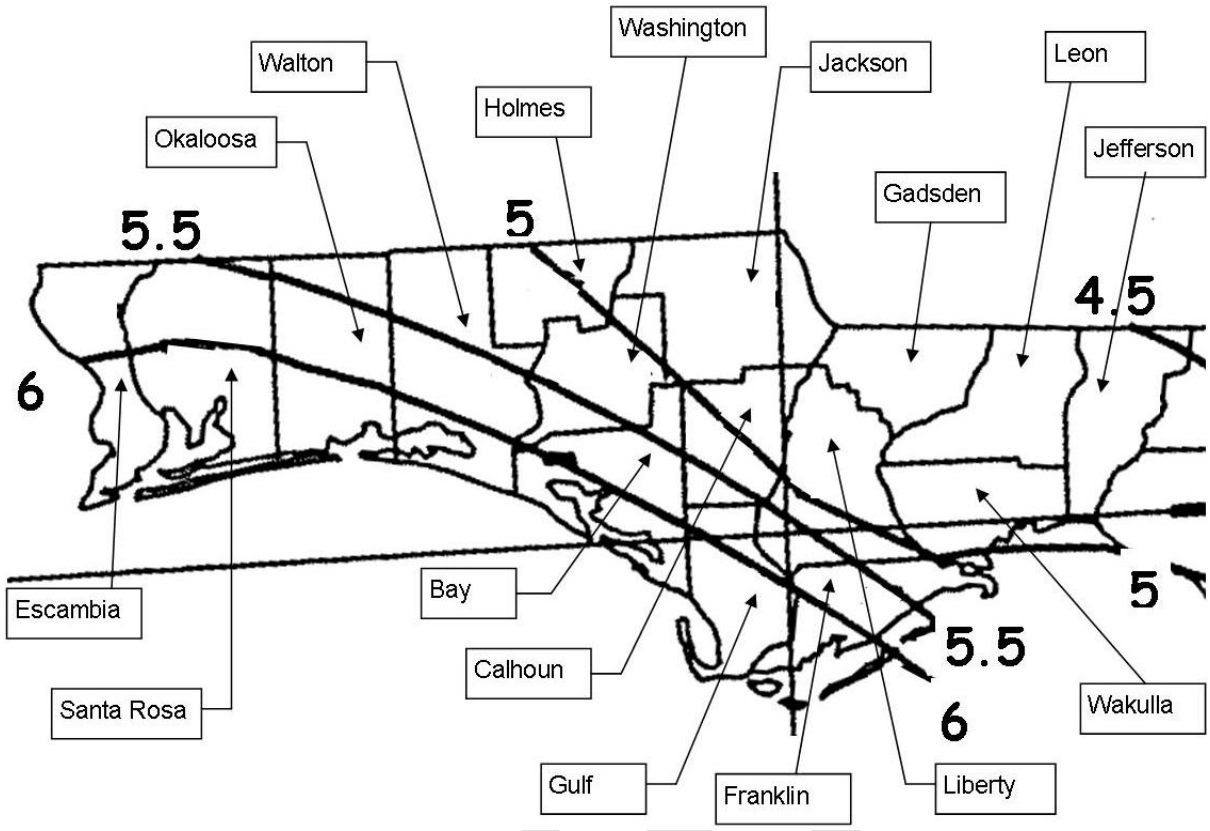


Figure 2.~~7~~5-1 2-year, 24-hour Maximum Rainfall depth.

(d) The applicant may propose applicable criteria established by a local government, state agency, or stormwater utility with jurisdiction over the project. The Agency will approve the use of such alternative criteria if the Agency determines that the alternative criteria will provide equivalent or greater reasonable assurance as the applicable criteria of this Volume.

In this case, the applicant is encouraged to consult with Agency staff prior to submitting an application.

2.~~7~~6.2 Tailwater for Water Quantity Design

Stormwater management systems designed in accordance with **Part III of this Volume** 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. Typical examples of this are illustrated in **Figures 2.~~7~~5-2** (gravity) and **2.~~7~~5-3** (pumped).

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.

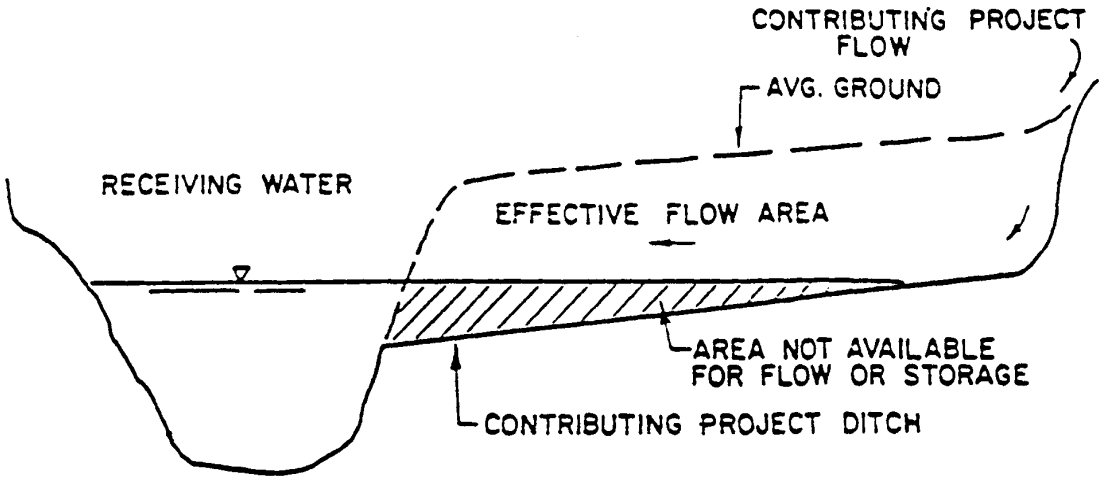


Figure 2.~~7~~5-2 Gravity tailwater example.

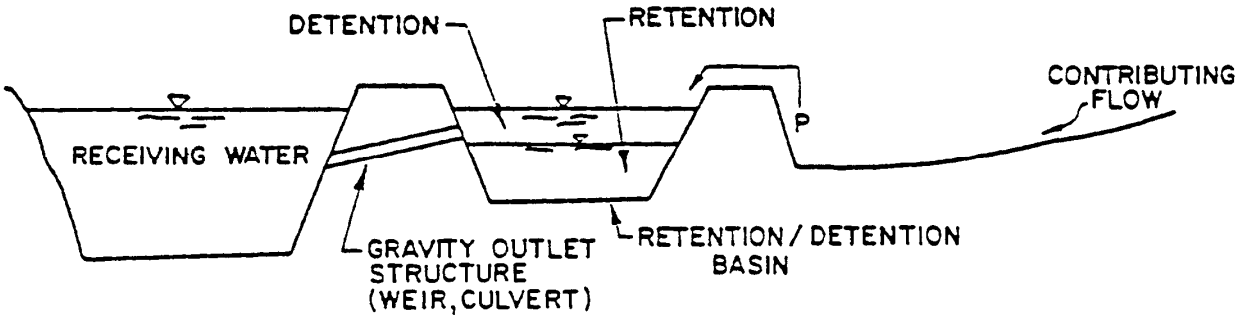


Figure 2.~~7~~5-3 Pumped flow tailwater example.

2.~~8~~6 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 **sections 4.0 through 4.4 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,~~ are based upon the existing water quality data within the area subject to the retrofit, and the degree of impairment or water quality violations in the receiving waters. If no water quality data exists and there are no listed impairments or water quality violations in the receiving waters, the applicant shall demonstrate such a net improvement whereby the pollutant loads discharged from the system shall be less than those discharged based on the project's existing condition for total nitrogen and total phosphorus.

(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 ~~**sections**~~ **Sections 3.1 through 3.3 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;

~~**2.9 Compensating Stormwater Treatment**~~

~~Occasionally, applicants find that it is impractical to construct a stormwater management system to capture the runoff from a portion of the project site due to on-site conditions such as extreme physical limitations, availability of right-of-way, or maintenance access. Two methods have been developed to compensate for the lack of treatment for a portion of a project. The first method is to treat the runoff that is captured to a greater extent than required by rule (i.e., "overtreatment"). The second method is to provide treatment for an off-site area which currently is not being treated (i.e., "off-site compensation"). Each method is designed to furnish the same level of treatment as if the runoff from the entire project site was captured and treated in accordance with the provisions of this Volume.~~

~~Either of these methods will only be allowed as a last resort and the applicant is strongly encouraged to schedule a pre-application conference with Agency staff to discuss the project if these alternatives are being considered. Other rule criteria, such as peak discharge attenuation, will still have to be met if the applicant utilizes these methods. Each alternative is described in more detail in the following sections.~~

~~**2.9.1 Overtreatment**~~

~~Overtreatment means to treat the runoff from the project area that flows to a treatment system to a higher level than the rule requires to make up for the lack of treatment for a portion of the project area. The average treatment efficiency of the areas treated and the areas not treated must meet the pollutant removal goals of Chapter 62-40, F.A.C., (i.e., 80% removal for discharges to Class III waters and 95% removal for systems which discharge to OFWs.) To meet these goals, the area not being treated generally must be small (less than 10%) in relation to the area which is captured and treated. Staff can aid in determining the proper level of overtreatment for a particular situation.~~

~~**2.9.2 Off-site Compensation**~~

~~Off-site compensation means to provide treatment to compensate for the lack of treatment for portions of the proposed project. The following conditions must be met when utilizing off-site compensation:~~

~~(a) The off-site area must be in the same watershed as the proposed project, and in the closest vicinity practical to the location of those untreated stormwater discharge(s) requiring compensating treatment; and~~

~~(b) The applicant shall use modeling or other data analysis techniques that provide reasonable assurance that the compensating treatment system removes at least the same amount of stormwater pollution loading as was estimated from the untreated project area.~~

2.107 Flexibility for State Transportation Projects and Facilities

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

2.~~11~~8 Dam Safety

As part of the determination as to whether a dam meets the criteria in Rule 62-330.301, F.A.C., a dam over five feet in height (as measured from the crest of the dam to the lowest elevation on the downstream toe) with the potential to store 50 acre feet or more of water, and any dam that is 10 feet or more in height must be designed, constructed, operated, and maintained consistent with generally accepted engineering practices as applied to local conditions, considering such factors as: the type of materials used to construct the dam, the type of soils and degree of compaction, hydrologic capacity, construction techniques, and downstream hazard potential ~~rating~~. (referenced in Section 8.4.5 and Appendix L of Volume I). An additional document that provides useful information for this purpose is *Design of Small Dams*, U.S. Department of Interior, Bureau of Reclamation, Third Edition, 2006.

Dams shall be designed with spillway capacities adequate to safely conduct the runoff through the impoundment based on the appropriate SCS rainfall distribution, in accordance with the following minimum storm routing requirements:

Minimum Storm Routing Requirements for Dams

Downstream Hazard Potential ~~Rating~~	**Principal spillway**	**Combination of spillways**

Low	~~2 yr, 24 hour~~ 2-year, 24-hour	~~25 year, 24 hour~~ 2-year, 24-hour
~~Moderate~~ Significant	~~25 year, 24~~ hour 25-year, 24-hour	~~100 year 24 hour~~ 100-year, 24-hour
High	~~100 year 24~~ hour 100-year, 24-hour	Probable Maximum Flood

~~2.12 Inspections to Ensure Proper Operation and Maintenance~~

~~(a) In accordance with subsection 62-330.311(1), F.A.C., stormwater management systems, dams, impoundments, reservoirs, appurtenant work, and works designed by a registered professional shall be inspected and documented by the registered professional as follows, unless otherwise specified in the permit:~~

~~TYPE OF SYSTEM~~	~~INITIAL INSPECTION AFTER BEGINNING OPERATION~~	~~AFTER THE FIRST YEAR OF SUCCESSFUL OPERATION~~
~~Dry Retention basins~~	~~1 Year~~	~~Once every 5 years~~
~~Exfiltration trenches~~	~~1 Year~~	~~Once every 2 Years~~
~~Underground retention~~	~~1 Year~~	~~Once every 2 Years~~
~~Sand Filters~~	~~1 Year~~	~~Once every 2 Years~~
~~Underdrain filtration~~	~~1 Year~~	~~Once every 2 Years~~
~~Underground vault/chambers~~	~~1 Year~~	~~Once every 2 Years~~
~~Swales (treatment)~~	~~1 Year~~	~~Once every 5 years~~
~~Wet Detention systems~~	~~1 Year~~	~~Once every 5 years~~
~~Vegetated Natural Buffers~~	~~1 Year~~	~~Once every 5 years~~
~~Above-ground Impoundments~~	~~1 Year~~	~~Annually~~

~~(b) Activities designed by a registered professional shall be inspected by that same registered professional, or by a similarly registered professional in accordance with the inspection frequency and terms required in the permit.~~

~~(c) Additional information on operation and maintenance requirements is contained in **section 12.4 of Volume I** and in Rule 62-330.311, F.A.C.~~

PART III — STORMWATER QUANTITY/FLOOD CONTROL

3.0 General Flood Control Requirements

3.1 Stormwater Management Systems That Must Meet Water Quantity Criteria

Stormwater management systems that meet any of the following thresholds must be designed, constructed, operated, and maintained in accordance with this Part:

(a) Systems that serve projects of 40 or more acres of total land area;

(b) Systems that provide for the placement of 12 or more acres of impervious surface, which also constitutes more than 40 percent of the total project area; or

(c) Systems that are at any time capable of impounding a volume of water exceeding 40 acre-feet, as measured at the top of the berm.

~~Stormwater management systems that do not exceed the above thresholds are not required to meet the stormwater quantity and flood control criteria of this Part, provided they are not part of a larger common plan of development or ownership that exceeds any of the above thresholds.~~

3.2 Standards that Apply and Relationship to Part IV

In addition to the criteria in this Part, all activities that require a stormwater management system (in accordance with **~~section~~ Section 2.1 of this Volume**) must also comply with the water quality criteria in **Part II of Volume I and Part IV of this Volume**.

As an example, a system that has 14 acres of impervious surface that comprises 54 percent of the total project area of 26 acres would have to meet the stormwater quantity/flood control criteria of this Part, because such a system exceeds the 12-acre/40 percent threshold. Because the project exceeds thresholds for stormwater management systems, the criteria in Part IV also apply. Additionally, because the project involves greater than 50~~%~~ percent impervious area, the project must also be designed according to the streambank protection discharge criteria as required in **~~section~~ Section 4.5.1 of this Volume**. However, a system that consists of 13 acres of impervious surface within a 39 acre project area would not have to meet the stormwater quantity/flood control criteria of this Part (assuming the system does not impound more than 40 acre-feet of stormwater), because even though such a system exceeds the 12-acre threshold in **3.1(b), above**, it constitutes an impervious surface of only 33 percent, and therefore does not exceed the second part of **3.1(b), above**, or the criteria in **3.1(a)**. Such a system also would not have to be designed to meet the streambank protection discharge criteria. As another example, a system that consists of 2 acres of impervious surface within a ~~3~~ 3-acre project area also would not have to meet the stormwater/flood control criteria of this Part because it does not exceed the 12-acre threshold. However, such a system exceeds the 50% impervious threshold (67% impervious) and therefore is required to comply with the streambank protection provisions.

3.3 Stormwater Quantity: Rate and Volume Controls

Criterion: Except as provided in ~~**section**~~ **Section 3.3(c), below**, the post-development stormwater discharge rate and volume must be controlled as follows.

(a) Rate Control

Any project involving construction that exceeds 50 percent impervious surface must provide rate control in accordance with ~~**section**~~ **Section 4.5.1 of this Volume**.

If the project is located totally within a stream or open-lake watershed, detention systems must be installed such that the peak rate of post-development runoff will not exceed the pre-development peak-rate of runoff for the 25-year, 24-hour design storm event, utilizing a Natural Resources Conservation Service (NRCS) type III rainfall distribution, with an antecedent moisture condition II. Rainfall associated with the 25-year, 24-hour event is provided in **Figure 3.3-1**. Outlet controls shall be designed such that required detention volumes are available within 14 days following the design storm event.

(b) Volume Control

A closed basin or closed-lake watershed is defined as that which does not have a surface outfall for conditions up to and including the 100-year, 24-hour flood stage. Rainfall depths ~~volumes~~ associated with this event are provided as **Figure 3.3-2**. Flood elevation shall be determined using the most accurate information available, such as:

1. Actual data, including water level, stream flow and rainfall records;

2. Hydrologic/hydraulic modeling;

3. Federal Flood Insurance Rate Maps and supporting flood study data; or

4. Floodplain analysis studies approved by the Agency.

Flood elevations shall be evaluated for accuracy considering the extent to which flood elevations are validated by site-specific data.

For systems discharging within a closed basin~~s~~ or closed-lake watershed, the post-development volume of runoff discharged offsite must not exceed the pre-development volume of runoff discharged offsite resulting from a 25-year, 96-hour design storm. Retention of the post-development increase in volume can be recovered by percolation, or, if soil conditions are not sufficient for percolation, then detention must be provided for a duration sufficient to prevent adverse impacts on flood stages. Rainfall depths associated with the 25-year, 96-hour design storm are provided in **Figure 3.3-3**. The applicant may provide a time-dependent model utilizing a 25-year, 96-hour hyetograph in conjunction with a rating curve (or equivalent) to estimate the rate of percolation from the system during the storm.

FSA Comment: It would be helpful to know the source of this data?

For systems discharging to closed basins or closed-lake watersheds that are wholly-owned, the applicant is not required to demonstrate compliance with ~~**section**~~ **Section 3.3(a) or (b) of this Volume**. However, the flood damage requirements of ~~**section**~~ **Section 3.6 of this Volume**

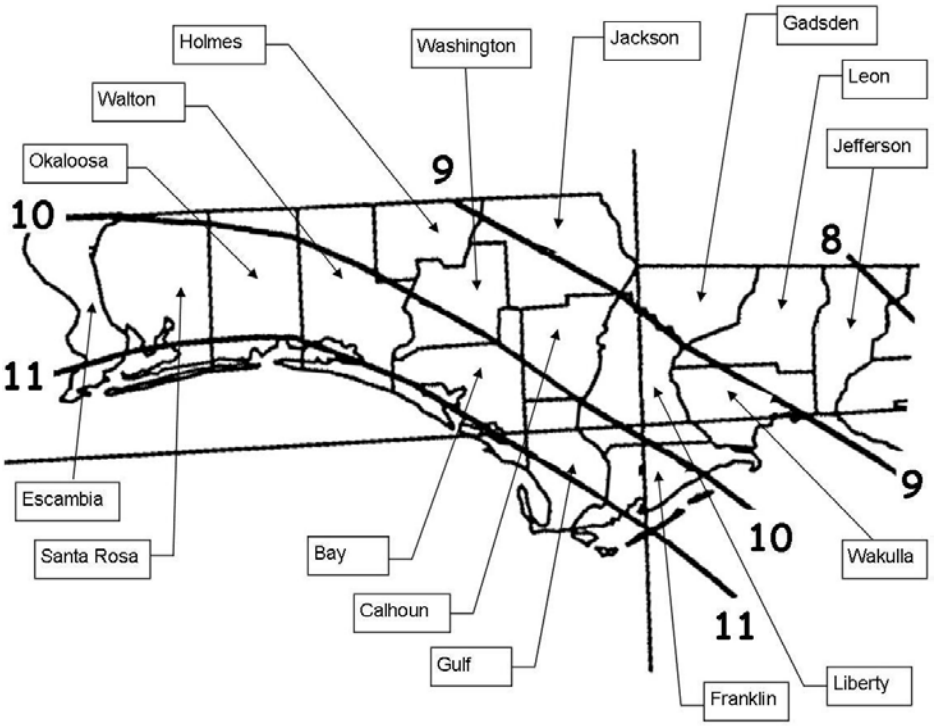


Figure 3.3-1 Rainfall Depths Associated with the 25-year, 24-hour Storm Event

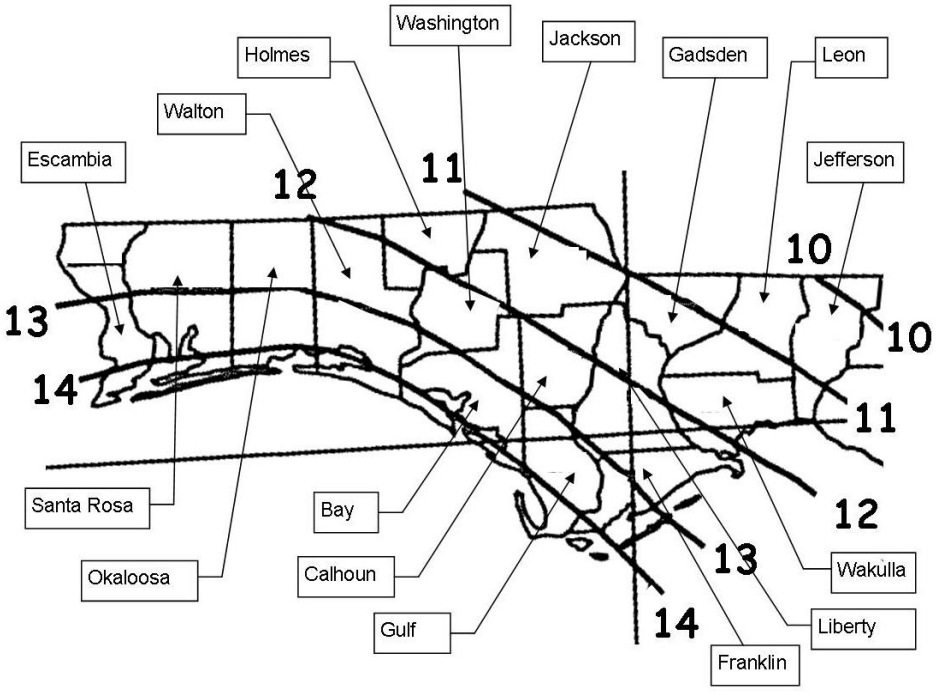


Figure 3.3-2 Rainfall Depths Associated with the 100-year, 24-hour Storm Event

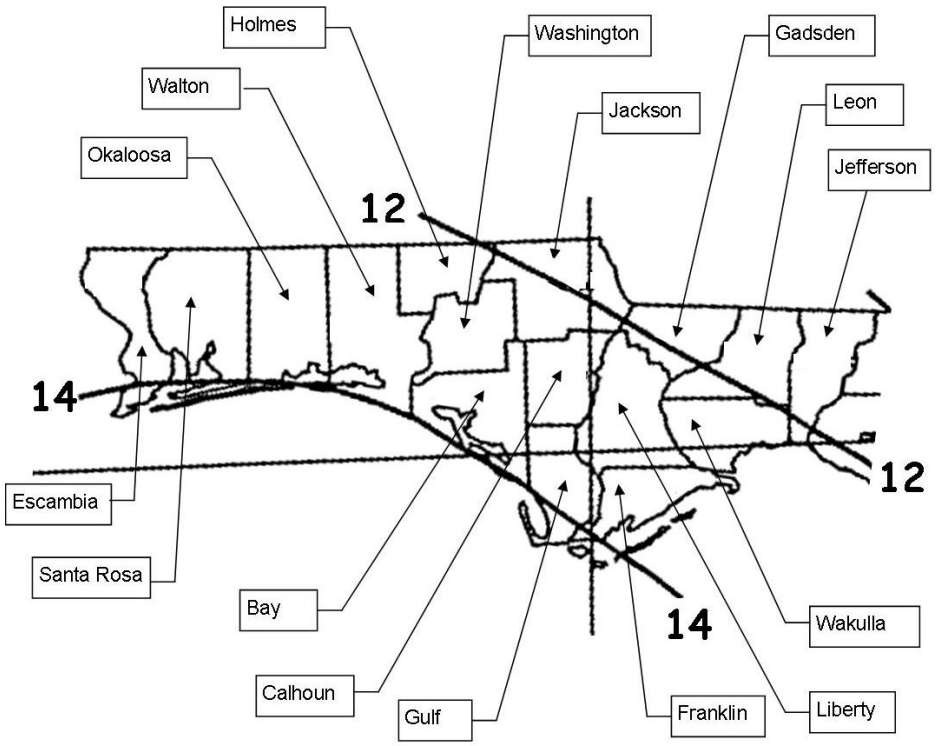


Figure 3.3-3 Rainfall Depths Associated with the 25-year, 96-hour Storm Event

---

must still be met. Additionally, for the purposes of this paragraph, minimum finished floor elevations must be located above the post-development design storm elevation associated with the 25-year, 96-hour storm event.

Post-development volume controls must be provided in accordance with this section, unless the applicant can demonstrate that cumulative increases in runoff volume from potential development will not cause an adverse impact on the frequency, duration or extent of off-site flood stages resulting from the 25-year, 96-hour design storm.

(c) Discharges to Tidally-influenced waters

The peak discharge requirements of this section are not required for systems that discharge directly into ~~the Gulf Intracoastal Waterway, including manmade portions of the Gulf Intracoastal Waterway, or to the Gulf of Mexico, or to other~~ tidally-influenced waterways. For the purposes of this section, "tidally-influenced waterways" includes surface waters that are characterized by a repeatable monthly average tide range of more than 0.1 feet.

3.3.1 Alternative Peak Rate Discharge Criteria

As an alternative to the peak discharge attenuation criteria in **~~section~~ Section 3.3 above**, applicants may propose to utilize applicable storm event, duration, or criteria specified by a local government, state agency (including FDOT), or stormwater utility with jurisdiction over the project. The Agency will approve the use of the alternative criteria if the Agency determines that the alternative criteria will provide equivalent or greater reasonable assurance as the criteria of **~~section~~ Section 3.3**

above. Applicants proposing to use alternative criteria are encouraged to have a pre-application conference with Agency staff.

3.3.2 Methodologies

A 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 should be divided into sub-basins according to artificial or natural drainage divides to allow for more accurate hydrologic simulations. Examples of accepted methodologies for computing runoff are:

(a) Soil Conservation Service Method [see U.S. Department of Agriculture, Soil Conservation Service "National Engineering Handbook, Section 4, Hydrology," TR-55 ("Urban Hydrology for Small Watershed") or TR-20 User's Manuals].

(b) Santa Barbara Urban Hydrograph Method.

(c) U.S. Army Corps of Engineers HEC-HMS Computer Programs.

(d) Storm Water Management Model (SWMM) 5 or higher

(e) Interconnected Channel and Pond Routing Model (ICPR)

(f) PONDS

(g) Other hydrograph and routing methods may be proposed and will be approved by the Agency if the applicant provides reasonable assurance that the alternative method has comparable accuracy and reliability as the above methods.

Peak discharge calculations must make proper use of the SCS Peak Rate Factor or K'. 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'. The most conservative approach is to use a K' = 484 for post-development. However, in some cases where surface storage is maintained, K' may be reduced to same value used in the pre-development condition.

Recommended K' values for various site conditions are provided below:

K'=484:
Standard peak rate factor developed for watersheds with little or no storage. Represents watersheds with moderate to steep slopes and/or significant drainage works. Typical ecological communities include long leaf pine, and turkey oak hills.

K'=323-384:
Intermediate peak rate factor representing watersheds with moderate surface storage in some locations due to depressional areas, mild slopes and/or lack of existing drainage features. Typical ecological communities include oak hammock, upland hardwood hammock, mixed hardwoods and pine.

K'=256-284:
Represents watersheds with very mild slopes, recommended for watersheds with average slopes of 0.5% or less. Significant surface storage throughout the watershed. Limited on-site drainage ditches. Typical ecological communities include North Florida flatwoods, freshwater marsh and ponds, swamp hardwoods, cabbage palm flatlands, and cypress swamp.

3.3.3 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 water body, the Agency will allow the total post-development peak discharge for the combined discharges to be used rather than each individual discharge.

3.3.4 Rainfall Intensity and Volume

In determining peak discharge rates, intensity of rainfall values shall be obtained through a statistical analysis of historical long-term rainfall data or from sources or methods generally accepted as good engineering practice.

(a) Examples of acceptable sources include:

1. USDA 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" January 1978; Gainesville, Florida.

2. U.S. Weather Bureau Technical Paper No. 49.

3. U.S. Weather Bureau Technical Paper No. 40.

4. U.S. Department of Interior, Bureau of Reclamation, "Design of Small Dams." ~~2nd~~ 3rd Edition.

(b) For a drainage basin greater than 10 square miles, the areal rainfall can be calculated from point rainfall data using a method that has been well documented. The converting factor as described in U.S. Weather Bureau Technical Paper No. 49 can be used.

3.3.5 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 should 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 ground water table.

(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 would require development of stage-storage relationships; if depression storage is considered, then both pre-development and post-development storage routing must be considered.

3.4 Storage and Conveyance

Floodways and floodplains, and levels of flood flows or velocities of adjacent streams, impoundments or other water courses must not be altered so as to adversely impact the off-site storage and conveyance capabilities of the water resource. Projects that alter existing conveyance systems (such as by rerouting an existing ditch) must not adversely affect existing conveyance capabilities. Also, the applicant shall provide reasonable assurance that proposed velocities are non-erosive or that erosion control measures (such as riprap and concrete lined channels) are sufficient to safely convey the flow.

(a) A system shall not cause a net reduction in flood storage within a 10-year floodplain except for structures elevated on pilings or traversing works.

(b) A system shall not cause a reduction in the flood conveyance capabilities provided by a floodway except for structures elevated on pilings or traversing works. Such works or other structures shall cause no more than a ~~one foot~~ one-foot increase in the 100-year flood elevation immediately upstream and no more than one tenth of a foot increase in the 100-year flood elevation 500 feet upstream.

(c) An applicant will not have to meet the requirements of (a) or (b) above if reasonable assurance is provided that the singular and cumulative impacts of not meeting those criteria will not contravene subsections 62-330.301(1) and (2), F.A.C., considering all other persons who could impact the surface water of any impoundment, stream, or other watercourse by floodplain encroachment to the same degree as proposed by the applicant.

(d) As an alternative, the applicant may propose to utilize applicable criteria established by a local government, another state agency, or a stormwater utility with jurisdiction over the project. DEP will approve the use of such alternative criteria if the alternative criteria provide

reasonable assurance that the proposed project will not adversely affect existing conveyance capabilities.

3.5 Low Flow and Base Flow Maintenance

3.5.1 Low Flow

(a) Systems with both of the following conditions must meet the low flow performance criteria in ~~section~~ Section **3.5.1(b) and (c), below**.

1. Systems that impound water for purposes in addition to temporary detention storage. Water impounded longer than a 14-day bleed down period is considered conservation storage for benefits other than detention storage (for example, recreation and irrigation).

2. Systems that impound a stream or other watercourse which, under pre-development conditions, discharged surface water off-site to receiving water during 5-year, 30-day drought frequency conditions.

(b) Any system meeting the conditions of ~~section~~ Section **3.5.1(a), above**, shall be designed with an outlet structure to maintain a low flow discharge of available conservation storage. When the conservation storage is at the average dry season design stage, the low flow discharge shall equal the average pre-development surface water discharge which occurred from the project site to receiving waters during the 5-year, 30-day drought.

(c) The system shall be operated to provide a low flow discharge whenever water is impounded. The actual discharge will vary according to the water stage in the impoundment. When conservation storage is at the average dry season design stage, the discharge will be the 5-year, 30-day average low flow. When storage is below the average dry season design stage, the discharge may be less than the 5-year, 30- day average low flow.

3.5.2 Base Flow

Design and performance criteria for maintaining acceptable base flow conditions include:

(a) Storage volumes in detention or retention systems shall be calculated so as not to include volumes below the seasonal high-water table for the project area;

(b) Underdrain systems shall be allowed provided that lowering of the groundwater table is restricted to the immediate vicinity of the treatment system; and

(c) Water tables shall not be lowered to a level that would decrease the flows or levels of surface water bodies below any minimum level or flow established by a water management district Governing Board pursuant to Section 373.042, F.S.

3.6 Flood Damage

In evaluating the potential for flood damages to residences, public buildings, the following criteria will be utilized:

(a) Residential buildings shall have the lowest floor elevated above the post-development 100-year flood elevation for that site. For the purposes of this section, the design storm for determining the 100-year flood elevations shall be the 100-year, 24-hour event.

(b) Industrial, commercial, and other non-residential buildings susceptible to flood damage must have the lowest floor elevated above the 100-year flood elevation~~,~~ or be designed and constructed so that below the 100-year flood elevation, the structure and attendant utility facilities are watertight and capable of resisting the effects of the regulatory flood. The design should take into account flood velocities, duration, rate of rise, hydrostatic and hydrodynamic forces, the effect of buoyancy and impacts from debris. Flood proofing measures must be operable without human intervention and without an outside source of electricity.

(c) Accessory buildings may be constructed below the 100-year flood elevation provided there is minimal potential for significant damage by flooding. An accessory building is a structure on the same parcel of property as a principal structure and the use of which is incidental to the use of the principal structure and not for human habitation. For example, a residential structure may have a detached garage, a carport, or storage shed for garden tools as accessory structures. Other examples of accessory structures include gazebos, picnic pavilions, boathouses, pole barns, storage sheds, and similar buildings.

PART IV — ADDITIONAL STORMWATER QUALITY STANDARDS AND REQUIREMENTS

4.0 Purpose

All stormwater management systems that require an individual permit under Chapter 62-330, F.A.C., must also be designed, constructed, operated, and maintained in conformance with the criteria in **Part II, Part IV, and Part V of Volume I** and in this Part. In addition, those systems that exceed the thresholds in ~~**section**~~ **Section 3.1 of this Volume** must also be designed, constructed, operated, and maintained in accordance with **Part III of this Volume**.

4.1 Criterion

Florida's stormwater quality regulations are "technology-based" not "water quality effluent-based." Collectively, the design criteria in **Part II, Part IV, and Part V of this** Volume in addition with **Part II of Volume I** are presumed to meet the minimum levels of stormwater treatment established in Chapter 62-40, F.A.C., the Water Resource Implementation Rule.

4.2 Integration with the Water Resource Implementation Rule

Subsection 62-40.432(2), F.A.C. (Water Resource Implementation Rule), provides minimum stormwater treatment performance standards. These standards, in part, provide that when a stormwater management system complies with rules establishing the design and performance criteria for such systems, there shall be a rebuttable presumption that the discharge from such systems will comply with state water quality standards.

Systems meeting the design and performance criteria of ~~this~~ Part II of Volume I as well as this Part are presumed to meet the Water Resource Implementation Rule performance standards stated above. However, as new research on the design and effectiveness of stormwater treatment systems becomes available, the design and performance criteria of Part II of Volume I and this Volume will be revised as appropriate through future rulemaking.

4.3 State Water Quality Standards

4.3.1 Surface Water Quality Standards

State surface water quality standards are set forth in Chapters 62-4 and 62-302, F.A.C., including the antidegradation provisions of paragraphs 62-4.242(1)(a) and (b), and subsections 62-4.242(2) and (3), F.A.C., Rule 62-302.300, F.A.C., and the special standards for OFWs set forth in subsections 62-4.242(2) and (3), F.A.C. Furthermore, the Agency cannot authorize permits that modify the quantity of water discharged offsite if such discharge will cause adverse environmental or water quality impacts.

4.3.2 Ground Water Quality Standards

State water quality standards for ground water are set forth in Chapter 62-520, F.A.C. In addition to the minimum criteria, Class G-I and G-II ground water must meet primary and secondary drinking water quality standards for public water systems established pursuant to the Florida Safe Drinking Water Act, which are listed in Rules 62-550.310 and 62-550.320, F.A.C.

Only the minimum criteria apply within a zone of discharge. A zone of discharge is defined as a volume underlying or surrounding the site and extending to the base of a specifically designated aquifer

or aquifers, within which an opportunity for the treatment, mixture or dispersion of wastes into receiving ground water is afforded. Generally, stormwater systems have a zone of discharge 100 feet from the system boundary or to the project's property boundary, whichever is less.

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 an existing public drinking water well~~,~~ and shall not be constructed within 75 feet of an existing private drinking water well.

4.3.3 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 ground water 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., **Part II, Part IV, and Part V of Volume I** and **Parts II, Part IV, and Part V of this Volume**. ~~However, this determination is rebuttable.~~ All stormwater treatment systems shall provide a level of treatment sufficient to accomplish the nutrient load reduction criteria listed in Section 8.3 of Volume I. The nutrient load reduction is demonstrated by the modeling or calculations of the type of treatment system, i.e. retention, wet detention, etc.~~The volume of runoff to be treated from a site shall be determined by the type of treatment system, i.e., retention, wet detention, etc.~~ 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/project runoff.

4.4 Reasonable Assurance

As part of providing reasonable assurance that a system meets the general criteria for issuance described in ~~section~~ **Section 2.0.2 of this Volume**, a stormwater management system must meet the design and performance standards described in the applicable **Parts III, IV, and V of this Volume** in addition to the treatment requirements described in **Part II of Volume I**.

4.5 Criteria to Protect Streambanks

Urbanization increases total runoff volume, peak discharge rates, and the magnitude and frequency of flood events. With an increase in the number of flood events a stream is subjected to, the potential for accelerated erosion of both the stream banks and channel bottom is enhanced, resulting in degradation of surface waters. Proper design of detention systems to limit ~~post~~ post-development peak discharge rates to predevelopment rates can minimize some of the stormwater effects of urbanization.

Proper selection of the design storm for peak discharge control is crucial to determining the effectiveness of the detention basin. Historically, stormwater programs only regulated the peak discharge from large storm events (for example, a 25-year, 24-hour storm). Unfortunately, that approach suffers from the following drawbacks:

(a) If a detention pond is only designed to reduce the peak of the 25-year storm, the discharge rates from lesser events such as the 2-, 5-, and 10-year flood events may not be controlled. The ineffectiveness of controlling small flood events may appear to be unimportant with respect to flood damages. However, these more frequent events do cause localized flood damage and are of prime importance as a cause of channel and streambank erosion.

(b) Cumulative water quantity impacts may occur from several projects that are below the thresholds for quantity control located within the same watershed.

To address these concerns, peak discharge rate must be controlled for the 2-year, 24-hour storm event and potentially for a larger storm event. The 2-year, 24-hour storm was selected as the design event for this rule because the shape and form of natural channels is controlled by approximately the 2-year return frequency storm. The rainfall depth for the 2-year, 24-hour storm for the Florida panhandle is shown in **Figure 2.7-1**. The rainfall depth at a particular location may be established by interpolating between the nearest isopluvial lines.

The 2-year event may be accommodated along with the larger flood control storm event (when required) by designing a multi-staged outlet structure to attenuate both the flood control and 2-year, 24-hour storm events, such as through the use of two-staged weirs, risers with multiple orifice controls, and combinations of weir and orifice controls. See **Figure 4.5-1** for a conceptual design of a multi-staged outlet structure.

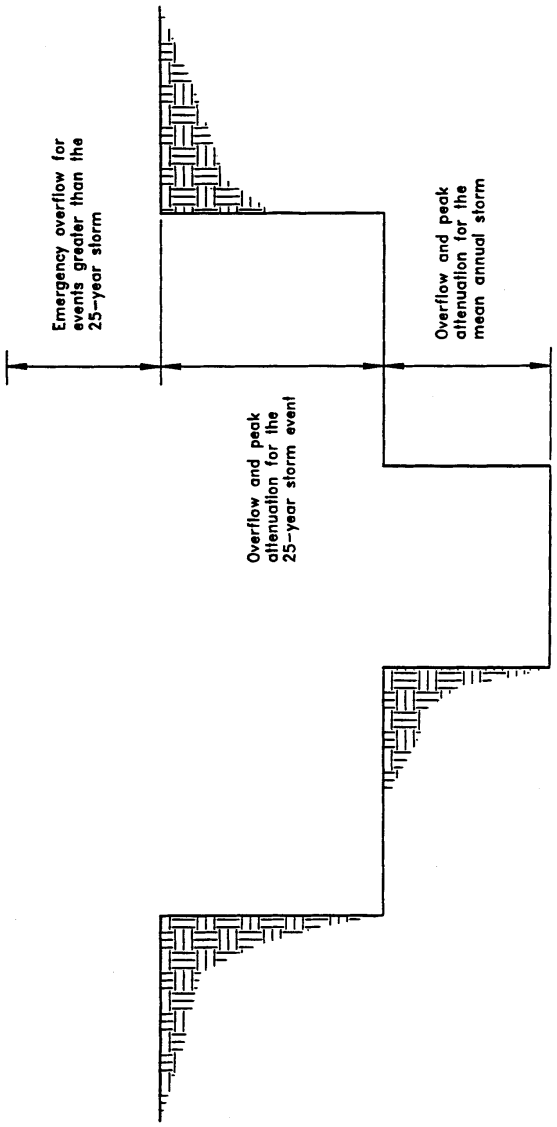


Figure 4.5-1 Conceptual design of a multi-stage outlet structure.

4.5.1 Peak Discharge Attenuation Criteria to Protect Streambanks

For systems serving new construction that is greater than 50 percent impervious (excluding water bodies and the area providing stormwater treatment) over the project area, the post-development peak discharge rate must not exceed the pre-development peak discharge rate for the 2-year, 24-hour design storm event, utilizing a Natural Resources Conservation Service (NRCS) type III rainfall distribution with an antecedent moisture condition II. Outlet controls shall be designed so that required detention volumes are fully bled-down at sufficient rates that result in non-erosive velocities. ~~Projects that modify existing systems, including adding new impervious surfaces, are exempt from this criterion when the modification will not cause significant adverse impacts to water resources using the criteria in Rule 62-330.301, F.A.C.~~ Projects that modify existing systems, including adding or removing impervious surfaces, are not exempt from this criterion and are required to demonstrate that the modification will not cause significant adverse impacts to water resources using the criteria in Rule 62-330.301, F.A.C. ~~Also, p~~Projects that discharge to tidally-influenced waters tide in accordance with ~~**section**~~ **Section 3.3(c) of this Volume** are exempt from this criterion.

Pervious concrete and turf blocks are not considered impervious surface for this purpose. However, pervious asphalt, compacted soils, limerock, or gravel surfaces, are considered impervious for the purpose of determining the percentage of impervious surface.

FSA Comment: It's important to note that while pervious concrete and turf blocks are not entirely impervious, they do slow down and decrease infiltration. Note that they are not completely pervious either. Please contact FDOT, they have data on this.

The streambank protection criteria must be met concurrent with applicable flood control requirements under **Part III of this Volume**, including any project that also requires peak discharge attenuation of the 25-year, 24-hour storm event.

4.5.2 Modified Rational Hydrograph Method for Streambank Protection Calculations

The rational method is a popular method for estimating peak runoff rates for small urban areas. Specifically, the rational method generates peak discharge rates rather than a runoff hydrograph. However, the rational method can be modified to generate a runoff hydrograph by utilizing the rainfall intensity for various increments of a design storm.

The rate of discharge at any point in time during a storm can be calculated by combining the rainfall intensity for that time increment with the traditional rational formula. The modified rational hydrograph equation is as follows:

$$Q = C\,(I/P_{Total})\,(P_{Total})\,A$$

where: Q = Discharge for a given time increment (cfs)
C = Runoff coefficient
I/P_{Total} = Intensity for a given time increment (in/hr-in)
P_{Total} = Total rainfall depth (in)
A = Drainage area (acres)

Calculating the peak discharge in 15-minute increments over a 24-hour period generates a synthetic hydrograph. Intensities are typically derived from intensity-duration-frequency (IDF) curves such as those published by the FDOT. The maximum allowable drainage area (A) is 600 acres.

Similar to the rational method for peak discharge, the modified rational method must be limited to small drainage basins with short times of concentration. The use of the modified rational method for generating a runoff hydrograph is limited to systems meeting the following conditions:

(a) The drainage area is less than 40 acres,

(b) The pre-development time of concentration for the system is less than 60 minutes, and

(c) The post-development time of concentration for the system is less than 30 minutes.

The Agency does not accept the modified rational hydrograph method for use in generating hydrographs for the 25-year, 24-hour storm event for use in complying with peak discharge requirements in ~~**section**~~ **Section 3.3 of this Volume**. For projects requiring peak discharge evaluation in accordance with **section 3.3 of this Volume**, the modified rational hydrograph method is acceptable only for evaluation of the 2-year, 24-hour storm, and not for other events (e.g., the 25-year, 24-hour storm).

Guidance on the use of the Modified Rational Hydrograph Method is contained in Chapter 5 of the *Florida Development Manual: A Guide to Sound Land and Water Management* (June 1988) (Appendix E).

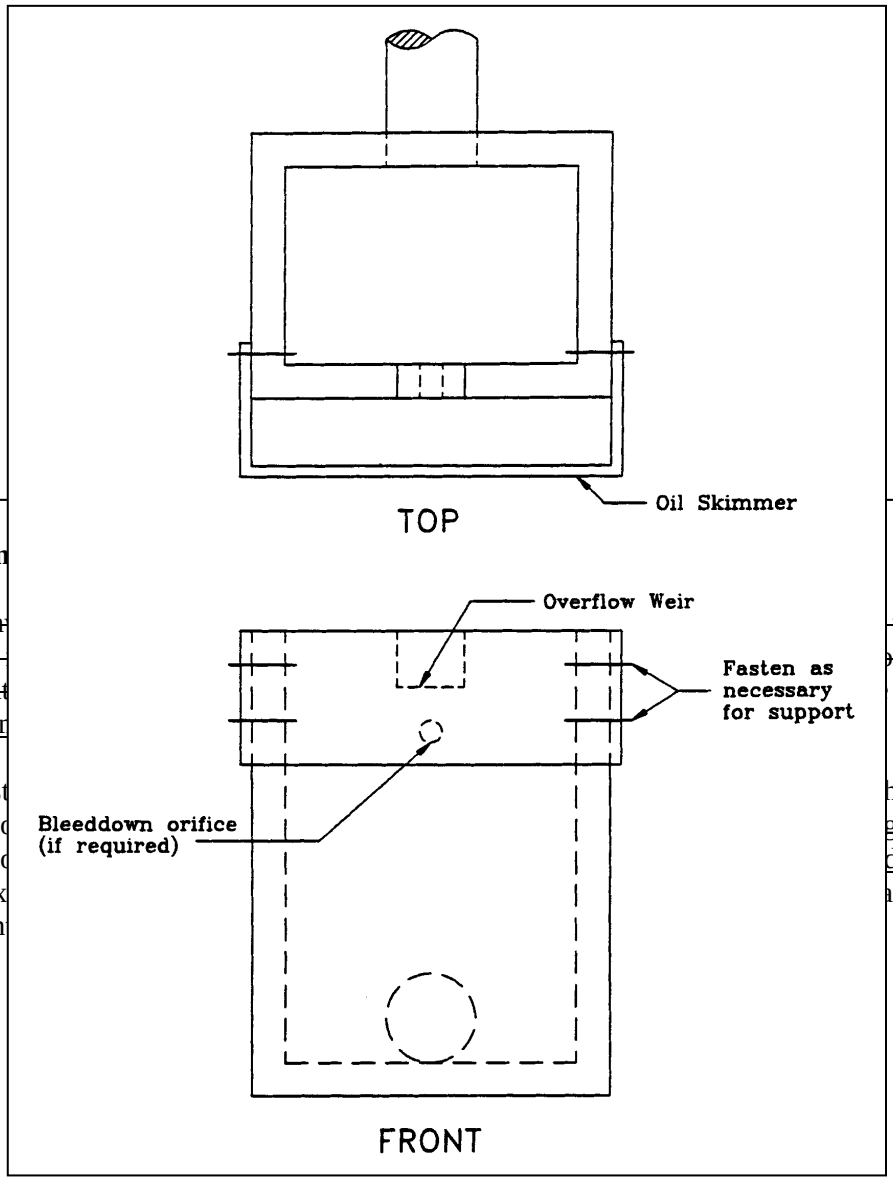
~~**4.6 Erosion and Sediment Control Criteria for Stormwater Management Systems**~~

~~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 off-site 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.~~

~~4.7 Oil and Grease Control~~

~~Systems that receive stormwater from contributing areas that are greater than 50 percent impervious (excluding water bodies) or which are a potential source of oil and grease (e.g., parking lots and gasoline stations) must include a baffle, skimmer, grease trap or other effective mechanism suitable for preventing oil and grease from leaving the stormwater system in concentrations that would cause a violation of water quality standards. Designs must assure sufficient clearance between the skimmer and structure or pond bottom to ensure that the hydraulic capacity of the structure is not affected. A typical illustration of a skimmer on an outlet structure is shown is **Figure 4.7-1**.~~

~~Figure 4.7-1 Oil skimmer detail for a typical outfall structure (N.T.S.).~~



4.8~~6~~ On-Line an

~~Each storm~~ ~~volume of stormwater~~ ~~surface or ground wat~~ ~~treatment volume~~storr

On-line syst he required treatment vo ge for peak discharge co d treatment volume mix a portion of the pollutan

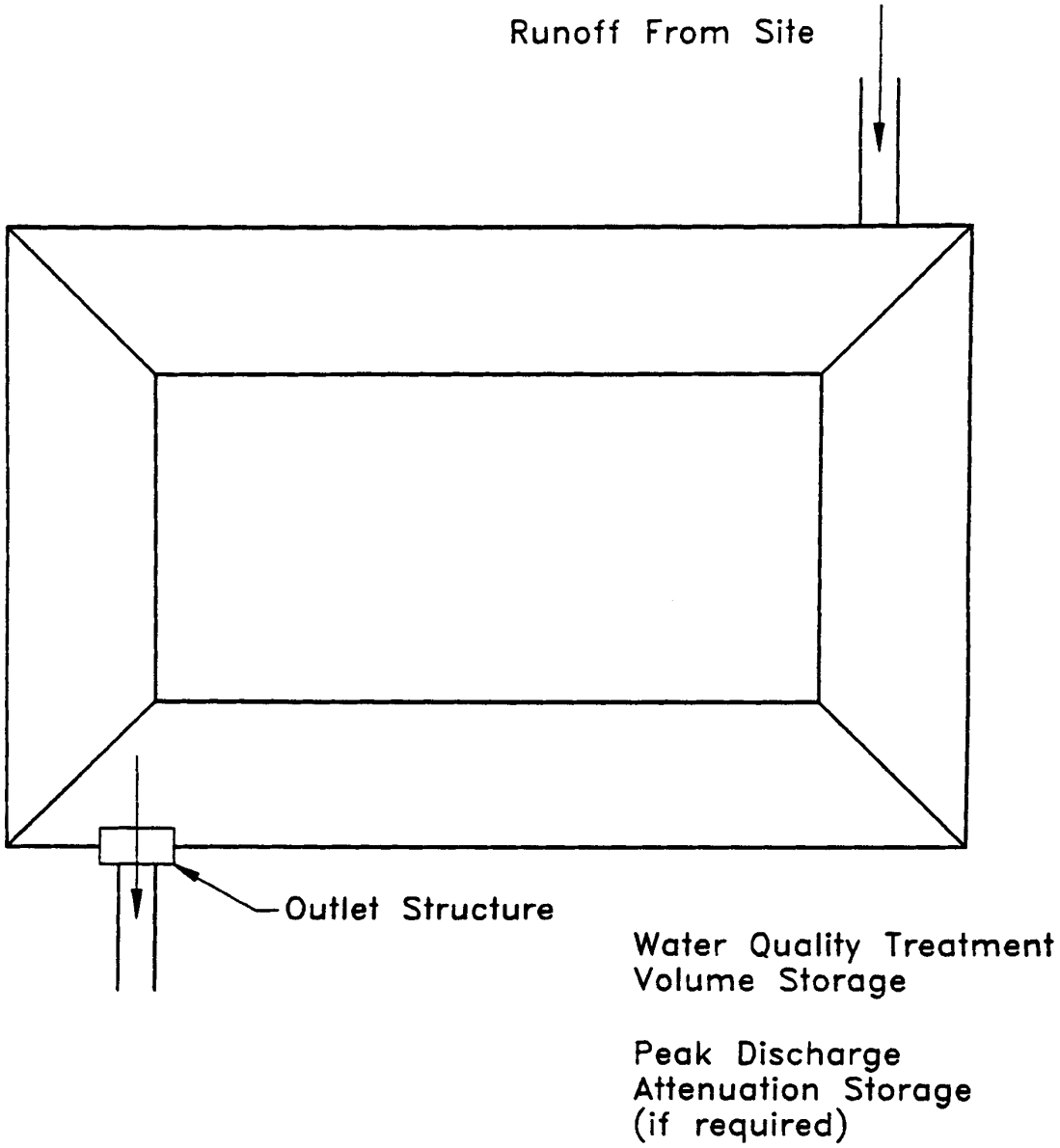


Figure 4.~~8~~6-1 On-line treatment system.

Off-line treatment systems (**Figure 4.~~8~~6-2**) divert the treatment volume into an off-line basin that is designed for storage ~~and treatment~~ of the ~~applicable~~ required treatment volume. Runoff volumes in excess of the required treatment volume by-pass the off-line ~~BMP~~ system and are discharged to either the receiving water or routed to a detention basin if peak discharge attenuation is required. A diversion box (**Figure 4.~~8~~6-3**) typically is used to divert the required treatment volume to the off-line ~~BMP~~ system and route ~~subsequent~~ excess flows away from it.

~~Figure 4.8-2 Off-line treatment system.~~

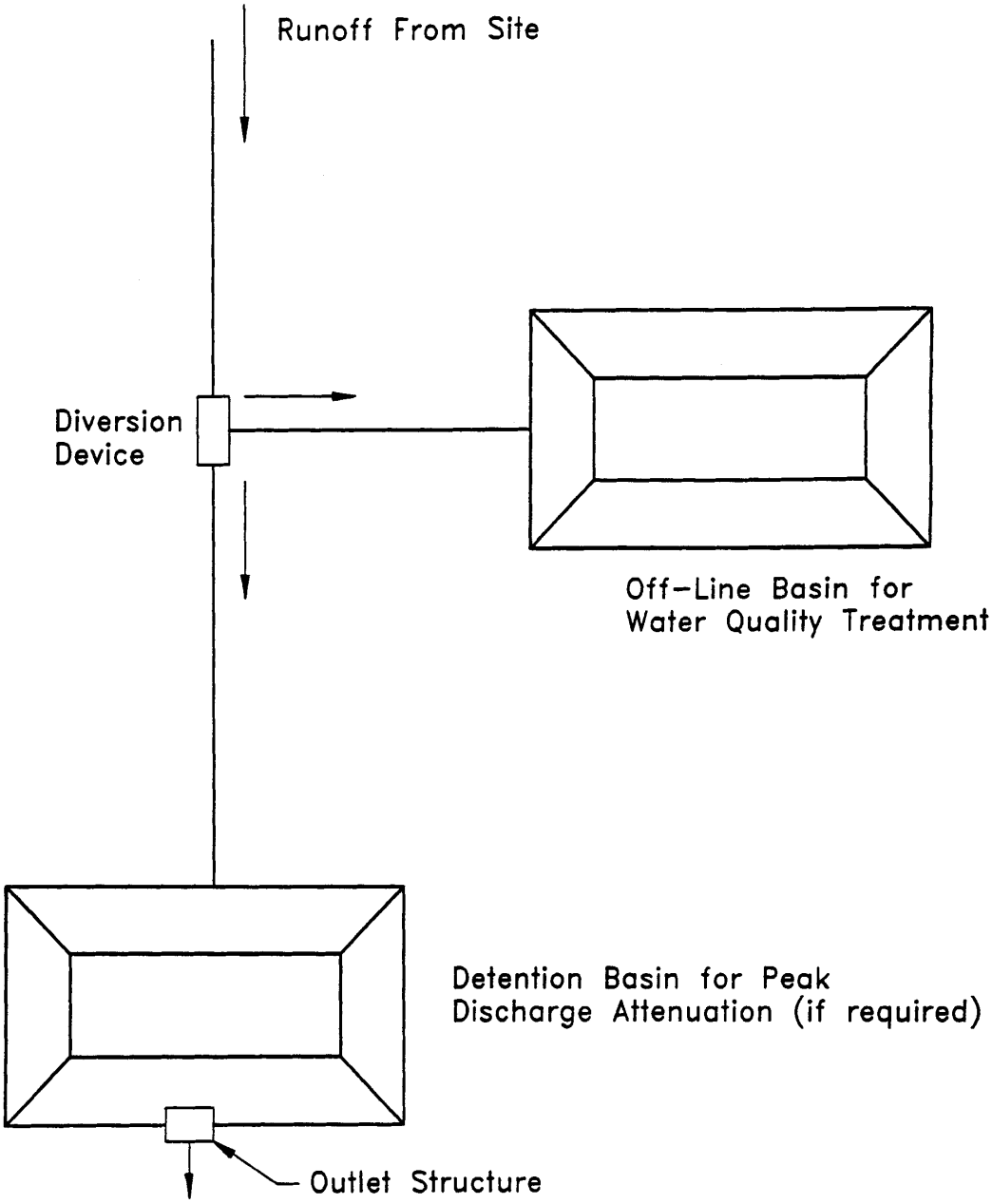


Figure 4.8~~6~~-2 Off-line treatment system.

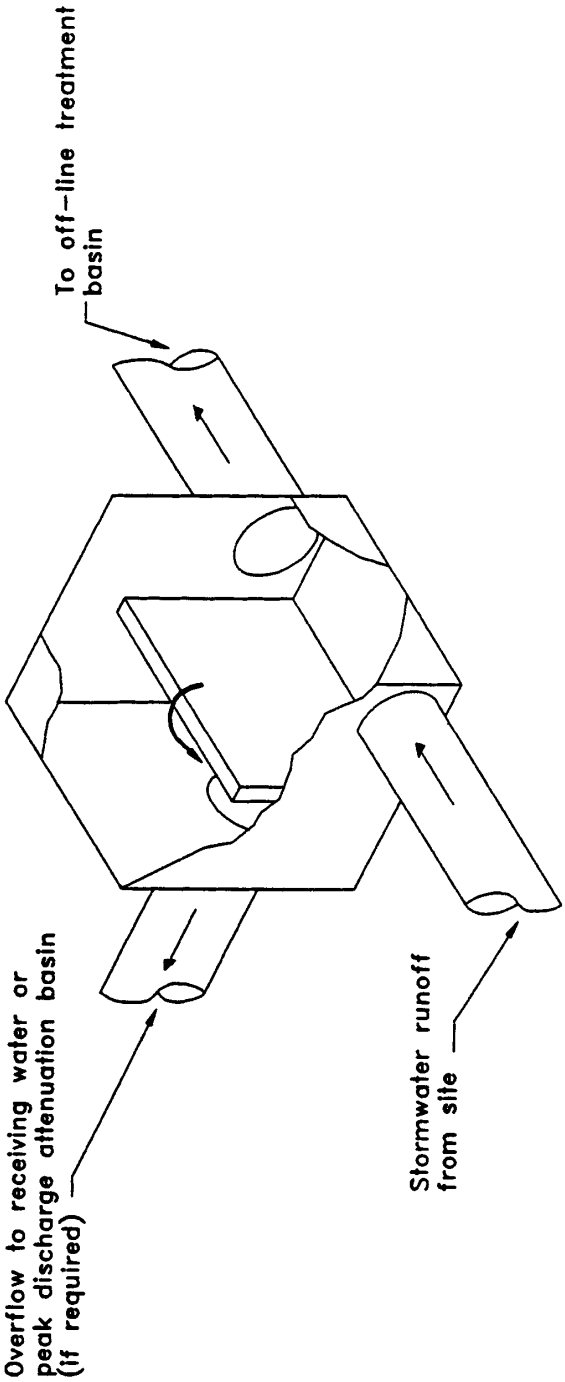


Figure 4.~~8~~6-3 Diversion box (N.T.S.).

~~Off-line systems are generally more effective at removing pollutants than on-line systems because accumulated pollutants cannot be "flushed out" during storm events that produce runoff volumes exceeding the treatment storage volume. Consequently, on-line systems must treat a greater volume of runoff than off-line systems to reduce the likelihood of flushing accumulated pollutants out of the system and achieve the minimum stormwater treatment levels required by the Water Resource Implementation Rule (Chapter 62-40, F.A.C.). Treatment volumes for each of the stormwater treatment practices are discussed in **sections 5 through 12 of Part V of this Volume.**~~

~~The treatment storage provided in an off-line system can be considered in the stage/storage calculations for peak discharge attenuation.~~ Off-line systems shall be designed to bypass essentially all additional stormwater runoff volumes greater than the required treatment volume to a discharge point or other detention storage area. ~~Of course~~, tThere will be some incremental additional storage in the off-line system associated with the hydraulic grade line at the weir structure in the typical diversion structure. This will depend on the size of the weir, but the weir shall be sized to pass the design or excess flow with minimal headwater.

Proposed off-line systems that will also serve to provide significant detention storage above the required off-line treatment ~~storage~~ volume will be considered to function as on-line systems. These systems shall either be designed to meet on-line treatment volume requirements, or the ~~designer~~ registered professional must discuss the merits of the particular system (in terms of potential of flushing accumulated pollutants) with Agency staff in a pre-application conference~~. In such cases, an applicant must provide reasonable assurance that the on-line treatment volume is not necessary to meet the other applicable criteria for issuance.~~

~~**4.9 Hazardous or toxic substances**~~

~~Systems serving a use that produces or stores hazardous or toxic substances shall be designed to have no stormwater discharge that contains such substances.~~

4.~~10~~7 Runoff Coefficient and Curve Number for Stormwater Management Ponds

Stormwater management ponds, including dry retention ponds, detention ponds with filtration, dry ~~detention~~ retention ponds with underdrains, and wet detention ponds, shall be considered as impervious area for calculating composite runoff coefficients (C), and composite curve numbers. This area is measured at the elevation of the required treatment volume.

4.~~11~~8 Rural Subdivisions

Systems serving subdivisions with no more than five percent impervious area are considered a rural subdivision provided that:

(a) No drainage system shall act in a manner that would divert and channelize large areas of overland sheet flow, thereby creating point source discharges that will adversely affect wetlands, or areas beyond the applicant's perpetual control; and

(b) The applicant's demonstration of compliance with this subsection shall include provision of a typical lot layout showing proposed driveways, buildings, and other impervious areas and the anticipated percentage of impervious surfaces resulting from projected construction on individual residential lots.

Drainage areas from individual lots in rural subdivision are not required to provide treatment or attenuation of stormwater provided they are designed, constructed, and maintained in accordance with this Section. However, portions of individual lots that drain to a system that serves other activities such as roads, clubhouses, etc., must be included in the treatment and attenuation calculations for that system.

4.12 Runoff from One-inch of Rainfall

Retention, exfiltration and under-drain treatment systems, etc., that are designed as on-line systems, require treatment of the runoff from the first one-inch of rainfall over the contributing basin with a minimum of one half-inch of runoff retained. In determining the runoff from one-inch of rainfall, the applicant must calculate runoff using the runoff coefficient (C) as detailed in the example below.

(a) Example of a 15.5-acre site with: 38 quarter acre lots, rolling hills, sandy soil
1 acre retention pond
5 acres of roads and ditches

The proposed roof and driveway areas which will contribute runoff directly to road drainage is 3,975 SF per lot.
Impervious area = (38)(3,975 SF) = 151,050 SF

The proposed road and drainage ditch area is five acres.
Impervious area = (5 acres)(43,560 SF/acre) = 217,800 SF

The *total impervious area* is calculated to be: 217,800 SF + 151,050 SF = 368,850 SF

The *total pervious area* is calculated to be:
(38 lots)(0.25 acre/lot)(43,560 SF/acre) 151,050 SF = 262,770 SF

Calculate the composite runoff coefficient (C) using recommended values from Table 2-1 in **section 2.0 of the Design Aids**:

$C_{impervious}$ = Rational Coefficient for impervious areas = 0.95
C_{pond} = Rational Coefficient for pond = 1.0
$C_{pervious}$ = Rational Coefficient for pervious areas = 0.25

$$C = \frac{[(\text{Impervious Area} \times C_{impervious}) + (\text{Retention Area} \times C_{pond}) + (\text{Pervious Area} \times C_{pervious})]}{\text{Total Project Area}}$$

$$C = \frac{[(368{,}850\ \text{SF} \times 0.95) + (43{,}560\ \text{SF} \times 1.0) + (262{,}770\ \text{SF} \times 0.25)]}{(15.5\ \text{acres} \times 43{,}560\ \text{SF/acre})}$$

Therefore, the composite runoff coefficient, C is calculated to be = 0.68

Total Treatment Volume from 1 inch of Rainfall:
Treatment volume = (C) (1 inch) (Project Contributing Area)
Treatment volume = (0.68) (1 inch) (15.5 acres) (1 ft / 12 inches) = 0.88 acre-ft

Also, calculate one half inch of runoff over the project for comparison:
(15.5 acres)(0.5 inch)(1 ft / 12 inches) = 0.65 acre-ft

Therefore, the required treatment volume for the project is the larger value, or 0.88 acre-ft.

4.13 Alternative Designs

An applicant may provide alternative designs to those provided in this Volume, such as when filter systems are proposed. These alternative designs will be considered by the Agency in determining whether, based on plans, test results, or other information that the alternative design is appropriate for the specific site conditions to provide for a design that can provide equivalent treatment, attenuation, and protection to water resources as the best management practices adopted in this Volume. In otherwise determining whether reasonable assurance has been provided for compliance with this paragraph, the Agency shall, where appropriate, consider:

(a) The public interest served by the system;

(b) Whether the proposed system will be as effective as the comparable system design in this Volume;

(c) The costs of the alternative controls; and

(d) Whether reasonable provisions have been made for the operation and maintenance of the proposed system.

Guidance for the use of filters is contained in **Appendix B of this Volume**.

PART V — BEST MANAGEMENT PRACTICES

5.0 Design Criteria and Guidelines for Retention Systems

5.1 Description

The term "retention system" is defined as a storage area designed to store a defined quantity of runoff, allowing it to percolate through permeable soils into the shallow ground water aquifer. 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 as flat as possible and turf is established to promote infiltration and stabilize the basin slopes (see **Figure 5.1-1**);
- Shallow landscaped areas designed to store stormwater;
- Vegetated swales with swale blocks or raised inlets; and
- Pervious concrete with continuous curb.

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 does 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.

Retention systems provide excellent removal of stormwater pollutants. Substantial amounts of suspended solids, oxygen demanding materials, heavy metals, bacteria, some varieties of pesticides and nutrients such as phosphorus are removed as runoff percolates through the vegetation and soil profile.

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. Retention systems can also be used to help meet the runoff volume criteria for systems that discharge to closed basins or land-locked lakes (see ~~section~~ Section **3.3(b) of this Volume**).

There are several design and performance criteria specific to retention systems that are described below.

5.2 Treatment Volume

The Required Treatment Volume necessary to achieve the treatment efficiency shall be routed to the retention basin and percolated into the ground. The required nutrient load reduction for the retention basin and, if necessary, associated BMPs in the BMP treatment train will be determined by the applicable performance standard as set forth in Section 8.3. of Volume I and methodology described in Section 9 of Volume I. Treatment volume shall be determined by the treatment efficiency.

~~The first flush of runoff shall be routed to the retention basin and percolated into the ground. For systems that discharge to Class III receiving water bodies, the applicant shall provide retention for one of the following:~~

~~(a) Off-line retention of the first one-half inch of runoff from the contributing area; or~~

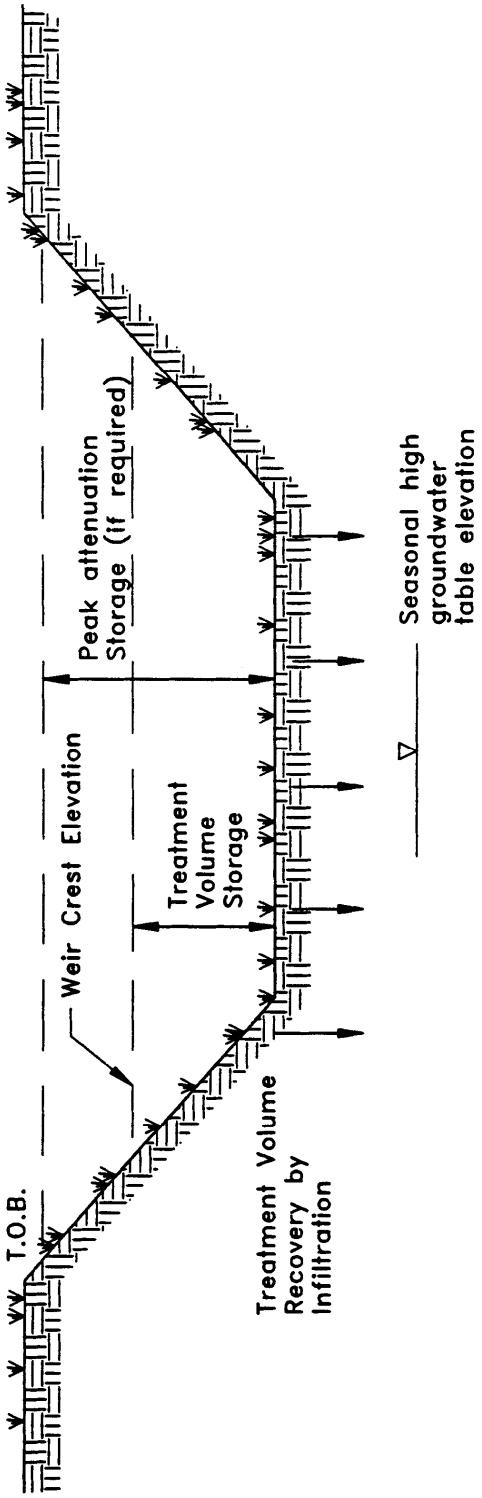


Figure 5.1-1 Typical retention system (N.T.S.).

~~(b) On-line retention of the runoff from one inch of rainfall over the contributing area. A minimum volume of one-half inch of runoff from the contributing area is required.~~

~~For direct discharges to OFWs, the applicant shall provide retention for an additional fifty percent of the applicable treatment volume specified in **(a) and (b), above**.~~

5.3 Recovery Time

The retention system must provide the capacity for the appropriate treatment volume of stormwater specified in **~~section~~ Section 5.2 of this Volume** within 72 hours following a storm event assuming average antecedent moisture conditions. In retention systems, the stormwater is drawn down by natural soil infiltration and dissipation into the ground water table, evaporation, or evapotranspiration, as opposed to underdrain systems which rely on artificial methods like drainage pipes.

Antecedent moisture condition (AMC) refers to the amount of moisture and storage in the soil profile prior to a storm event. Antecedent soil moisture is an indicator of wetness and availability of soil to infiltrate water. The AMC can vary from dry to saturated depending on the amount of rainfall received prior to a given point in time. Therefore, "average AMC" means the soil is neither dry nor saturated, but at an average moisture condition at the beginning of a storm event when calculating recovery time for retention systems.

The antecedent condition has a significant effect on runoff rate, runoff volume, infiltration rate, and infiltration volume. The infiltration volume is also known as the upper soil zone storage. Both the infiltration rate and upper soil zone storage are used to calculate the recovery time of retention systems and shall be estimated using any generally accepted and well documented method with appropriate parameters consistent with such generally accepted and well documented method to reflect drainage practices, seasonal high water table elevation, consideration of groundwater mounding, the AMC, and any underlying soil characteristics which would limit or prevent percolation of storm water into the soil column. **~~section~~ Section 1.3 of the Design Aids for Volume II** provides an accepted methodology for calculating basin recovery time.

5.4 Basin Stabilization

The retention basin shall be stabilized with pervious material or permanent vegetative cover. To provide proper treatment of the runoff in very permeable soils, permanent vegetative cover must be utilized when U.S. Department of Agriculture Natural Resources Conservation Service (NRCS, SCS) hydrologic group "A" soils underlie the retention basin, except for pervious pavement systems.

5.5 Retention Basin Construction

Retention basin construction procedures and the overall sequence of site construction are two key factors that can contribute to the effectiveness of retention basins. Sub-standard construction methods or improper construction sequence can render the basin inoperable prior to completion of site development.

Since stormwater management systems typically are required to be constructed during the initial phases of site development, retention basins are often exposed to poor quality surface runoff. Stormwater runoff during construction contains considerable amounts of suspended solids, organics, clays, silts, trash and other undesirable materials. For example, the subgrade stabilization material utilized during construction of roadways and pavement areas typically consist of clayey sand or soil

cement. If a storm occurs when these materials are exposed (prior to placement of the roadway wearing surface), considerable amounts of these materials end up in the retention basin. Another source of fine material generated during construction is disturbed surface soil that can release large quantities of organics and other fine particles. Fine particles of clay, silt, and organics at the bottom of a retention basin create a poor infiltrating surface.

The following construction procedures are recommended to avoid degradation of retention basin infiltration capacity due to construction practices:

(a) Initially construct the retention basin to rough grade by under-excavating the basin bottom and sides by approximately 12 inches.

(b) After the drainage area contributing to the basin has been fully stabilized, the interior side slopes and basin bottom shall be excavated to final design specifications. The excess soil and undesirable material must be carefully excavated and removed from the pond so that all accumulated silts, clays, organics, and other fine sediment material has been removed from the pond area. The excavated material shall be disposed of in a manner so as to not cause or contribute to violations of water quality standards.

(c) Once the basin has been excavated to final grade, the entire basin bottom must be deep raked and loosened for optimal infiltration.

(d) Finally, the basin must be stabilized according the ~~**section**~~ **Section 5.4 of this Volume**.

6.0 Underdrain Design and Performance Criteria

FSA Comment: Are underdrain systems covered in some other part of the rule? We're concerned this was removed, is DEP removing underdrain systems as an option?

6.1 Description

Stormwater underdrain systems consist of a dry basin underlain with perforated drainage pipe which collects and conveys stormwater following percolation from the basin through suitable soil. Underdrain systems are an option for the applicant where high water table conditions dictate that recovery of the stormwater treatment volume cannot be achieved by natural percolation (i.e., retention systems) and suitable outfall conditions exist to convey flows from the underdrain system to receiving waters. Schematics of a typical underdrain system are shown in **Figures 6.1-1 and 6.1-2.**

Underdrain systems are intended to control the water table elevation in the immediate vicinity of the treatment system in order to provide for the drawdown of the treatment volume. Underdrains are utilized where the soil permeability is adequate to recover the treatment volume since the on-site soils overlay the perforated drainage pipes. The design criteria for underdrain systems excludes "filter" systems as described in Structural Stormwater Controls SW-BMP-3.10 of Chapter 6 of the *Florida Development Manual: A Guide to Sound Land and Water Management* (June 1988) (Appendix F). A copy of this material also may be obtained as described in subsection 62-330.010(5), F.A.C.

Underdrain systems provide excellent removal of stormwater pollutants. Substantial amounts of suspended solids, oxygen-demanding materials, heavy metals, bacteria, some varieties of pesticides and nutrients such as phosphorus are removed as runoff percolates through the vegetation and soil profile.

There are several design and performance criteria which must be met in order for an underdrain system to meet the rule requirements. The underdrain rule criteria are described below.

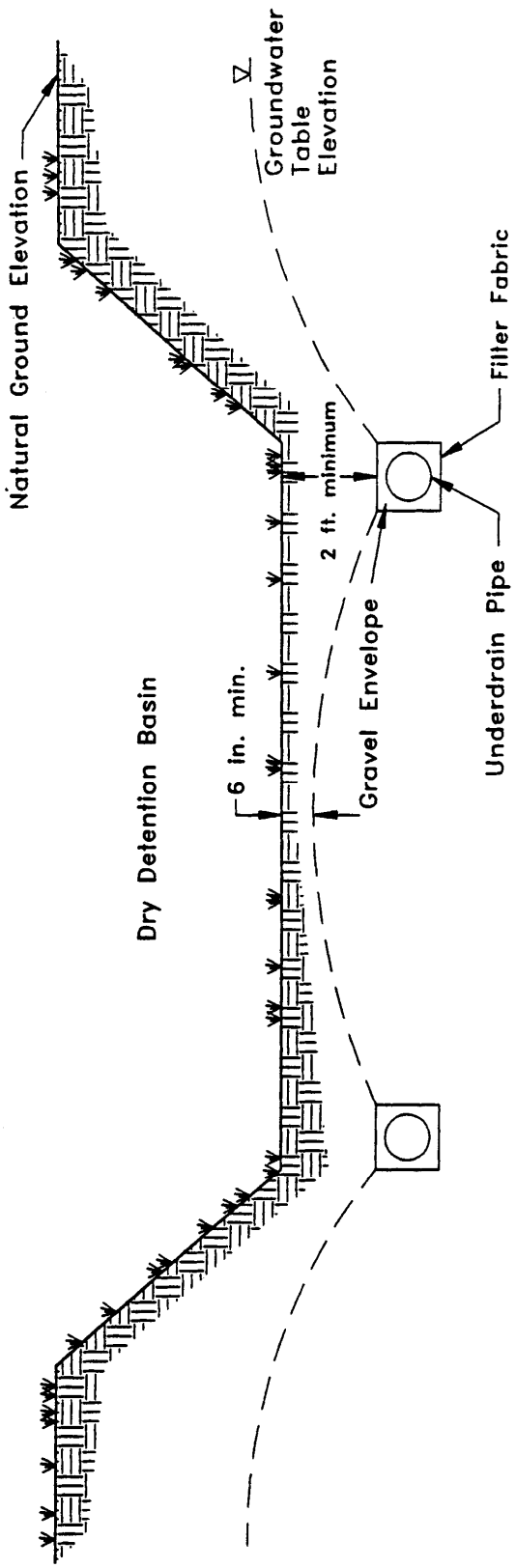
6.2 Treatment Volume

The first flush of runoff shall be detained in a dry retention basin and percolated through the soil. For discharges to Class III receiving water bodies, the applicant shall provide retention for one of the following:

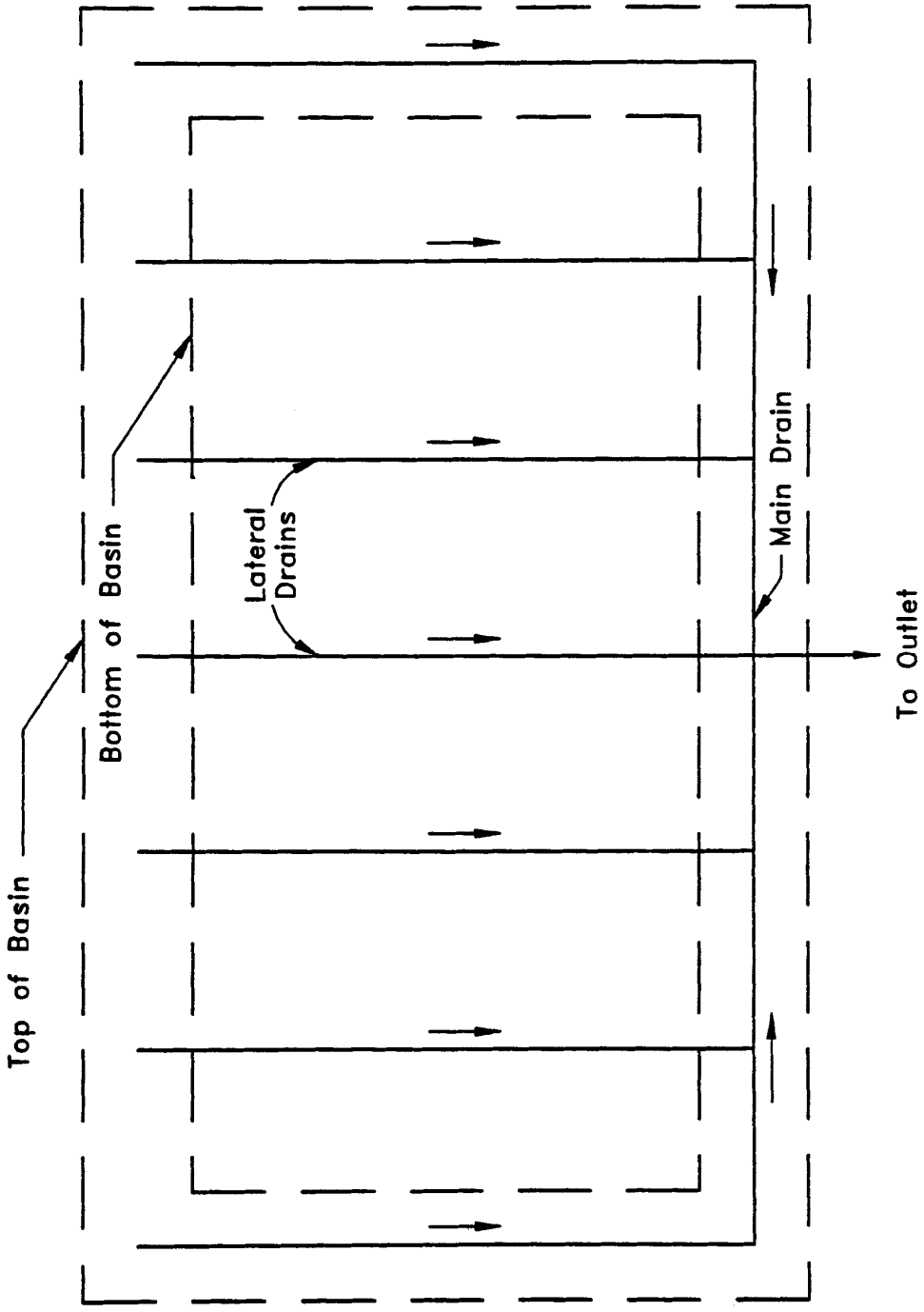
(a) Off-line retention of the first one-half inch of runoff from the contributing area; or

(b) On-line retention of the runoff from one inch of rainfall over the contributing area. A minimum volume of one-half inch of runoff from the contributing area is required.

For direct discharges to OFWs, the applicant shall provide retention for at least an additional fifty percent of the applicable treatment volume specified for retention in **(a) and (b), above**.



~~Figure 6.1-1 Typical cross section of underdrain system (N.T.S.).~~



~~Figure 6.1-2 Plan view of typical underdrain system (N.T.S.).~~

6.3 Recovery Time

The system shall be designed to provide for the drawdown of the appropriate treatment volume specified in **section 6.2 of this Volume** within 72 hours following a storm event. The treatment volume is recovered by percolation through the soil with subsequent transport through the underdrain pipes. The system shall only contain standing water within 72 hours of a storm event.

The pipe system configuration (e.g., pipe size, depth, pipe spacing, and pipe inflow capacity) of the underdrain system must be designed to achieve the recovery time requirement. Underdesign of the system will result in reduced hydraulic capacity. This, in turn, will result in a reduction in storage between subsequent rainfall events and an associated decrease in the annual average volume of stormwater treated resulting in a reduction of pollutant removal. Such circumstances also reduce the aesthetic value of the system and may promote mosquito production.

6.4 Safety Factor

The underdrain system must be designed with a safety factor of at least two unless the applicant affirmatively demonstrates based on plans, test results, calculations or other information that a lower safety factor is appropriate for the specific site conditions. Examples of how to apply this factor include design factors such as the following:

(a) Reducing the design percolation rate by half; and

(b) Designing for the required drawdown within 36 hours instead of 72 hours.

6.5 Underdrain Media

Underdrain systems assist in volume recovery where the native soil has a good capacity for percolation, but where high water table conditions generally prevent the infiltration of the treatment volume through the soil profile. To provide proper treatment of the runoff, at least two feet of indigenous soil is required between the bottom of the basin storing the treatment volume and the outside of the gravel envelope.

6.6 Filter Fabric

Underdrain systems shall utilize filter fabric or other means to prevent the soil from moving into the gravel envelope and clogging perforated pipe.

6.7 Inspection and Cleanout Ports

To facilitate maintenance of the underdrain system, capped and sealed inspection and cleanout ports which extend to the surface of the ground using non-perforated piping shall be provided, at a minimum, at the following locations for each drainage pipe:

(a) The terminus; and

(b) At every 400 feet or every bend of 45 or more degrees, whichever is shorter.

6.8 Basin Stabilization

The underdrain basin shall be stabilized with permanent vegetative cover and should contain standing water only within 72 hours following a rainfall event.

6.9 Base Flow

(a) Underdrain systems shall be allowed provided that lowering of the groundwater table is restricted to the immediate vicinity of the treatment system; and

(b) Water tables shall not be lowered to a level that would decrease the flows or levels of surface water bodies below any minimum level or flow established by a water management district Governing Board pursuant to Section 373.042, F.S. or cause negative impacts to the functions provided by water resources on site and adjacent to the project.

~~7~~6.0 Exfiltration Trench Design and Performance Criteria

~~7~~6.1 Description

An exfiltration trench is a subsurface system consisting of a conduit such as perforated pipe surrounded by natural or artificial aggregate which temporarily stores and infiltrates stormwater runoff (**Figure 7.1-1**). Stormwater passes through the perforated pipe and infiltrates through the trench walls and bottom into the shallow groundwater aquifer. The perforated pipe increases the storage available in the trench and helps promote infiltration by making delivery of the runoff more effective and evenly distributed over the length of the system. Generally, exfiltration trench systems are utilized where space is limited and/or land costs are high (i.e., downtown urban areas).

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 is returned to a normally "dry" condition when drawdown of the treatment volume is completed. Like retention basins, the treatment volume in exfiltration trench systems is not discharged to surface waters. Thus, exfiltration is considered a type of retention system.

Like other types of retention systems, exfiltration trench systems provide excellent removal of stormwater pollutants. Substantial amounts of suspended solids, oxygen demanding materials, heavy metals, bacteria, some varieties of pesticides and nutrients such as phosphorus are removed as runoff percolates through the soil profile. Exfiltration trench systems should not be located in close proximity to drinking water supply wells (see **~~section~~ Section 4.3.2 of this volume**).

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. Exfiltration trench systems can also be used to help meet the runoff volume criteria for projects which discharge to land-locked lakes (see **~~section~~ Section 3.3(b) of this Volume**).

The operational life of an exfiltration trench is short (possibly 5 to 10 years) for most exfiltration systems. Sediment accumulation and clogging by fines can reduce the life of an exfiltration trench. Total replacement of the trench may be the only possible means of restoring the treatment capacity and recovery of the system. Periodic replacement of the trench should be considered routine operational maintenance when selecting this management practice.

There are several design and performance criteria which must be met in order for an exfiltration trench system to meet the rule requirements. A description of each criterion is presented below.

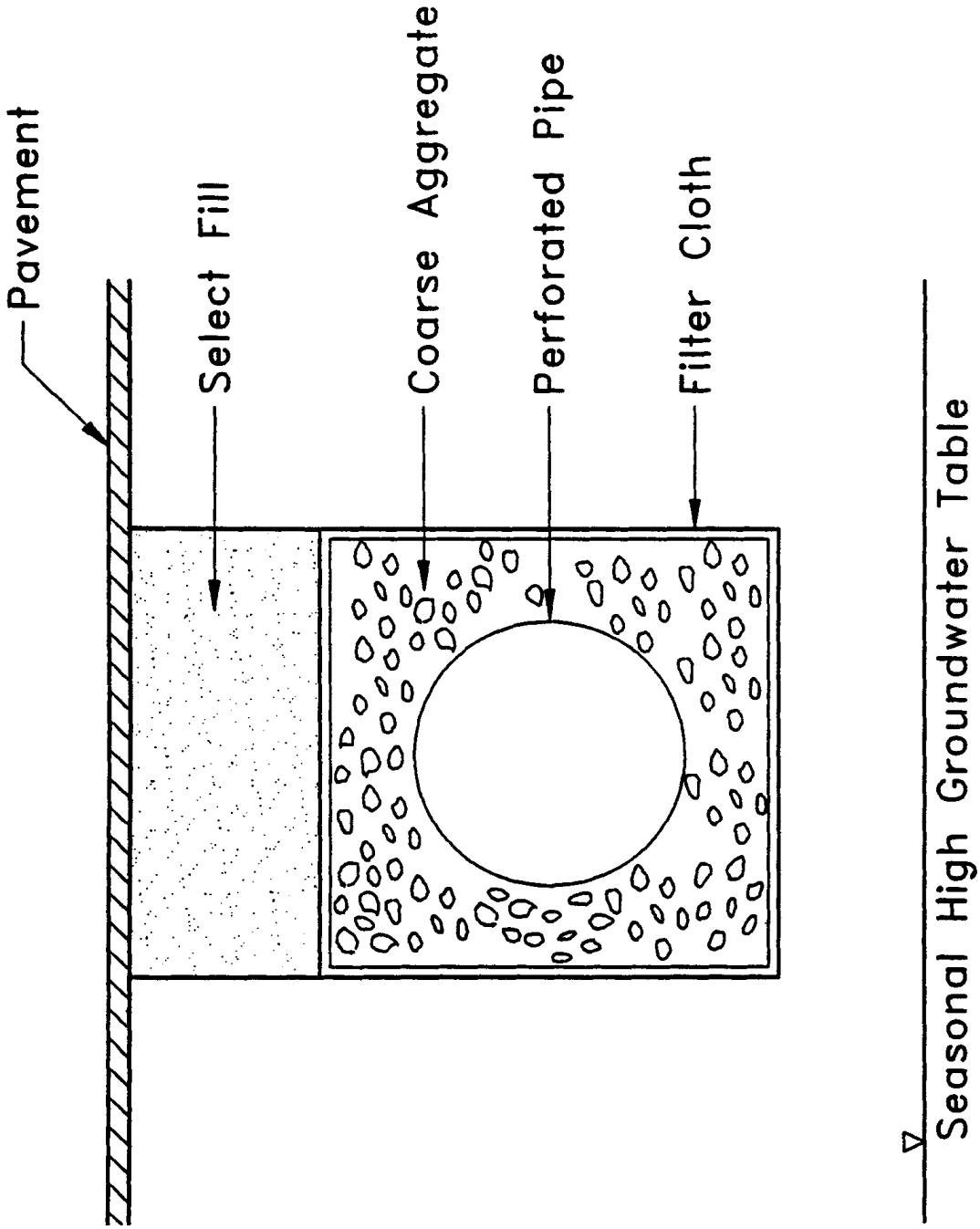


Figure ~~7~~6.1-1 Cross-section of typical underground exfiltration trench (N.T.S.).

~~7~~6.2 Treatment Volume

The Required Treatment Volume necessary to achieve the treatment efficiency shall be routed to the exfiltration trench and percolated into the ground. The required nutrient load reduction for the exfiltration trench and, if necessary, associated BMPs in the BMP treatment train will be determined by the applicable performance standard as set forth in Section 8.3. of Volume I and methodology described in Section 9 of Volume I. Treatment volume shall be determined by the treatment efficiency.

~~The first flush of runoff shall be collected in the exfiltration trench and infiltrated into the surrounding soil. For systems which discharge to Class III receiving water bodies, the applicant shall provide one of the following:~~

~~(a) Off-line storage of the first one-half inch of runoff from the contributing area; or~~

~~(b) On-line storage of the runoff from one inch of rainfall over the contributing area. A minimum volume of one-half inch of runoff from the contributing area is required.~~

~~For direct discharges to OFWs, the applicant shall provide storage for at least an additional fifty percent of the applicable treatment volume specified for off-line storage in **(a) and (b), above**.~~

~~Exfiltration trench systems must be designed to have the capacity to retain the required treatment volume without considering discharges to ground or surface waters.~~

~~7~~6.3 Recovery Time

The system shall be designed to ~~provide for the appropriate~~ recover the required treatment volume of stormwater runoff ~~specified in **section 7.2 of this Volume**~~ within 72 hours following a storm event assuming average antecedent moisture conditions. The stormwater is drawn down by infiltration into the soil.

Antecedent moisture condition (AMC) refers to the amount of moisture and storage in the soil profile prior to a storm event. Antecedent soil moisture is an indicator of wetness and availability of soil to infiltrate water. The AMC can vary from dry to saturated depending on the amount of rainfall received prior to a given point in time. Therefore, "average AMC" means the soil is neither dry nor saturated, but at an average moisture condition at the beginning of a storm event when calculating recovery time for exfiltration systems.

The antecedent condition has a significant effect on runoff rate, runoff volume, infiltration rate, and infiltration volume. The infiltration volume is also known as the upper soil zone storage. Both the infiltration rate and upper soil zone storage are used to calculate the recovery time of retention systems and must be estimated using any generally accepted and well documented method with appropriate parameters consistent with such generally accepted and well documented method to reflect drainage practices, seasonal high water table elevation, the AMC, and any underlying soil characteristics which would limit or prevent percolation of storm water into the soil column.

~~7~~6.4 Safety Factor

The exfiltration trench system must be designed with a safety factor of at least two unless the applicant affirmatively demonstrates based on plans, test results, calculations or other information that a lower safety factor is appropriate for the specific site conditions. For example, two possible ways to apply this factor are:

(a) Reducing the design percolation rate by half; and

(b) Designing for the required drawdown within 36 hours instead of 72 hours.

~~7~~6.5 Minimum Dimensions

The perforated pipe shall be designed with a 12 inch minimum inside pipe diameter or hydraulic equivalent, and a 3 foot minimum trench width. The perforated pipe shall be located within the trench ~~section~~ Section to minimize the accumulation of sediment in the aggregate void storage and maximize the preservation of this storage for stormwater treatment. To meet this goal, it is recommended that the perforated pipe be located at or within 6 inches of the trench bottom.

~~7~~6.6 Filter Fabric

Exfiltration trench systems shall be designed so that aggregate in the trench is enclosed in filter fabric. This serves to prevent migration of fine materials from the surrounding soil that could result in clogging of the trench.

Alternatively, filter fabric may also be utilized directly surrounding the perforated pipe. In this instance, sedimentation of particulates will occur in the perforated pipe. Consequently, the pipe is more prone to clogging and reductions in capacity may occur more often than usual. However, the pipe may be cleaned relatively easy using high pressure hoses, vacuum systems, etc. On the other hand, designs without the fabric directly surrounding the perforated pipe requires complete replacement when clogging occurs.

~~7~~6.7 Inspection and Cleanout Structures

Inspection and cleanout structures that extend exfiltration pipe to the surface of the ground shall be provided, at a minimum, at the inlet and terminus of each exfiltration pipe. Inlet structures shall include sediment sumps. These inspection and cleanout structures provide four primary functions:

(a) Observation of how quickly the trench recovers following a storm;

(b) Observation of how quickly the trench fills with sediment;

(c) Maintenance access to the perforated pipe; and

(d) Sediment control (sumps).

Standard precast concrete inlets and manholes are widely used to furnish the inspection and cleanout access.

~~7~~6.8 Ground Water Table

The exfiltration trench system shall be designed so that the invert elevation of the trench is at least two feet above the seasonal high ground water table elevation unless the applicant affirmatively demonstrates based on plans, test results, calculations or other information that an alternative design is appropriate for the specific site conditions.

~~7~~6.9 Construction

During construction, every effort should be made to limit the parent soil and debris from entering the trench. Any method used to reduce the amount of fines entering the exfiltration trench during construction will extend the life of the system. The use of an aggregate with minimal fines is also recommended.

~~8~~7.0 Wet Detention Design and Performance Criteria

~~8~~7.1 Description

Wet detention systems are permanently wet ponds which are designed to slowly release collected stormwater runoff through an outlet structure. A schematic of a typical wet detention system is shown in **Figure 8.1-1**.

Wet detention systems are the recommended BMP for sites with moderate to high water table conditions. The Agency strongly encourages the use of wet detention treatment systems for the following two reasons. First, wet detention systems provide significant removal of both dissolved and suspended pollutants by taking advantage of physical, chemical, and biological processes within the pond. Second, the complexity of BMPs, such as underdrains, is not encountered in a wet detention pond control structure. Wet detention systems offer an effective alternative for the long term control of water levels in the pond, provide a predictable recovery of storage volumes within the pond, and are easily maintained by the maintenance entity.

In addition to providing good removal of pollutants from runoff, wet detention systems also provide other benefits such as flood detention, passive recreation activities adjacent to ponds, ~~storage of runoff for irrigation, and pleasing aesthetics~~ and aesthetic amenities. As stormwater treatment systems, these ponds should not be designed to promote in-water recreation (i.e., swimming, fishing, and boating). To exclude such uses, measures such as fencing, signage, and other methods designed to prevent unauthorized pedestrian, vehicle, and boat access to the system shall be used.

FSA Comment: Why was storage of runoff for irrigation removed?

There are several components in a wet detention system which must be properly designed to achieve the level of stormwater treatment required by Chapter 62-330, F.A.C. A description of each design feature and its importance to the treatment process is presented below. The design and performance criteria for wet detention systems are discussed below. A methodology for the design of wet detention systems is provided in ~~**section**~~ **Section** ~~**2**~~ **3 of the References and Design Aids**.

~~8~~7.2 Treatment Volume

The required nutrient load reduction for the wet pond and, if necessary, associated BMPs in the BMP treatment train will be determined by the applicable performance standard as set forth in Section 8.3. of Volume I and methodology described in Section 9 of Volume I. Treatment volume shall be determined by the treatment efficiency.

~~For wet detention systems, the design treatment volume is one inch of runoff from the contributing area.~~

~~Additional treatment volume criteria apply to systems that discharge directly to OFWs (see **section 8.12 of this Volume**).~~

~~8~~7.3 Recovery Time

The outfall structure shall be designed to drawdown one-half the required treatment volume between 48 and 60 hours.

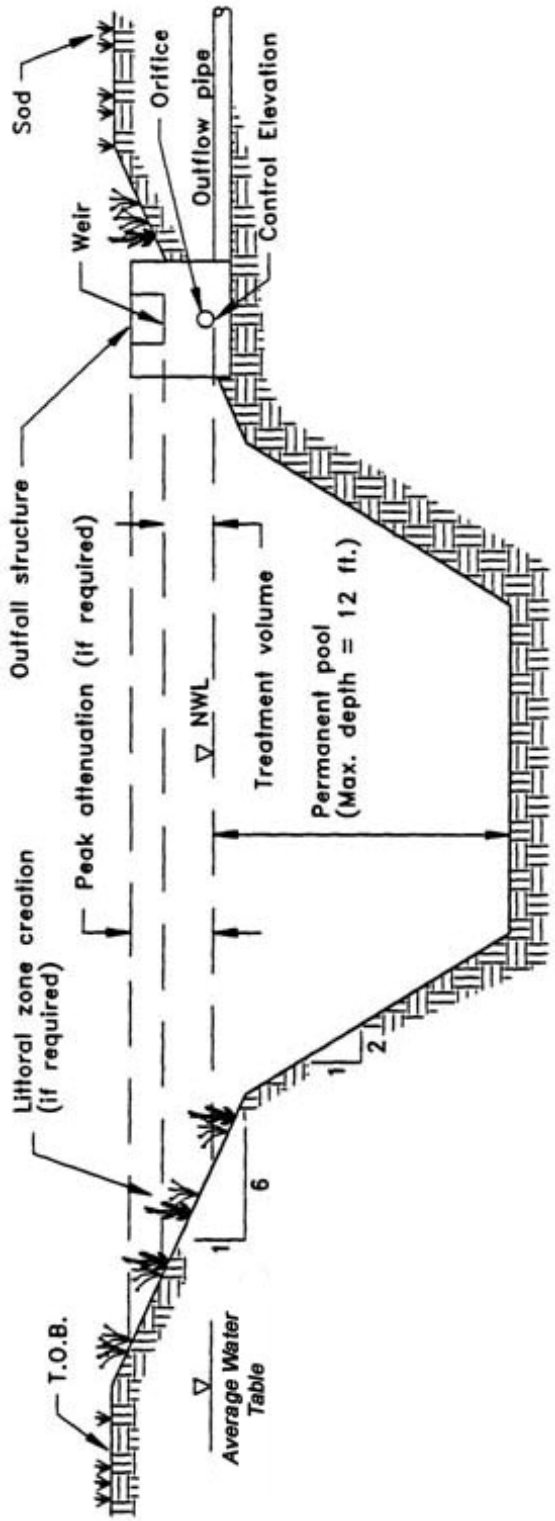


Figure ~~8~~7.1-1 Typical wet detention system (N.T.S.).

~~8~~7.4 Outlet Structure

The outlet structure generally includes a drawdown device (such as an orifice or "V" or square notch weir) set to establish a normal water control elevation and slowly release the treatment volume (see **Figures 8.4-1 and 8.4-2**). The design of the outfall structure must also accommodate the passage of flows from upstream stormwater management systems (see **Figure 8.4-3**).

The control elevation shall be set at or above the design tailwater elevation so the pond can effectively recover the treatment storage. Also, drawdown devices smaller than 3 inches minimum width or less than 20 degrees for "V" notches shall include a device to eliminate clogging. Examples of such devices include baffles, grates, screens, and pipe elbows.

~~8~~7.5 Permanent Pool

A significant component and design criterion for the wet detention system is the storage capacity of the permanent pool (i.e., the ~~**section**~~ **Section** of the pond that holds water at all times). The permanent pool shall be sized to provide at least a ~~14~~21-day residence time based upon average wet season rainfall (rainfall occurring over the wettest four months of an average year; for Northwest Florida, these are June through September).

FSA Comment: Increasing from 14 to 21 days will increase pond design costs. This could also be problematic in areas where space is limited. Is there a stated reason to make this change?

Important pollutant removal processes that occur within the permanent pool include: uptake of nutrients by algae, adsorption of nutrients and heavy metals onto bottom sediments, biological oxidation of organic materials, and sedimentation. Uptake by algae is probably the most important process for the removal of nutrients. Sedimentation and adsorption onto bottom sediments is likely the primary means of removing heavy metals.

The storage capacity of the permanent pool must be large enough to detain the untreated runoff long enough for the treatment processes described above to take place. Since one of the major biological mechanisms for pollutant removal in a wet detention basin is phytoplankton growth, the average hydraulic residence time of the pond must be long enough to ensure adequate algal growth. A residence time of 2 weeks is considered to be the minimum duration that ensures adequate opportunity for algal growth.

FSA Comment: The above statement seems to contradict the increase to 21 days above.

~~Additional permanent pool volume is required for wet detention systems which directly discharge to OFWs (see **section 8.12 of this Volume**).~~

~~8~~7.6 Littoral Zone

The littoral zone is that portion of a wet detention pond which is designed to contain rooted aquatic plants. The littoral area is usually provided by extending and gently sloping the sides of the pond down to a depth of 2 to 3 feet below the normal water level or control elevation. Also, the littoral zone can be provided in other areas of the pond that have suitable depths (i.e., a shallow shelf in the middle of the lake). Littoral Zones are not required but can be used to increase the treatment efficiency of the wet pond system.

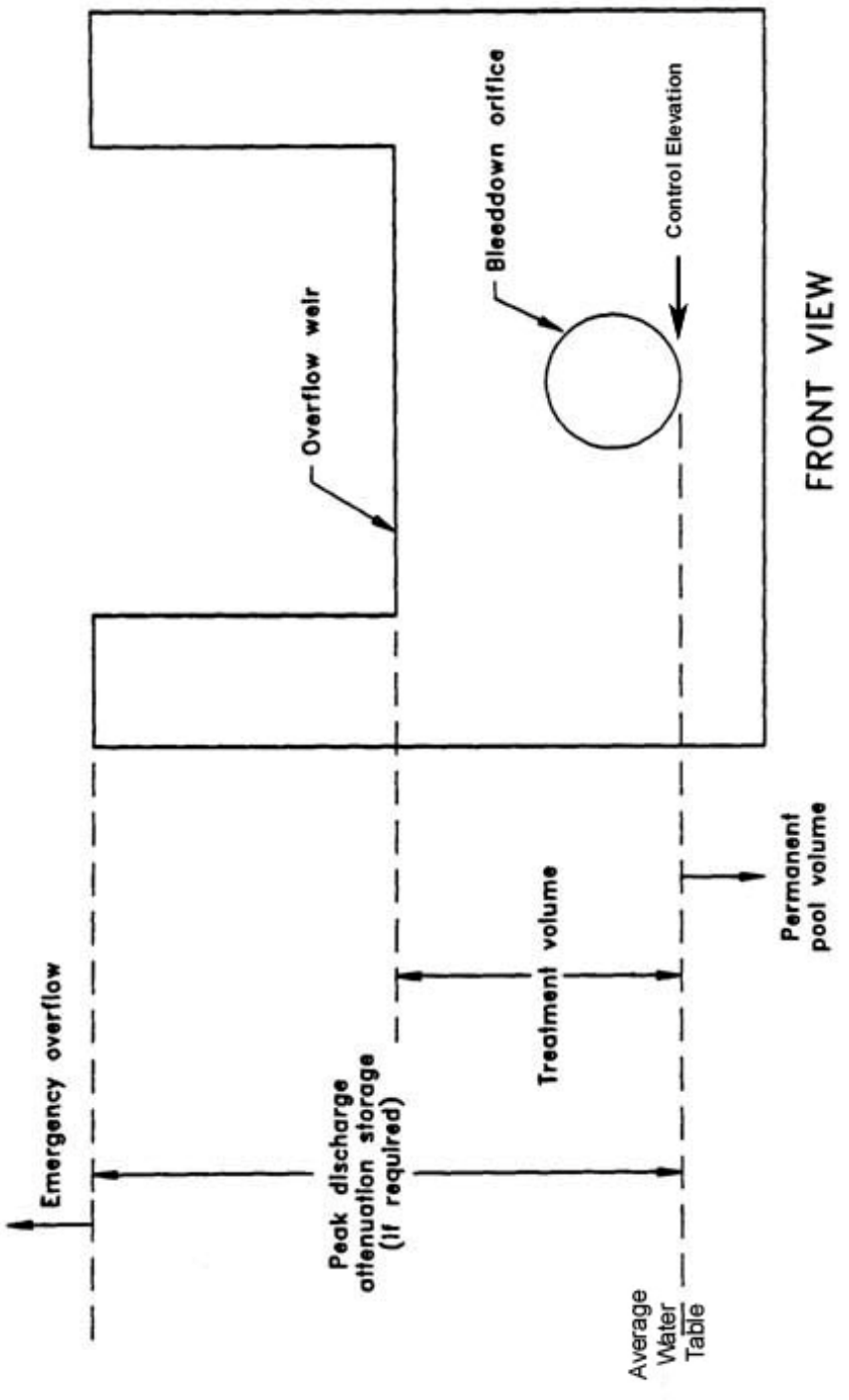


Figure ~~8~~7.4-1 Typical wet detention outfall structure (N.T.S.).

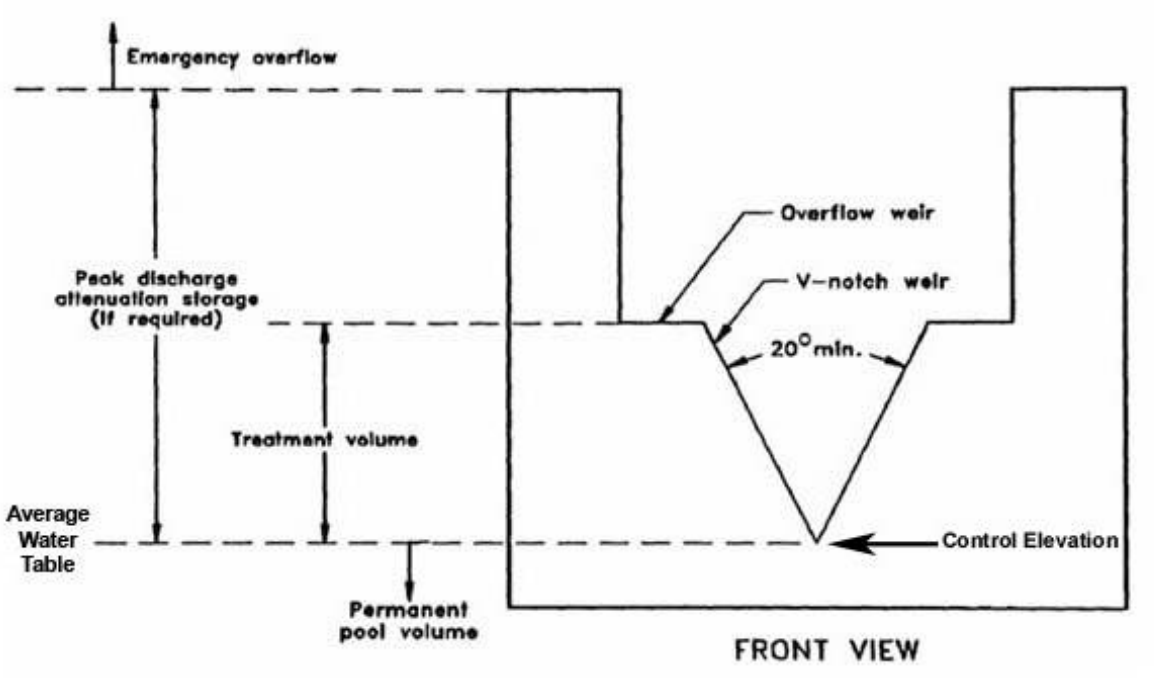


Figure ~~8~~7.4-2 Typical wet detention outfall structure with "V"-notch weir (N.T.S.).

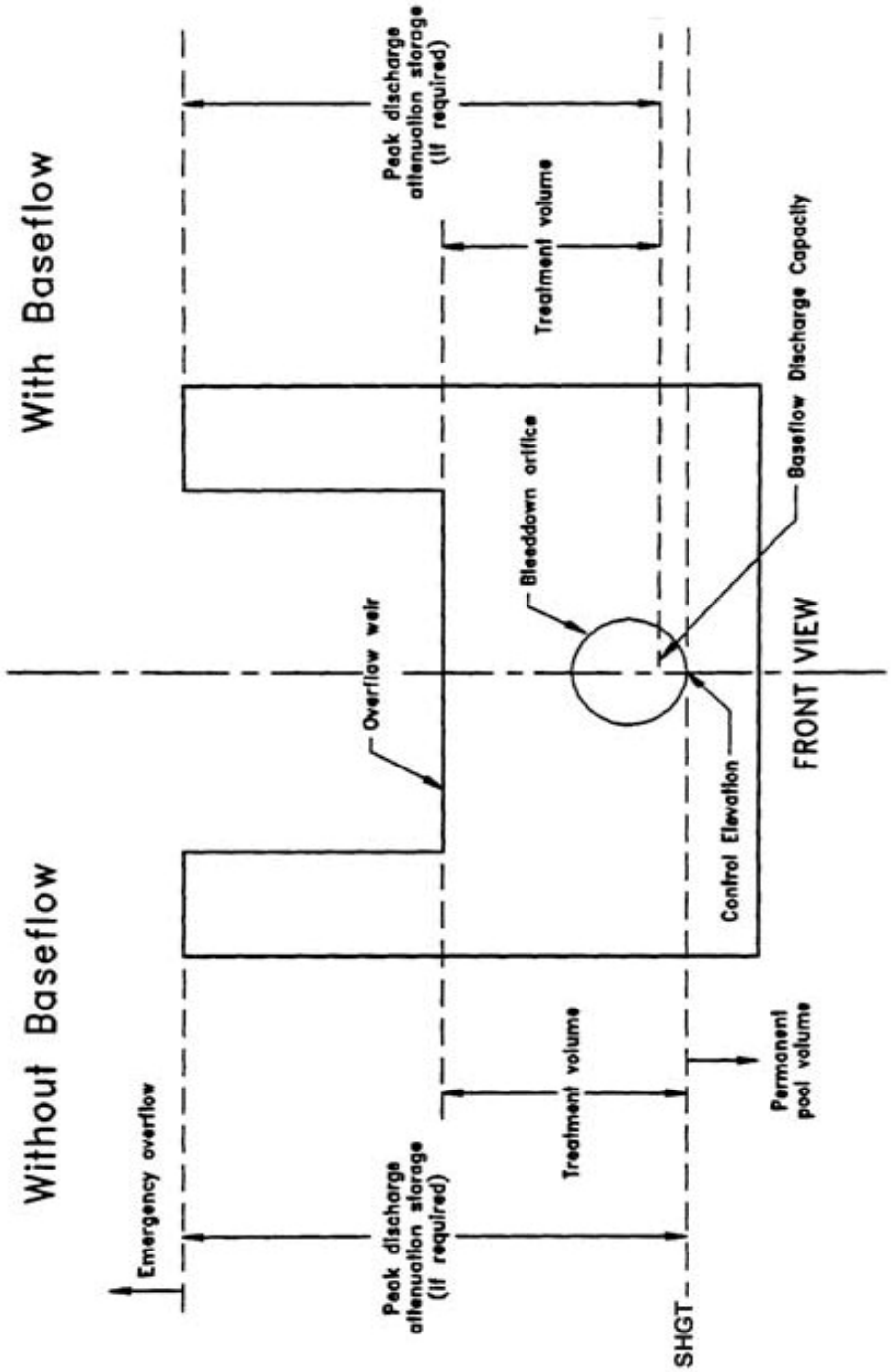


Figure ~~8~~7.4-3 Typical wet detention outfall structure with and without baseflow conditions (N.T.S.).

The littoral zone is established with native aquatic plants by planting and/or the placement of wetland soils containing seeds of native aquatic plants. A specific vegetation establishment plan must be prepared for the littoral zone. The plan must consider the hydroperiod of the pond and the type of plants to be established. ~~The *Florida Development Manual* provides a list of recommended native plant species suitable for littoral zone planting.~~ Additional information for a list of recommended native plant species is included in the **References and Design Aids for Volume II**. In addition, a layer of muck can be incorporated into the littoral area to promote the establishment of the wetland vegetation. When placing muck, special precautions must be taken to prevent erosion and turbidity problems in the pond and at its discharge point while vegetation is becoming established in the littoral zone.

The following is a list of the design criteria for wet detention littoral zones:

(a) The littoral zone shall be gently sloped (6:1 Horizontal:Vertical or flatter), and 30 to 40 percent of the wet detention pond surface area shall consist of a littoral zone. The percentage of littoral zone is based on the ratio of vegetated littoral zone to surface area of the pond at the control elevation.

(b) The treatment volume shall not cause the pond level to rise more than 18 inches above the control elevation unless the applicant affirmatively demonstrates that the littoral zone vegetation can survive at greater depths.

(c) Within 24 months of completion of the system, 80 percent coverage of the littoral zone by suitable aquatic plants is required.

(d) Planting of the littoral zone is recommended to meet the 80% coverage requirement. As an alternative to planting, portions of the littoral zone may be established by placement of wetland top soils (at least a four inch depth) containing a seed source of desirable native plants. When utilizing this alternative, the littoral zone must be stabilized by mulching or other means and at least the portion of the littoral zone within 25 feet of the inlet and outlet structures must be planted.

~~As an alternative option to establishing and maintaining vegetative littoral zones as described in this section, the applicant can provide either:~~

~~(e) An additional 50% of the appropriate permanent pool volume as required in **section 8.5, above,** or~~

~~(f) Pre-treatment of the stormwater prior to the stormwater entering the wet detention pond. The level of pre-treatment must be at least that required for retention, underdrain, exfiltration, or swale systems. See **section 8.10, below,** for additional information on pre-treatment.~~

Routine custodial maintenance must be performed to remove nuisance or exotic plant species such as cattails (*Typha* spp.).

~~8~~7.7 Pond Depth

A maximum pond depth of 12 feet is required. ~~and a mean depth (pond volume divided by the pond area at the control elevation) between 2 and 8 feet is required.~~ Deeper ponds are allowable, provided the registered professional affirmatively demonstrates that any design for deeper pond depths will not cause stratification within the water column and will prevent resultant anoxic bottom waters and sediments. Many of the nutrients and metals removed from the water column accumulate in the top few inches of the pond bottom sediments. If a pond is deep enough, it will have a tendency to stratify, creating the potential for anoxic conditions developing at the bottom of the pond. An aerobic environment should be maintained throughout the water column in wet detention ponds in order to minimize the release of nutrients and metals from the bottom sediments. The maximum depth criteria minimizes the potential for significant thermal stratification which will help maintain aerobic conditions in the water column that should maximize sediment uptake and minimize sediment release of pollutants.

On the other hand, the minimum mean depth criteria minimizes aquatic plant growth which may be excessive if the pond is too shallow.

FSA Comment: Please clarify text in 7.7, are the rules now saying that you must have a maximum depth of 12 feet somewhere in the pond? Also, there does not appear to be a minimum average depth requirement, was that the intention? Note, second paragraph references criteria that is deleted in first paragraph.

~~8~~7.8 Pond Configuration

The average length to width ratio of the pond must be at least 2:1. It is important to maximize the flow path of water from the inlets to the outlet of the pond to promote good mixing (i.e., no dead spots). Under these design conditions, short circuiting is minimized and pollutant removal efficiency and mixing is maximized.

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. Examples of good and poor pond configurations are given in **Figure ~~8~~7.~~9~~8-1**.

~~8~~7.9 Ground Water Table

To minimize ground water contributions which may lower treatment efficiencies, the control elevation shall be set at or above the normal on-site ground water table elevation. This elevation may be determined by calculating the average of the seasonal high and seasonal low ground water table elevations. In areas where the seasonal low water table is not determinable, the applicant may propose using the seasonal high water table elevation minus one foot. The decision to use this alternative should be made by a professional with significant experience with and knowledge of the historic weather patterns and groundwater conditions of the local area. Regardless of which method is used, the system cannot cause adverse secondary impacts to adjacent wetlands or other surface waters, such as dewatering.

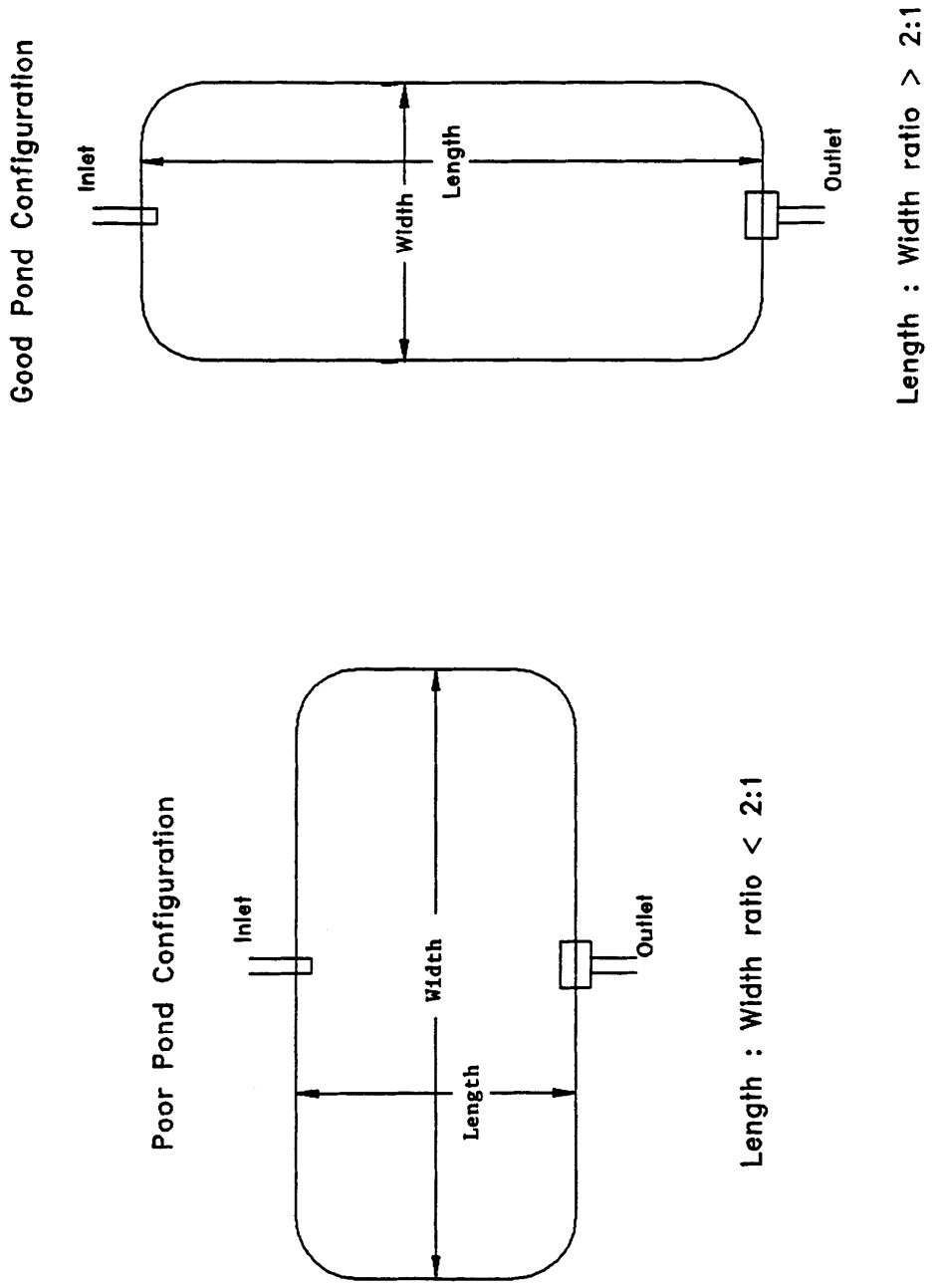


Figure ~~8~~7.8-1 Examples of good and poor wet detention pond configurations (N.T.S.).

~~**8.10 Pre-treatment**~~

7.10 Treatment Train Nutrient Reduction

BMPs can be implemented in combination or in conjunction with one another in a series called a "BMP Treatment Train." If used, BMP Treatment Train efficiencies must account for the reduced loading transferred to subsequent downstream treatment devices. As stormwater pollutant concentrations are reduced in each BMP in the treatment train, the ability of a BMP Treatment Train to further reduce stormwater pollutant concentrations and loads is diminished. This is shown in Equation 9-5. This equation assumes each BMP acts independently of upstream BMPs and that upstream BMPs do not impact performance of downstream BMPs. If the BMP acts in combination with the upstream BMP, the designer will consider the use of another methodology to determine the resultant efficiency of the BMP Treatment Train.

Equation 9-5: Overall Treatment Train Efficiency for systems in series

$$Overall\ Treatment\ Train\ Efficiency = Eff1 + [(1 - Eff1)x\ Eff2] + [(1 - (Eff1 + Eff2))\ x\ Eff3\ ]$$

Eff1 = efficiency of initial treatment system
Eff2 = efficiency of second treatment system
Eff3 = efficiency of third treatment system

~~"Pre-treatment" is defined as the treatment of a portion of the runoff prior to its entering the wet detention pond. Pre-treatment increases the pollutant removal efficiency of the overall stormwater system by reducing the pollutant loading to the wet detention pond. Pre-treatment may be used to enhance the appearance of the wet detention pond or meet the additional treatment criteria for discharges to receiving water which are classified as OFWs.~~

For developments where the appearance of the lake is important, pre-treatment a series of BMPs can reduce the chances of algal blooms and slow the eutrophication process. Some types of ~~pre-treatment~~ Green Stormwater Infrastructure or Low Impact Development practices include utilizing vegetative swales for conveyance instead of curb and gutter, perimeter swales or berms around the lake, oil and grease skimmers on inlet structures, retention storage in swales with raised inlets, or shallow landscaped retention areas (when soils and water table conditions will allow for adequate percolation).

~~For systems in which pre-treatment is utilized to meet the additional design criteria requirements for systems with a direct discharge to an OFW, pre-treatment practices must meet the appropriate design and performance criteria for that BMP. Acceptable types of pre-treatment include the following:~~

~~(a) Retention systems which meet the design and performance criteria in **section 5 of this Volume**;~~

~~(b) Underdrain systems which meet the design and performance criteria in **section 6 of this Volume**; or~~

~~(c) Swales systems which meet the design and performance criteria in **section 9 of this Volume**.~~

~~Alternative pre-treatment methods will be evaluated on a case-by-case basis by the Agency. Applicants or system designers are encouraged to meet with Agency staff in a pre-application conference if alternative methods are proposed.~~

~~8~~7.11 Pond Side Slopes

The pond must be designed so that the pond side slope measured between the control elevation and two feet below the control elevation is no steeper than 4H:1V (horizontal:vertical). Because the pond sediments are an important component in the wet detention treatment processes, this criterion will ensure sufficient pond bottom/side slope area for the appropriate processes to occur. Littoral zone areas must be 6H:1V or flatter as described in ~~**section**~~ **Section 8.6 of this Volume**.

~~8.12 Direct Discharges to Outstanding Florida Waters~~

~~Wet detention systems which have a direct discharge to an OFWs, must provide either:~~

~~(a) An additional fifty percent of both the required treatment and permanent pool volumes; or~~

~~(b) Pre-treatment of the stormwater prior to entering the wet detention pond. The level of pre-treatment must be at least that required for retention, underdrain, or swale systems (see **section 8.10 of this Volume**).~~

~~9~~8.0 Design Criteria for Swale Systems

When a stormwater management system relies in part on a swale to meet the conditions for issuance of Rule 62-330.301, F.A.C., and of this Volume, the following design criteria for swale systems apply.

~~9~~8.1 Description

Swales are a man-made or natural system shaped or graded to required dimensions and designed for the conveyance and rapid infiltration of stormwater runoff. Swales are designed to infiltrate a defined quantity of runoff through the permeable soils of the swale floor and side slopes into the shallow ground water aquifer (**Figure 9.1-1**). Suitable vegetation is established to promote infiltration and stabilize the side slopes. Soil permeability and water table conditions must be such that the swale can percolate the desired runoff volume from the 3-year, 1-hour storm event. The swale holds water only during and immediately after a storm event, thus the system is normally "dry." Unlike retention basins, swales are "open" conveyance systems. This means there are no physical barriers such as berms or check-dams to impound the runoff in the swale prior to discharge to the receiving water.

Swales provide excellent removal of stormwater pollutants. Substantial amounts of suspended solids, oxygen demanding materials, heavy metals, bacteria, some varieties of pesticides and nutrients such as phosphorus are removed as runoff percolates through the vegetation and soil profile.

Besides pollution control, swale systems can be utilized to promote the recharge of groundwater to prevent saltwater intrusion in coastal areas, and to maintain ground water levels in aquifer recharge areas. Swales can be incorporated into the design of a stormwater management system to help meet the runoff volume criteria for projects requiring permits under Chapter 62-330, F.A.C., which discharge to land-locked lakes (see ~~**section**~~ **Section 3.3(b) of this Volume)**.

Swales can also be utilized as part of a treatment train to provide ~~pre~~-treatment of runoff prior to its release to another treatment BMP such as wet detention (see ~~**section**~~ **Section ~~8~~7.10 of this Volume**), ~~or wetlands stormwater management systems (see **section 10.3 of this Volume**).~~ Incorporating swales as part of a treatment train ~~Pre-treatment~~ reduces the pollutant loading to the downstream treatment system, increases the pollutant efficiency of the overall stormwater management system, and reduces maintenance. In the case of wet detention systems, ~~pre-treatment~~ swales may be used to meet the performance standards set forth in Section 8.3 of Volume I~~. additional treatment criteria for discharges to sensitive receiving waters (OFWs).~~ For developments where the appearance of the downstream system (i.e., wet detention lake) is important, ~~pre-treatment~~ swales can reduce the probability of algal blooms occurring and slows the eutrophication process.

The design and performance criteria specific to swale systems are described below.

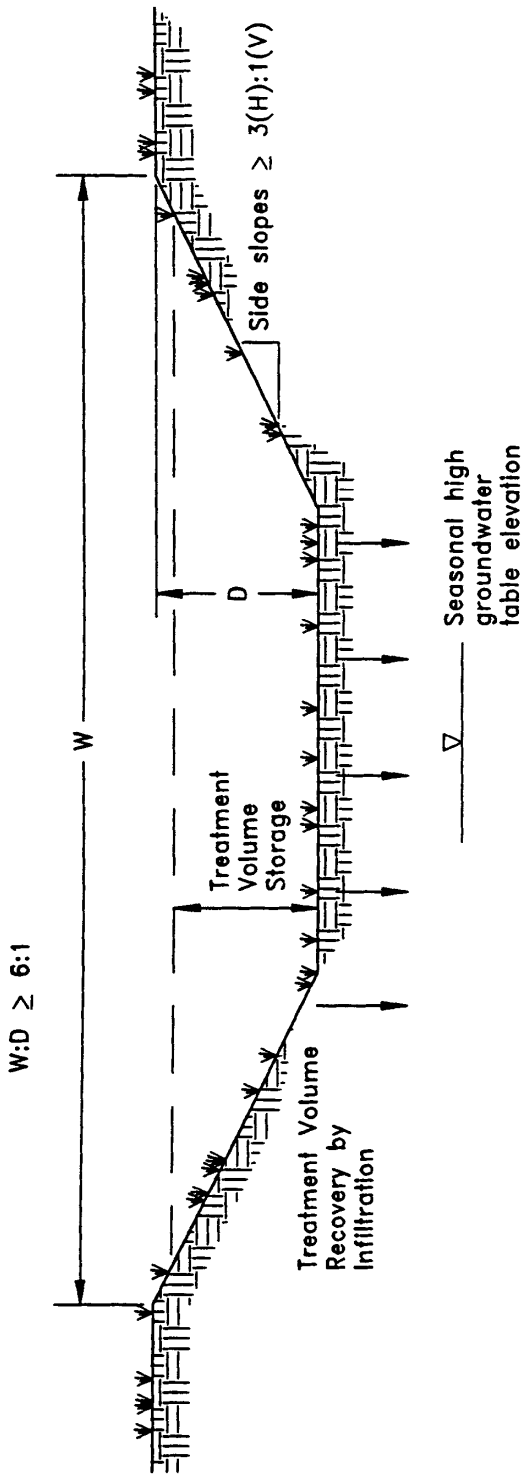


Figure ~~9~~8.1-1 Cross-section of typical swale system (N.T.S.)

~~9~~8.2 Treatment Volume

The Required Treatment Volume necessary to achieve the treatment efficiency shall be routed to the swale and percolated into the ground. The required nutrient load reduction for the swale and, if necessary, associated BMPs in the BMP treatment train will be determined by the applicable performance standard as set forth in Section 8.3. of Volume I and methodology described in Section 9 of Volume I. Treatment volume shall be determined by the treatment efficiency.

~~The runoff from the site shall be routed to the swale system for conveyance and percolation into the ground. For systems which discharge to Class III receiving water bodies, the swales should be designed to percolate 80% of the runoff from the 3-year, 1-hour design storm during the storm event as influenced by the time of concentration, assuming average antecedent conditions. The remaining 20% of the runoff from the 3-year, 1-hour storm event can be discharged offsite by the swale system.~~

~~Swale systems which directly discharge to OFWs, shall be designed to percolate all of the runoff from the 3-year, 1-hour storm.~~

~~9~~8.3 Soils Requirements

Swale systems must be constructed on Hydrologic Soils Group (HSG) A or B soils and swale system design shall consider antecedent moisture conditions.

Antecedent moisture condition (AMC) refers to the amount of moisture and storage in the soil profile prior to a storm event. Antecedent soil moisture is an indicator of wetness and availability of soil to infiltrate water. The AMC can vary from dry to saturated depending on the amount of rainfall received prior to a given point in time. Therefore, "average AMC" means the soil is neither dry nor saturated, but at an average moisture condition at the beginning of a storm event when calculating recovery time for swale systems.

The antecedent condition has a significant effect on runoff rate, runoff volume, infiltration rate, and infiltration volume. The infiltration volume is also known as the upper soil zone storage. Both the infiltration rate and upper soil zone storage are used to calculate the recovery time of retention systems and should be estimated using any generally accepted and well documented method with appropriate parameters to reflect drainage practices, seasonal high water table elevation, consideration of ground water mounding, the AMC, and any underlying soil characteristics which would limit or prevent percolation of storm water into the soil column.

~~9~~8.4 Dimensional Requirements

Swales must have a top width to depth ratio of the cross-section equal to or greater than 6:1 or side slopes equal to 3:1 (horizontal to vertical) or flatter.

~~9~~8.5 Construction and Stabilization

Construction of swale systems must be in conformance with procedures that avoid degradation of swale infiltration capacity due to compaction and construction sedimentation. Construction of swale systems must conform to the construction practices in ~~section~~ **Section 5.5 of this Volume**.

Swales shall be stabilized with vegetative cover suitable for soil stabilization, stormwater treatment, and nutrient uptake. Also, the swale shall be designed to take into account the soil erodibility, soil

percolation, slope, slope length, and drainage area so as to prevent erosion and reduce pollutant concentrations.

~~10~~9.0 Design Criteria for Wetlands Stormwater Management Systems

~~10~~9.1 Description

Wetlands are an essential part of nature's stormwater management system. Important wetland functions include the conveyance and storage of stormwater. These function to dampen flooding impacts; reduce flood flows and velocity of stormwater which in turn reduces erosion, increases sedimentation, and helps the assimilation of pollutants typically carried in stormwater. Accordingly, there is interest in the incorporation of natural wetlands into stormwater management systems, especially wetlands which have been previously drained. This concept provides an opportunity to use wetlands to help meet the requirements of this subsection. In addition, by using wetlands for stormwater management, drained wetlands can be revitalized and landowners and developers have greater incentive to preserve or restore wetlands.

For wetlands stormwater management systems the Agency must ensure that a proposed wetlands stormwater management system is compatible with the existing ecological characteristics of the wetlands proposed to be utilized for stormwater treatment. The Agency must also ensure that water quality standards will not be violated by discharges from wetlands stormwater management system. To achieve these goals, specific performance criteria are set forth herein and are described below for systems which incorporate wetlands for stormwater treatment.

~~10~~9.2 Types of Wetlands that may be Utilized for Stormwater Treatment

The only wetlands which may be considered for use to provide stormwater treatment are those which:

(a) Are isolated and wholly-owned by one individual; or

(b) Are connected to other waters solely by artificial watercourses.

~~10~~9.3 Treatment Volume

The Required Treatment Volume necessary to achieve the treatment efficiency shall be routed to the wetland and percolated into the ground. The required nutrient load reduction for the wetland and, if necessary, associated BMPs in the BMP treatment train will be determined by the applicable performance standard as set forth in Section 8.3. of Volume I and methodology described in Section 9 of Volume I. Treatment volume shall be determined by the treatment efficiency.

~~For systems discharging to Class III waters, the design treatment volume is one inch of runoff from the contributing area. Those systems which directly discharge to OFWs shall provide an additional fifty percent of the treatment volume.~~

~~If the wetland alone cannot provide the treatment volume, then other best management practices must be incorporated upstream and outside of the wetland to store the proper level of runoff. Utilization of other BMPs must not adversely affect the ability of the wetlands stormwater management system from meeting the requirements of this section.~~

~~10~~9.4 Recovery Time

The system shall be designed to bleed down one-half the treatment volume specified above between 60 and 72 hours following a storm event, with the remainder bled down within 120 hours.

~~10~~9.5 Inlet Structures

Inlet structures shall be designed to dissipate the energy of runoff entering the wetland and minimize the channelized flow of stormwater. Methods include design features such as sprinklers, pipe energy dissipators, overland flow, or spreader swales. Alternative designs may be proposed if they provide comparable reasonable assurance.

~~10~~9.6 Wetland Function

Provisions must be made to remove sediment, oils and greases from runoff entering the wetland. This can be accomplished through incorporation of adjacent sediment sumps, forebays, baffles and dry vegetated swales or a combination thereof. Normally, a dry vegetated swale system designed for detention of the first one-fourth inch of runoff with an overall depth of no more than 4 inches will satisfy the requirement for removal of sediment, oils and greases~~. In addition, pre-treatment~~ Additional BMP's can be utilized as part of a treatment train to attenuate stormwater volumes and peak discharge rates so that the wetland's hydroperiod is not adversely altered.

~~10~~9.7 Residence Time

The design features of the system shall maximize residence time of the stormwater within the wetland to enhance the opportunity for the stormwater to come into contact with the wetland sediment, vegetation, and micro-organisms. This can be accomplished by several means. The inlets and outlets should be located to maximize the flow path through the wetland. Energy dissipators and spreader swales can promote overland flow and reduce the possibility of channelized flow occurring. In some instances, berms in wetlands can act as baffles to increase the flow path of surface flow through the wetland.

~~11~~10.0 Design Criteria for Vegetated Natural Buffers

~~11~~10.1 Description

Vegetated natural buffers (VNB) are defined as naturally vegetated areas that are set aside between developed areas and a receiving water or wetland for stormwater treatment purposes. Under certain conditions, VNBs are an effective best management practice for the control of nonpoint source pollutants in overland flow by providing opportunities for filtration, deposition, infiltration, absorption, adsorption, decomposition, and volatilization.

VNBs are most commonly used as an alternative to swales or berms installed between back-lots and the receiving water. Buffers are intended for use to avoid the difficulties associated with the construction and maintenance of backyard swales controlled by individual homeowners. Potential impacts to adjacent wetlands and upland natural areas are reduced because fill is not required to establish grades that direct stormwater flow from the back of the lot towards the front for collection in the primary stormwater management system. In addition, impacts are potentially reduced since buffer strips can serve as wildlife corridors, reduce noise, and reduce the potential for siltation into receiving waters.

Vegetative natural buffers are not ~~intended~~ to be the primary stormwater management system for residential developments. They are most commonly used only to treat those rear-lot portions of the development that cannot be feasibly routed to the system serving the roads and fronts of lots. A schematic of a typical VNB and its contributing area is presented in **Figure ~~11~~10-1**.

The design and maintenance criteria for VNBs and their contributing areas are described in **~~sections~~ Sections ~~11~~10.2 through ~~11~~10.9 of this Volume**.

~~11~~10.2 Contributing Area

The contributing area is defined as the area that drains to the VNB.

Rear-lots of residential areas are allowed to contribute runoff to a VNB only if routing the runoff from such areas to the primary stormwater management system serving the development is not practical. The use of a VNB for other types of development shall only be allowed if the applicant demonstrates that there are no practical alternatives for those portions of the project, and only if the VNB and contributing areas meet all of the criteria of **~~sections~~ Sections ~~11~~10.2 through ~~11~~10.9 of this Volume**.

To promote overland flow, the maximum width (dimension parallel to the flow direction) of the contributing area is 300 feet. The contributing area must be stabilized with permanent vegetative cover that is consistent with the Florida Yards and Neighborhood program. No fertilizer shall be applied to the contributing area.

Erosion control measures such as those described in **Part IV of Applicant's Handbook Volume I** must be utilized during development of the contributing area so as to prevent siltation of the buffer area.

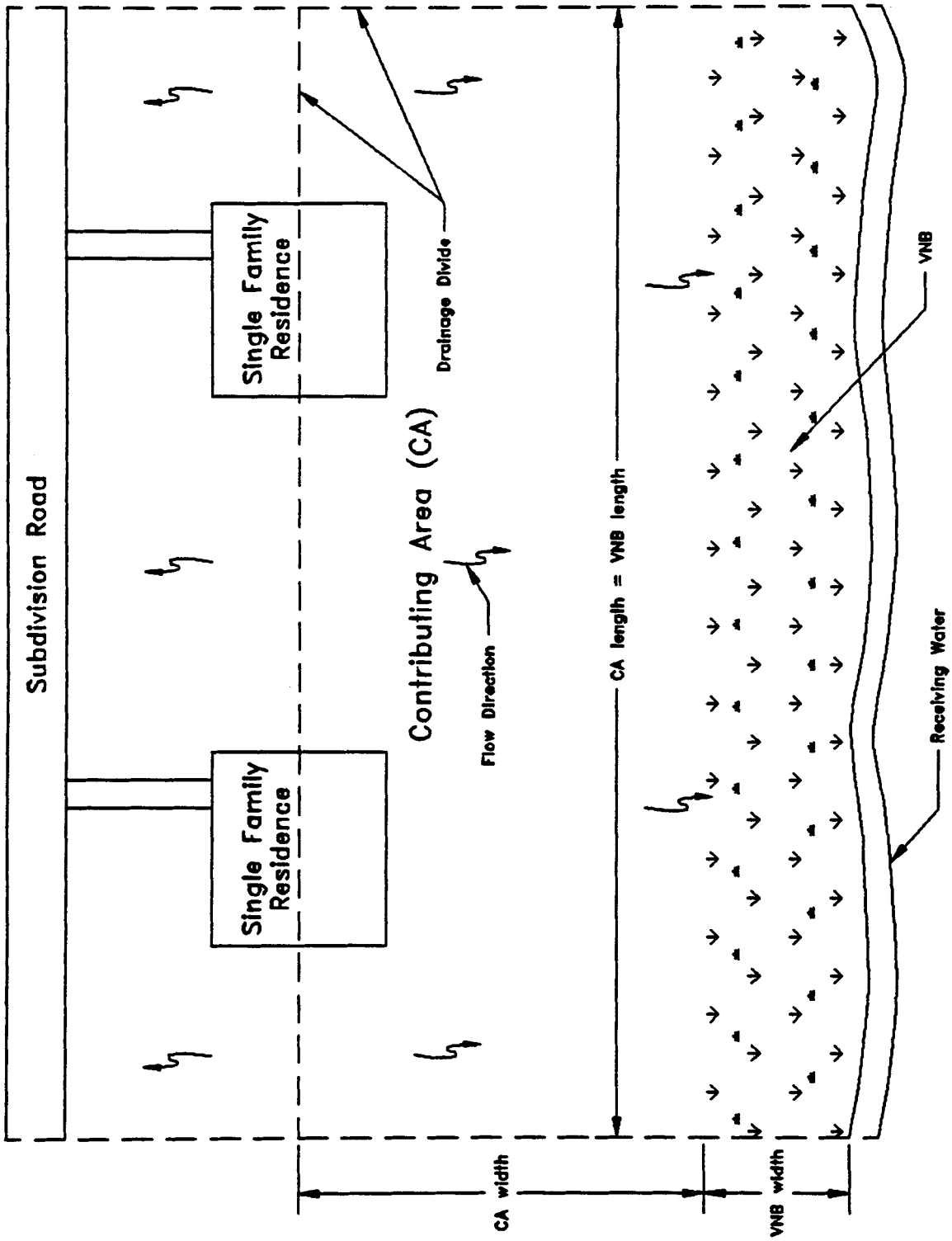


Figure ~~11~~10-1 Plan View Schematic of Typical Vegetative Natural Buffer

~~11~~10.3 Buffer Area Vegetation

The VNB area is an existing undeveloped area which contains naturally occurring native vegetation. The existing vegetation must not be disturbed during the development of the project.

~~11~~10.4 Buffer Width

In all cases, a minimum buffer width of 25 feet is required to ensure the integrity of the treatment system. Factors affecting the minimum width (measured parallel to the direction of runoff flow) of VNBs include ground slope, rainfall, cover and soil characteristics, depth to water table and overland flow length. Infiltration is the primary means of treatment when soil characteristics and depth of ground water table promote infiltration. For sites with poor infiltration potential (i.e. hydrologic soil group C or D soils), pollutant removal occurs due to travel time across the buffer and is primarily a result of filtration and assimilation rather than infiltration. For design purposes, buffer widths shall be based upon the more conservative approach that utilizes a minimum travel time for overland flow.

Vegetated Natural Buffers must be designed to provide a specified travel time through the buffer as described herein. For systems that discharge to receiving water bodies other than OFWs, the VNB must be designed to provide at least 200 seconds of travel time by overland flow through the buffer for the 2-year, 24-hour storm event. Systems which directly discharge to OFWs must be designed to provide at least 300 seconds of travel time by overland flow through the buffer for the 2-year, 24-hour storm event.

A sample calculation for designing a buffer to meet the above requirements is provided in **Section 4~~-~~5 of the Volume II Design Aids**.

~~11~~10.5 Maximum Buffer Slope

The maximum slope of VNB must not be greater than 15%.

~~11~~10.6 Minimum Buffer Length

The length of the buffer (measured perpendicular to the runoff flow direction) must be at least as long as the length of the contributing runoff area (see **Figure ~~11~~10-1**).

~~11~~10.7 Runoff Flow Characteristics

Runoff from the adjacent contributing area must be evenly distributed across the buffer strip to promote overland flow. If channeling of the flow occurs, the buffer is effectively "short-circuited" and will not perform as designed.

~~11~~10.8 Preservation and Maintenance Access

A legal reservation, in the form of an easement or other limitation of use, must be recorded which provides preservation of the existing undeveloped area in its natural state. The reservation must also include access for maintenance of the VNB unless the operation and maintenance entity wholly owns or retains ownership of the property. The legal reservation must include at least the entire area of the VNB. See ~~section~~ **Section 2.4 of this Volume** for additional maintenance access requirements.

~~11~~10.9 Maintenance and Inspections

VNBs must be inspected annually by the operation and maintenance entity to determine if there has been any encroachment or violation of the terms and condition of the VNB as described below.

Buffers must be examined for damage by foot or vehicular traffic, encroachment, gully erosion, density of vegetation, and evidence of concentrated flow through or around the buffer. Repairs to the buffer must be made as soon as practical in order to prevent additional damage to the buffer. Repaired areas must be re-established with native vegetation. Invasive plant species such as cattail and primrose willow must be prevented from becoming the dominant species.

~~12~~11.0 Design Criteria for Stormwater Harvesting

~~12~~11.1 Description

On the average, and in most of the State of Florida, approximately 50% of the potable water delivered to residential units is used for irrigating lawns. The potable water used for irrigation may be supplemented with non-potable water from stormwater detention facilities. The use of detention stormwater in new developments is very probable, because the cost of irrigating the detained stormwater is significantly less than the cost of potable water and in most cases about 5-25% the cost of potable water. In specific new development locations in the State of Florida, the cost of irrigation water from detention ponds is certainly competitive.

Stormwater reuse systems are designed to prevent the discharge of a given volume of stormwater into surface waters of the state by deliberate application of stormwater runoff for irrigation or other acceptable supplemental water uses. For the purposes of this Volume, the terms stormwater harvesting and stormwater reuse are interchangeable. Examples of areas that can be irrigated include golf courses, cemeteries, highway medians, parks, retail nurseries, agricultural lands, and residential and commercial properties. Supplemental uses include hydration of wetlands, low flow augmentation, cooling water, process water, and wash water.

A stormwater reuse pond is similar to a wet detention system described in **~~section~~ Section ~~8~~7 of this Volume** except for the drawdown of the treatment volume storage. For typical wet detention ponds, the treatment volume is released at a controlled rate by a drawdown orifice or weir. However, in a stormwater reuse system the drawdown structure is replaced by a mechanical reuse system which recovers the treatment volume storage by withdrawing water from the pond. In a reuse pond the treatment volume is termed "reuse volume" and the "control elevation" is the lowest elevation at which water can be withdrawn from the pond by the reuse system. Like wet detention, stormwater reuse systems are a recommended BMP for sites with moderate to high ground water table conditions. A schematic a typical reuse pond is shown in **Figure ~~12~~11-1**.

The Agency encourages the use of stormwater reuse systems because of the following benefits they provide:

(a) Reduction of runoff volume discharged to the receiving waters;

(b) Reduction of pollutants discharged to the receiving waters;

(c) Substitution of stormwater use instead of potable ground water withdrawals; and

(d) Potential economic savings from not having to pay user fees for potable water.

Stormwater reuse systems provide significant removal of both dissolved and suspended pollutants by taking advantage of physical, chemical, and biological processes associated with wet detention systems and the harvesting and recycling of constituents back to the landscape by irrigation with stormwater. Reuse systems can be utilized to help meet the runoff volume criteria for stormwater management systems and management and storage of surface water (MSSW) projects which discharge to land-locked lakes.

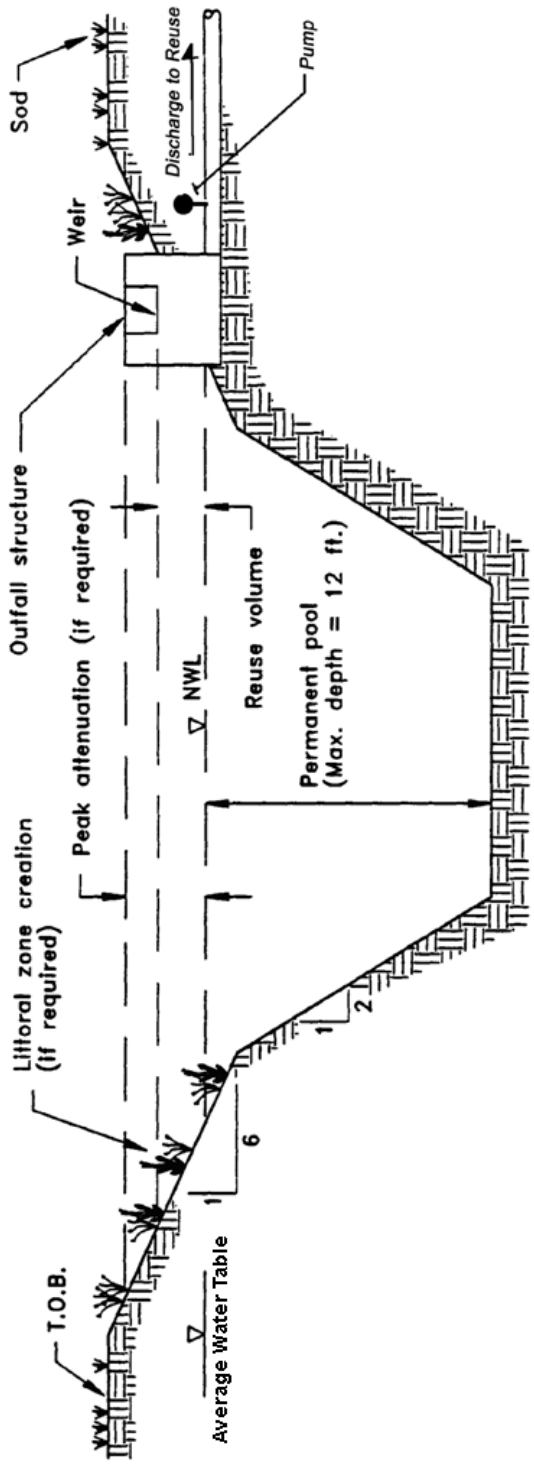


Figure ~~12~~11-1 Typical stormwater reuse system (N.T.S.).

In addition, stormwater reuse ponds also provide other benefits such as flood detention, recreation activities adjacent to ponds, and pleasing aesthetics. As stormwater treatment systems, these ponds must not be designed to promote in-water recreation (i.e., swimming, fishing, and boating).

There are several components in a stormwater reuse system which must be properly designed to achieve the level of stormwater treatment required by Chapter 62-330, F.A.C. A description of each design feature and its importance to the treatment process is presented below. These criteria are not intended to preclude the reuse of stormwater from other types of stormwater management systems such as wet detention. Several of these criteria are the same as those for wet detention systems as described in ~~**section**~~ **Section** ~~**8**~~ **7 of this Volume**.

~~12~~11.2 ~~Reuse~~ Harvesting Volume

The Required Treatment Volume necessary to achieve the treatment efficiency shall be percolated into the ground, typically through irrigation. The required nutrient load reduction from the stormwater harvesting and associated BMPs in the BMP treatment train will be determined by the applicable performance standard as set forth in Section 8.3. of Volume I and methodology described in Section 9 of Volume I. Volume of water used for Stormwater Harvesting shall be determined by water use volume and rate.

~~A portion of the runoff from the site must be stored in the pond and subsequently withdrawn through the reuse system. For systems which discharge to Class III receiving water bodies, the system must reuse at least 50 percent of the average annual runoff discharging to the reuse pond.~~

~~Stormwater reuse systems which directly discharge to OFWs, must reuse at least 90 percent of the average annual runoff discharging to the pond. A methodology for designing reuse systems to meet the above criteria is presented in **section 3 of the Volume II Design Aids**.~~

~~12~~11.3 Permanent Pool

The permanent pool is that portion of a pond which is designed to hold water at all times (i.e., below the control elevation). The permanent pool shall be sized to provide at least a ~~14~~21-day residence time during the wet season (June through September). A description of the pollutant removal processes which occur in the permanent pool is given in ~~**section**~~ **Section** ~~**8**~~ **7 of this Volume** and a methodology for calculating the residence time is given in ~~**section**~~ **Section** ~~**2**~~ **3 of the Volume II Design Aids**.

~~12~~11.4 Littoral Zone

The littoral zone is that portion of a stormwater reuse pond which is designed to contain rooted aquatic plants. The littoral area is usually provided by extending and gently sloping the sides of the pond down to a depth of 2 to 3 feet below the normal water level or control elevation. Also, the littoral zone can be provided in other areas of the pond that have suitable depths (i.e., a shallow shelf in the middle of the lake).

The littoral zone is established with native aquatic plants by planting and/or the placement of wetland soils containing seeds of native aquatic plants. A specific vegetation establishment plan must be prepared for the littoral zone. The plan must consider the hydroperiod of the pond and the type of plants to be established. ~~The *Florida Development Manual* provides a list of recommended native plant species suitable for littoral zone planting.~~ Additional information for a list of recommended native plant species is included in the **References and Design Aids for Volume II for wet detention**. In addition, a layer of muck can be incorporated into the littoral area to promote the establishment of the

wetland vegetation. When placing muck, precautions must be taken to prevent erosion and turbidity problems in the pond and at its discharge point while vegetation is becoming established in the littoral zone.

The following is a list of the design criteria for stormwater reuse littoral zones:

(a) The littoral zone shall be gently sloped (6H:1V or flatter). Thirty to forty percent of the stormwater reuse pond surface area shall consist of a littoral zone. The percentage of littoral zone is based on the ratio of vegetated littoral zone to surface area of the pond at the control elevation.

(b) The treatment volume shall not cause the pond level to rise more than 18 inches above the control elevation unless the applicant provides reasonable assurance that the littoral zone vegetation can survive at greater depths.

(c) Within 24 months of completion of the system, 80 percent coverage of the littoral zone by suitable aquatic plants is required.

(d) Planting of the littoral zone is recommended to meet the 80% coverage requirement. As an alternative to planting, portions of the littoral zone may be established by placement of wetland top soils (at least a four inch depth) containing a seed source of desirable native plants. When utilizing this alternative, the littoral zone must be stabilized by mulching or other means and at least the portion of the littoral zone within 25 feet of the inlet and outlet structures must be planted.

~~12~~11.5 Pond Depth

A maximum pond depth of 12 feet and a mean depth (pond volume divided by the pond area at the control elevation) between 2 and 8 feet is required. This criterion is needed because many of the nutrients and metals removed from the water column accumulate in the top few inches of the pond bottom sediments. If a pond is deep enough, it will have a tendency to stratify, creating the potential for anoxic conditions developing at the bottom of the pond. An aerobic environment should be maintained throughout the water column in wet ponds in order to minimize the release of nutrients and metals from the bottom sediments. The maximum depth criteria minimize the potential for significant thermal stratification which will help maintain aerobic conditions in the water column that should maximize sediment uptake and minimize sediment release of pollutants. On the other hand, the minimum mean depth criteria are required because aquatic plant growth may become excessive if the pond is too shallow.

~~12~~11.6 Pond Configuration

The average length to width ratio of the pond should be at least 2:1. 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.

~~12~~11.7 Ground Water Table

To minimize ground water contributions which may lower treatment efficiencies, the control elevation should be set at or above the normal on-site ground water table elevation. This elevation may be determined by calculating the average of the seasonal high and seasonal low ground water table

elevations. In areas where the seasonal low water table is not determinable, the applicant may propose using the seasonal high water table elevation minus one foot. The decision to use this alternative should be made by a professional with significant history and knowledge of the local areas historic weather patterns and groundwater conditions. Regardless of which method is used, the system cannot cause adverse secondary impacts to adjacent wetlands or other surface waters such as dewatering.

~~13~~12.0 Special Basin Criteria: Sensitive Karst Areas

Subparagraph 62-330.301(1)(k)1., F.A.C., provides that a condition for issuance of a permit includes compliance with any applicable special basin or geographic area criteria rules. The only area within the geographical extent of the Northwest Florida Water Management District (NWFWMD) for which additional geographic criteria have been developed are two Sensitive Karst Areas (SKAs). These areas cover portions of the central and eastern regions of the geographical extent of the NWFWMD **(**see **Figure ~~13~~12.0-1).** A location description of these areas is contained in **Appendix A of this Volume.** In addition to the design criteria for projects outside of the SKAs, projects located within the SKAs also must meet the additional design criteria of **Sections ~~13~~12.3 through ~~13~~12.3.2 of this Volume**.

~~13~~12.1 Background of the Sensitive Karst Area Design Criteria

The Floridan Aquifer System is the drinking water source for most of the population in the geographical extent of the NWFWMD. In parts of the NWFWMD, limestone (or dolostone) that makes up or comprise this aquifer system occurs at or near the land surface. Sediments overlying the limestone can be highly permeable. The limestone, due to its chemical composition, is susceptible to dissolution when it interacts with slightly acidic water. "Karst" is a geologic term used to describe areas where landscapes have been affected by the dissolution of limestone or dolostone, including areas where the formation of sinkholes is relatively common. Sensitive Karst Areas reflect areas with hydrogeologic and geologic characteristics relatively more conducive to potential contamination of the Floridan Aquifer System from surface pollutant sources. The formation of karst-related features, such as sinkholes is also more likely to occur in SKAs.

~~13~~12.2 Hydrogeology of the Sensitive Karst Areas

Throughout the majority of the geographical extent of the NWFWMD the highly porous limestone that comprises the Floridan Aquifer System is generally overlain by tens to hundreds of feet of sands, clays, and other material. Where present, this material may act to protect, to varying degrees, the Floridan Aquifer System from surface pollutants. Surface water seeps through this material slowly, which allows for some degree of filtration, adsorption, and biological transformation or degradation of contaminants.

In SKAs, however, the limestone that comprises the Floridan Aquifer System may occur at or near the land surface (**Figure ~~13~~12.2-1**), and sand overburden, confining clays, or other confining cover material is absent or discontinuous. As a result, there can be rapid movement of surface water and possibly entrained contaminants into the aquifer. The SKAs are areas of relatively high recharge to the Floridan Aquifer System. Floridan Aquifer System ground water levels vary from land surface to approximately 290 feet below land surface in the SKAs.

One factor that makes the SKAs particularly prone to stormwater contamination is the formation of solution pipe sinkholes within retention basins. Solution pipe sinkholes are common in these areas and form due to the collapse of surficial material into vertical cavities that have been dissolved in the upper part of the limestone (**Figure ~~13~~12.2-2**). They are also formed by the movement of surface material into the underlying porous limestone. In most cases, the solution pipes are capped by a natural plug of sands and clays (**Figures ~~13~~12.2-1 and ~~13~~12.2-2**). If the cap is washed out (as may happen if a large volume of water is stored over the solution pipes), the resulting solution pipe

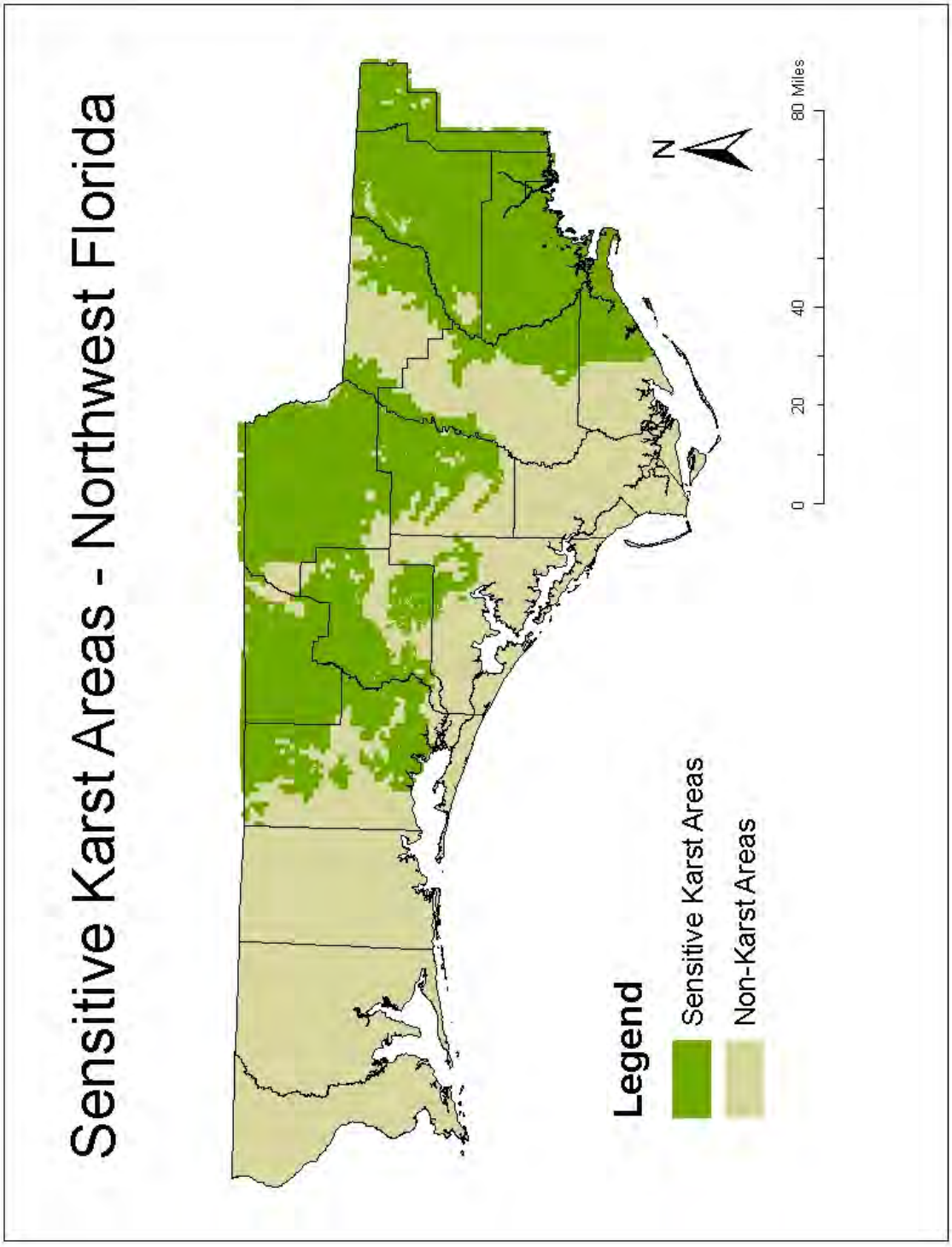


Figure ~~13~~12.0-1 Sensitive Karst Areas within the NWFWMD

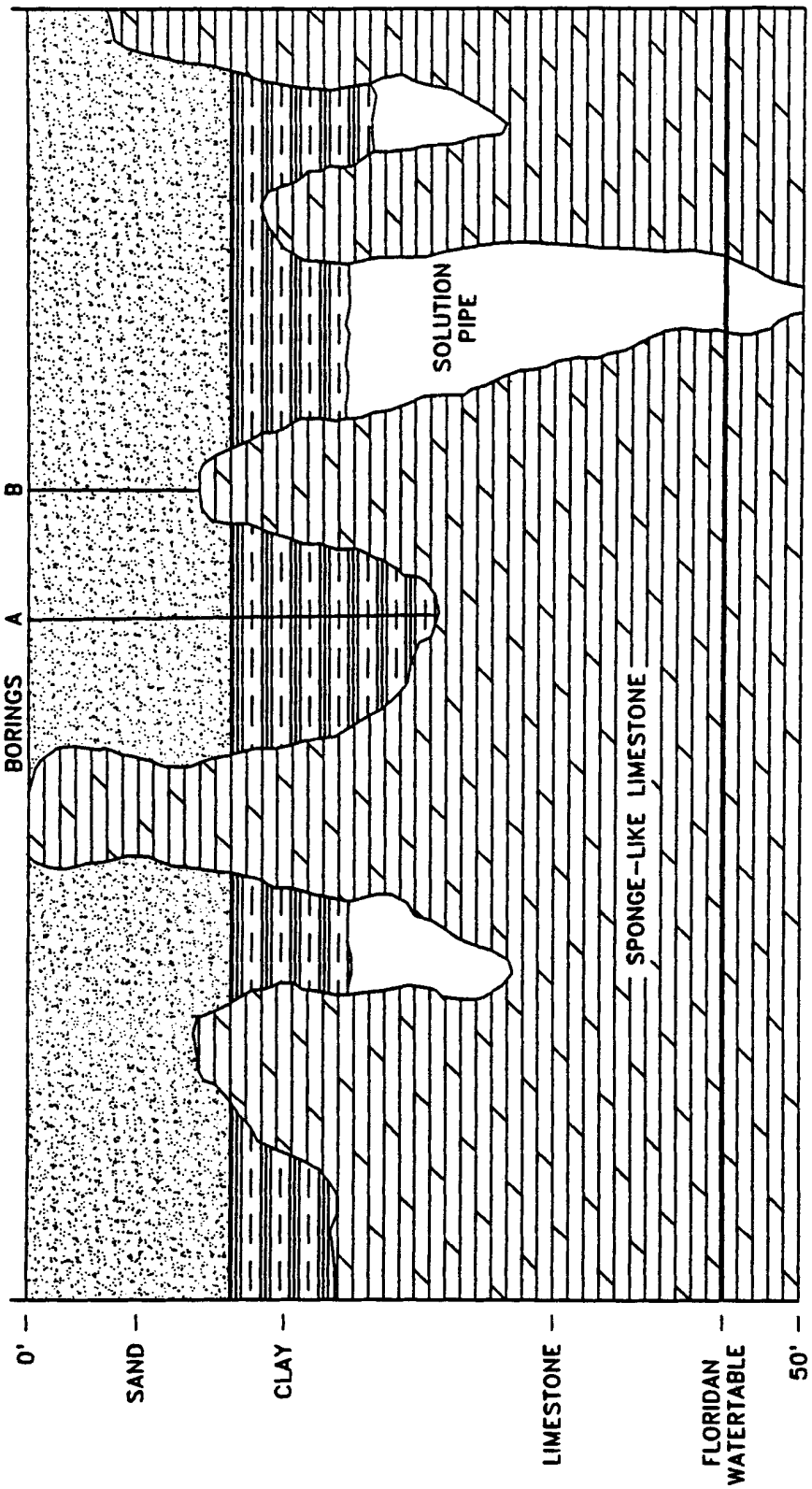


Figure ~~13~~12.2-1 Generalized geologic section in Sensitive Karst Area with limestone at and near land surface.

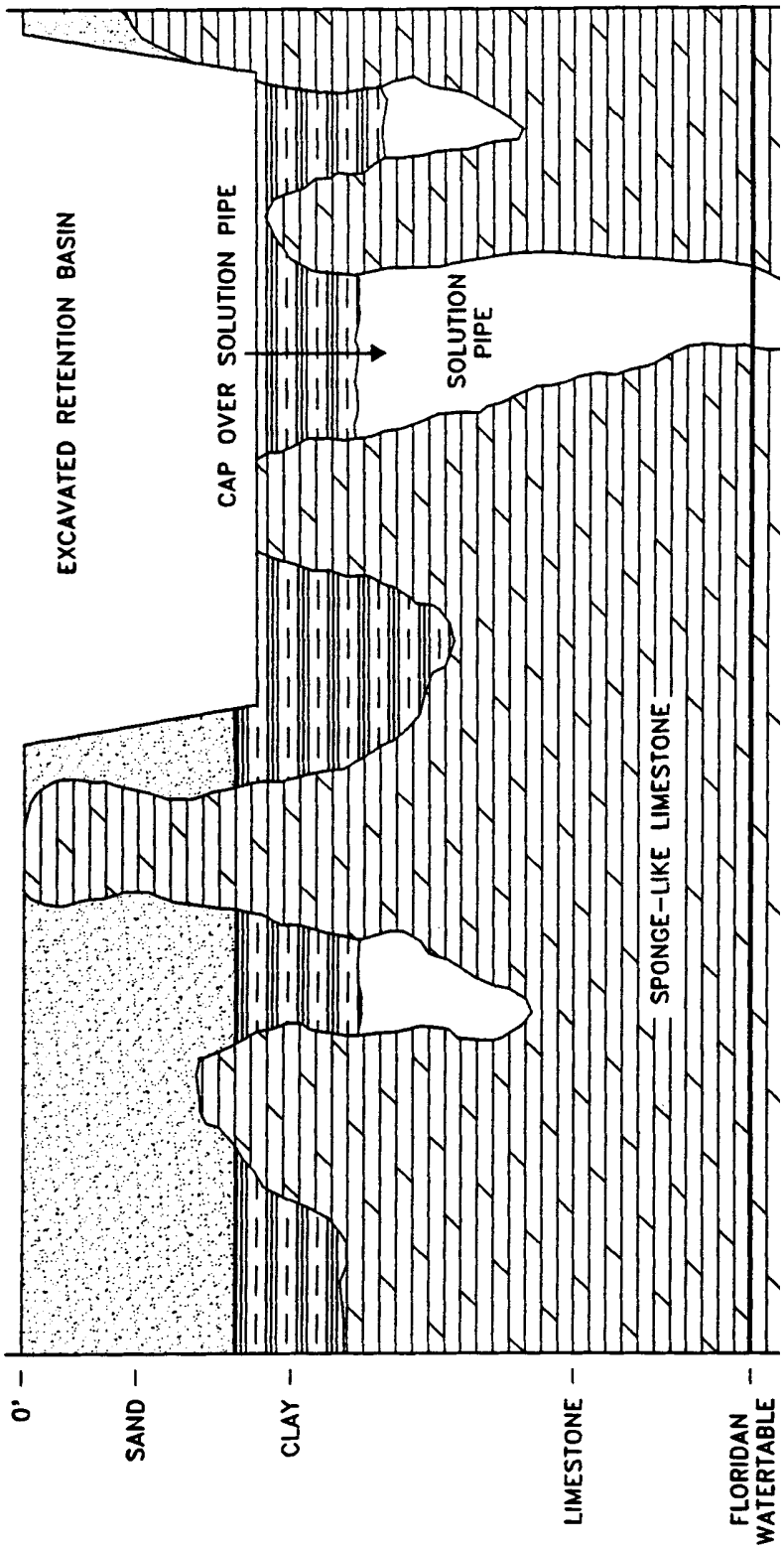


Figure ~~13~~12.2-2 Retention basin added to Figure 13.2-1.

sinkhole (**Figure ~~13~~12.2-3**) can act as a direct pathway for the movement of surface water into the Floridan Aquifer System.

Solution pipe sinkholes and other types of sinkholes may open in the bottom of stormwater retention basins. The capping plug or sediment fill may be reduced by excavation of the basin. Stormwater in the basin may increase the hydraulic head on the remaining material in the pipe throat. Both of these factors can wash material down the solution pipe. Solution pipes act as natural drainage wells and can drain stormwater basins.

The irregular weathering of the limestone surface in the SKAs contributes to uncertainty and errors in predicting the depth from land surface to limestone. For example, in **Figure ~~13~~12.2-1**, boring A would show limestone much deeper than it would actually be encountered during excavation, shown at boring B. This potential for error must be considered for site investigations when evaluating site borings, and load-specific geological analyses must be included to base site designs.

~~13~~12.3 Additional Design Criteria for Sensitive Karst Areas

FSA Comment: Karst additional requirements don't seem very protective of groundwater beyond drinking water requirements. This is an issue in areas where the groundwater is discharged through springs. Nitrogen leaching from urban and other landscapes during infiltration of rainfall is included as a source in springs BMAPs. Leached nitrogen has to pass through the entire soil profile but stormwater only requires three feet of soil to be adequately addressed?

~~13~~12.3.1 Stormwater management systems shall be designed and constructed to prevent direct discharge of untreated stormwater into the Floridan Aquifer System. Such stormwater management systems also shall be designed and constructed in a manner that avoids breaching an aquitard and such that construction excavation will not allow direct mixing of untreated water between surface waters and the Floridan Aquifer System. The system shall also be designed to prevent the formation of solution pipes or other types of karst features in the SKAs. Test borings located within the footprint of a proposed stormwater management pond must be plugged in a manner to prevent mixing of surface and ground waters.

~~13~~12.3.2 Except as provided in **~~section~~ Section ~~13~~12.3.5 of this Volume**, systems that are designed as follows are presumed to comply with **~~section~~ Section ~~13~~12.3.1 of this Volume**:

(a) A minimum of three feet of unconsolidated sediment or soil material between the surface of the limestone bedrock and the complete extent of the bottom and sides of the stormwater basin at final completion of the project. Excavation and backfill of unconsolidated sediment or soil material shall be conducted, if necessary to meet these criteria. As an alternative, an impermeable liner can be used to ensure that stormwater is isolated from communication with groundwater (e.g., for wet detention). This provision is presumed to provide reasonable assurance of adequate treatment of stormwater before it enters the Floridan Aquifer System;

(b) To reduce the potential for solution pipe sinkhole formation caused by newly created additional hydraulic head conditions, stormwater storage areas are limited to a maximum of 10 feet of vertical staging (shallower depths are encouraged), as measured for dry ponds from the bottom of the pond to the design high water level; and for wet ponds 10 feet of vertical staging as measured from the seasonal high ground water table to the design high water level, and shall have a horizontal bottom (no deep spots); and

(c) Basin side slopes and bottom (if not a wet pond) must be fully vegetated or otherwise stabilized.

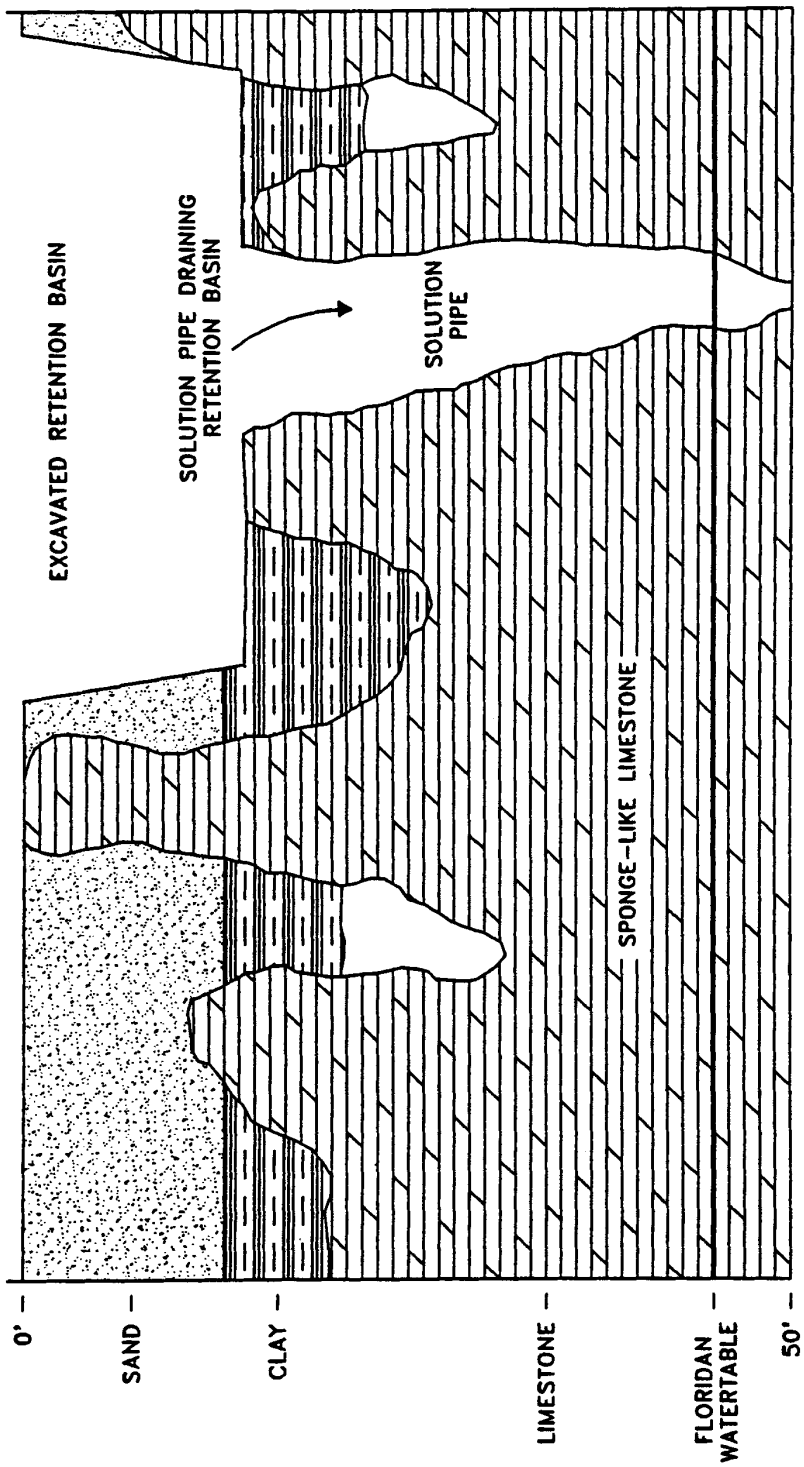


Figure ~~13~~12.2-3. Potential sinkhole resulting from change in physical conditions due to constructed retention basin depicted in Figure ~~13~~12.2-2.

~~13~~12.3.3 Applicants who believe that their proposed system is not within the influence of a karst feature, notwithstanding that it is within the SKAs designated by **Figure ~~13~~12.0-1** and **Appendix A of this Volume**, and therefore wish to design their system other than as provided in **~~section~~ Section ~~13~~12.3.2 of this Volume,** shall furnish the Agency with reasonable assurance that the proposed system complies with **~~section~~ Section ~~13~~12.3.1 of this Volume**. Such reasonable assurance shall consist of:

(a) A geotechnical analysis consisting of existing soil, geologic, and lithologic data of the project area that demonstrates the presence of an aquitard consisting of at least 20 feet of unconsolidated low permeability material [clay (particle size less than 0.002mm, or material passing No. 200 sieve) content >10%] below the pond bottom that will not be breached by the proposed design and construction;

(b) The presence of a minimum of 100 ft. of unconsolidated sediment or soil material from the bottom of the pond and the top of the limestone as demonstrated by core borings within the proposed pond area; or

(c) Other site specific geologic information demonstrating the presence of a confining layer below the pond bottom that provides protection equivalent to that set forth in (a) or (b), above.

A registered professional shall be required to certify that the submitted information, the site characteristics, and the project design provide reasonable assurance of compliance with **~~section~~ Section 13.3.1 of this Volume.**

~~13~~12.3.4 In addition to sites identified on **Figure ~~13~~12.0-1, and Appendix A of this Volume,** the Agency shall require compliance with the criteria in **~~section~~ Section ~~13~~12.3.2 of this Volume** when available data and information indicate that a substantial likelihood exists that a proposed stormwater management system on a site has the potential to be located within the influence of a karst feature based on methodologies generally accepted by registered professionals, and has the potential to adversely affect the Floridan Aquifer System.

~~13~~12.3.5 If during construction or operation of the stormwater management system, a structural failure is observed that has the potential to cause the direct discharge of surface water into the Floridan Aquifer System, corrective actions designed or approved by a registered professional shall be taken as soon as practical to correct the failure. A report prepared by a registered professional must be provided as soon as practical to the Agency for review and approval that provides reasonable assurance that the breach will be permanently corrected.

~~1~~3312.4 Considerations for Mining and Certain Other Excavation Activities

Reasonable assurance must be provided demonstrating that groundwater quality standards will not be violated by excavation activities, including mining, that have the potential to penetrate confining layers or, that by their nature, must be in direct communication with limestone. Applicants for such activities must demonstrate that runoff entering the excavated area is sufficiently treated prior to discharge to any surface or ground waters. For example, site grading or other water management practices must direct runoff from areas that are potential sources of pollutants into stormwater treatment areas that are designed, constructed, operated and maintained in compliance with **Part II, Part IV, and Part V of Volume I as well as Parts IV and V of this Volume** prior to discharge to the excavated area or off-site. Entrance roads, parking areas, vehicle maintenance and wash areas, and storage areas for petroleum and hazardous substances are examples of areas that have the potential for generating and discharging such pollutants and, as such, require such treatment. However, areas associated with material processing, such as washing associated with grading and

sorting of sand or limestone extracted from the site, are not considered potential sources of pollutants, provided that no chemicals, except water conditioners or pH adjusters which, are added to the process water used for transporting, washing, or processing of the sand or limestone.

Applicants are advised that such excavated areas shall not be presumed to be suitable for treating stormwater associated with any future change in land use or development of the site. For example, stormwater from future development may require treatment separate from any impoundment or other surface water created by the excavation. However, such created waters may be suitable for hydrograph attenuation provided that the 10 ft. criteria of ~~**section**~~ **Section** ~~**13**~~**12.3.2(b) above**, is not exceeded.

Impoundments created by mining activities, excluding borrow pits, will not be required to have a horizontal bottom, as provided in **section ~~13~~12.3.2(b), above**.