

## ***Stormwater Management - Envision Alachua Sector Plan***

**Prepared for:** Plum Creek Land Company



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### **INTRODUCTION**

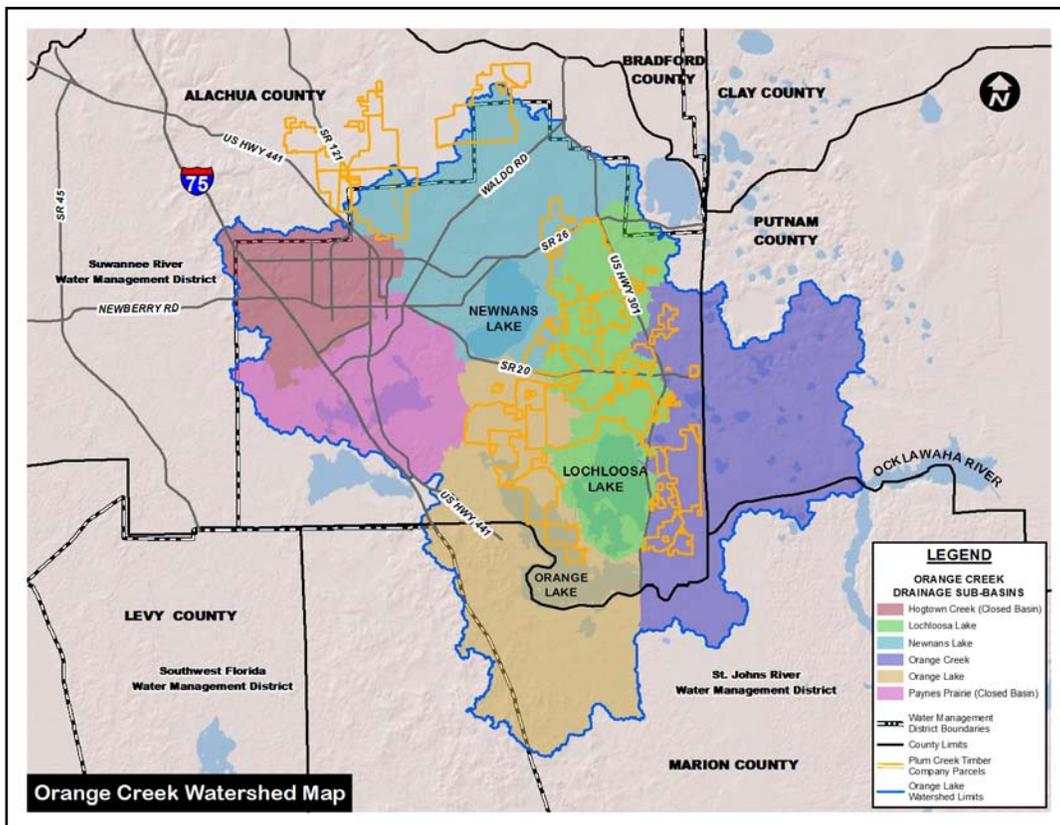
The Envision Alachua Stormwater Management System will consist of a multi-faceted integrated system to address several critical elements within the watershed. These elements include the following, to name a few:

- Provide sufficient volume within the proposed stormwater management ponds in order to properly attenuate the peak discharge rates and prevent downstream flooding.
- Create sufficient compensating storage volume in order to offset any floodplain encroachments and prevent upstream flooding.
- Implement an integrated water resources plan and incorporate low impact development practices in order to reduce the pollutant loads conveyed to the downstream water bodies at or below current levels.

The purpose of this technical memorandum is to outline and describe the conceptual stormwater management system associated with the Envision Alachua Sector Plan (EASP) and to address the comments and concerns brought forth by County staff and the public. Specifically, this memorandum will present important design considerations for stormwater management ponds, compensating storage areas, and effective practices to address pollutant loads and subsurface conditions.

## STORMWATER MANAGEMENT PONDS

The Envision Alachua stormwater management system will be required by applicable regulations to provide sufficient volume within proposed stormwater ponds to offset the effects of future development by applicable regulations. The St. Johns River Water Management District and Alachua County stormwater rules, regulations, and criteria clearly state that stormwater ponds are required to attenuate post-development peak discharge rates to be less than or equal to pre-development peak runoff rates when located within an open basin / positive outfall watershed, such as the case for the Envision Alachua properties (in other words, the stormwater runoff will eventually discharge to the Atlantic Ocean or the Gulf of Mexico). With respect to the watershed that encompasses the Envision Alachua Sector Plan (approximately 34,000 acres which includes the future developable area, as well as the upstream and off-site undeveloped areas), stormwater runoff currently discharges to Newnans Lake, Lochloosa Creek, Lochloosa Lake, and Orange Lake, all of which eventually discharge to the St. Johns River and ultimately the Atlantic Ocean.



The following is a partial listing of the rules, regulations, and stormwater criteria related to the attenuation of discharge rates in an open basin:

- St. Johns River Water Management District  
Environmental Resource Permit Applicant's Handbook - Volume I  
Part II – Criteria for Evaluation  
Section 8.2.2 – All Individual and Conceptual Approval Permits

*Generally, to obtain an individual or conceptual approval permit, an applicant must provide reasonable assurance that the construction, alteration, operation, maintenance, removal, or abandonment of a project will meet the Conditions for Issuance in Rule 62-330.301, F.A.C., the applicable Additional Conditions for Issuance in Rule 62-330.302, F.A.C., and the requirements of this Volume, and the applicable parts of Volume II.*

*Excerpts from Chapter 62-330.301, F.A.C.:*

*(1) To obtain an individual or conceptual approval permit, an applicant must provide reasonable assurance that the construction, alteration, operation, maintenance, removal, or abandonment of the projects regulated under this chapter:*

- (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;*

- St. Johns River Water Management District  
Environmental Resource Permit Applicant's Handbook - Volume II  
Part III - Stormwater Quantity / Flood Control  
Section 3.2.1 - Design Standards for Flood Protection | Water Quantity

*(a) The post-development peak discharge rate must not exceed the pre-development peak rate of discharge for the mean annual 24-hour storm for systems serving both of the following:*

- 1. New Construction area greater than 50% impervious areas (excluding waterbodies).*

2. *Projects for the construction of new developments that exceed the thresholds in paragraphs 62-330.020(2)(b) or (c), F.A.C.*

*(b) The post-development peak rate of discharge must not exceed the pre-development peak rate of discharge for the 25-year frequency, 24-hour duration storm for all areas of the District.*

- Alachua County Unified Land Development Code  
Chapter 407 - General Development Standards  
Article IX - Stormwater Management  
Section 407.91(c)(1) - Standards

*For projects that discharge to a stream or open lake basin, the stormwater management system must be designed such that the post-development peak rate of discharge does not exceed the pre-development peak rate of discharge for storm events up to and including the 100-year storm. For detention storage it shall be sufficient to control the 25-year critical duration storm event.*

- Alachua County Comprehensive Plan 2011 - 2030  
Stormwater Management Element  
Objective 5 | Policy 5.1

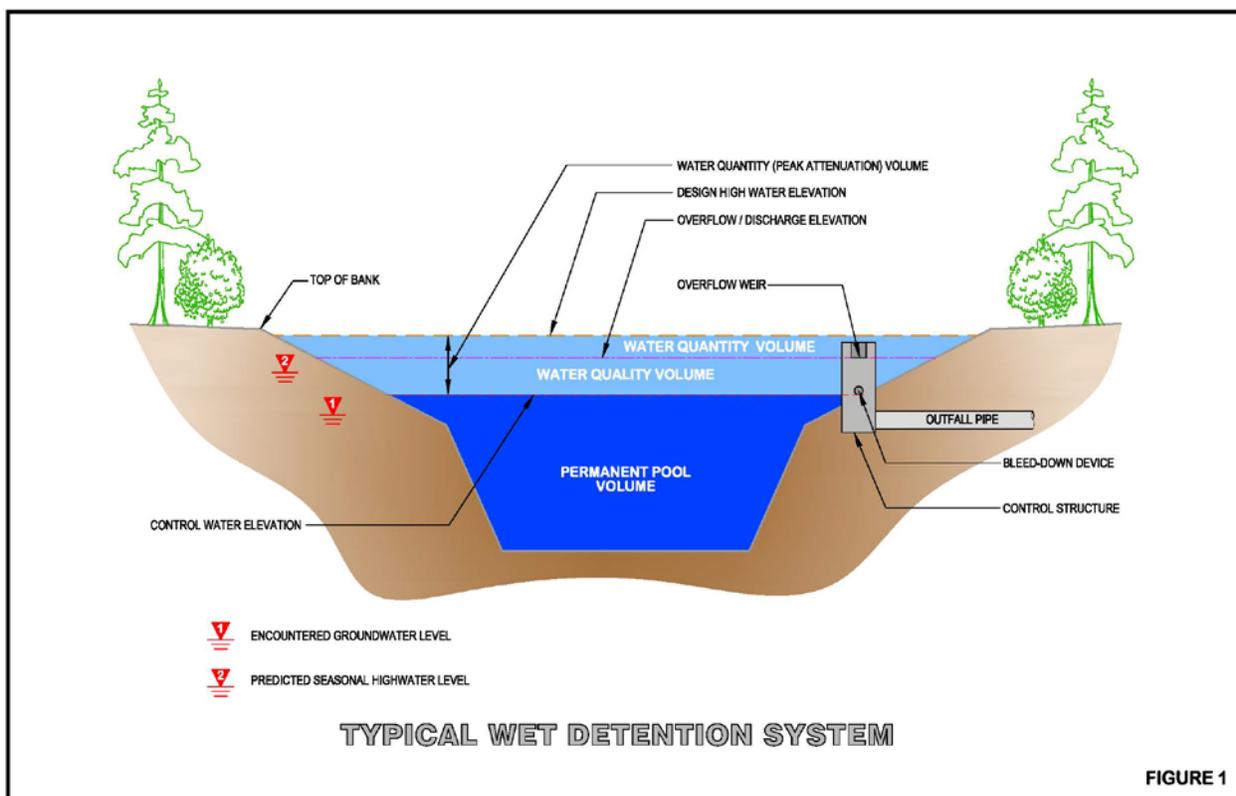
*All development outside a regional master plan shall control post-development runoff rates and/or volumes to not exceed pre-development runoff rates and/or volumes.*

It should be noted that a small portion of the area associated with the Envision Alachua watershed (approximately 1,200 acres, or roughly 4% of the watershed), includes a sinkhole feature which is classified as a closed basin / land-locked system. However, since there are no plans for future development within the closed basin, Envision Alachua will not be required to address both the rate and volume criteria that is required by Alachua County and the St. Johns River Water Management District.

In general, the design of stormwater management ponds to attenuate discharge rates is similar throughout the State of Florida, independent of the type and size of the development. The following is intended to describe the elements of a stormwater pond (whether wet bottom or dry bottom) in order to properly attenuate runoff rates.

As land transitions from undeveloped to developed, the effects of urbanization increases the total volume of stormwater runoff, as well as the peak rate of discharge. In order to offset these increases, state and regional agencies, as well as local governments, require proper design and construction of stormwater management ponds and control structures to limit post-development peak discharge rates to pre-development rates. This is accomplished by creating attenuation volume within stormwater ponds and controlling the peak discharge rates through the use of control structures. In the case of Envision Alachua, and given the relatively shallow depth of the groundwater table, it is anticipated that a vast majority of the proposed stormwater ponds will be wet detention ponds. Wet detention ponds encompass three (3) distinct volume elements to address water quality and quantity criteria: ❶ water quantity volume, ❷ water quality volume, and ❸ permanent pool volume.

With respect to the water quantity (attenuation) volume, wet detention ponds provide the required volume between the control water level and the design high water elevation (refer to Figure 1). When properly designed and constructed, the volume between these two (2) elevations provides sufficient storage to attenuate the post-development peak discharge rates to pre-development levels. In other words, in order to satisfy the peak attenuation criteria, the stormwater management ponds simply need enough volume (storage) between the control water level or pond bottom and the design high water elevation to accommodate the excess runoff caused by development. It is also worth noting that the presence of poorly drained soils versus well drained soils does not impact the performance or effectiveness of the stormwater management ponds, it only governs the type of pond (wet bottom versus dry bottom) and the runoff characteristics (i.e., the amount of stormwater runoff).



In summary, it is important to note that the Envision Alachua sector plan is not proposing any waivers or deviations from the applicable stormwater criteria enforced by either the County or the St. Johns River Water Management District. The future stormwater management ponds will be properly designed to accommodate limiting the post-development discharge rates to pre-development conditions, the current groundwater levels, the contributing drainage basin area and future land-use, and the hydroperiod associated with the adjacent wetland systems. It should also be noted that the required stormwater management ponds will be physically located within the Envision Alachua Sector Plan parcels and not within the Plum Creek holdings outside the Sector Plan parcels.

## **FLOODPLAIN MANAGEMENT**

Based on the current Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs), the lands upstream and downstream of Plum Creek, as well as the holdings within the EASP contain floodplains. Floodplains are areas adjacent to rivers, creeks, tributaries, wetlands, and depressional areas that have a high potential of being inundated by the 100-year (base flood) elevation. Floodplains provide temporary storage of the runoff associated with a 100-year storm event. It is worth noting that all the floodplains within the Sector Plan are classified as Zone "A", which represents approximate flood hazard areas with no 100-year elevation determined.

Under the National Flood Insurance Program (NFIP), communities throughout the United States are encouraged to develop and implement regulations and criteria that monitor encroachment and construction within floodplains in order to minimize the risk to adjacent homeowners and landowners. One of the key components of floodplain management is to ensure that the volume of encroachment is offset by an equivalent volume of compensating storage. That approach is consistent with the County's Comprehensive Plan and the Land Development Code, as well as with regulations imposed by the St. Johns River Water Management District. The following references provide documentation that compensating storage is acceptable to the County:

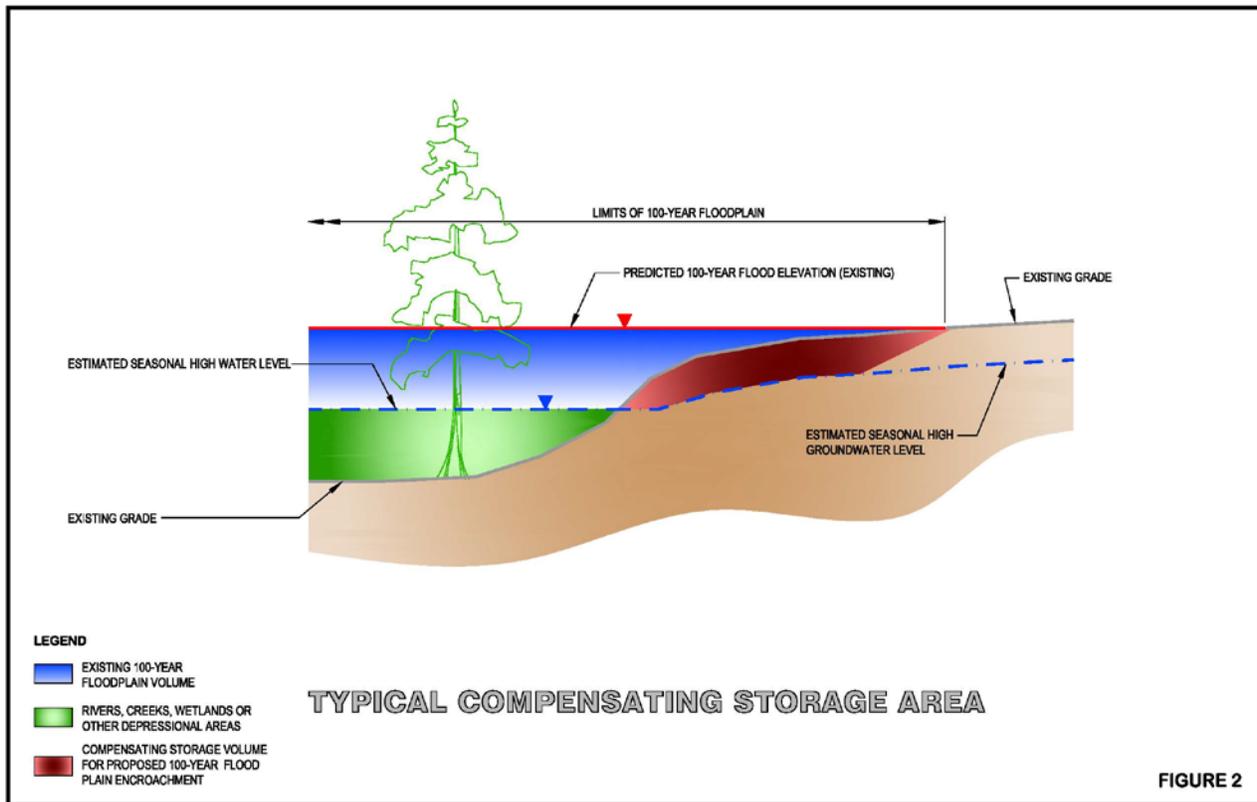
- Alachua County Unified Land Development Code  
Chapter 407 - General Development Standards  
Article VII - Flood Hazard Areas  
Section 407.57(b) - Flood Hazard Reduction Standards

*Fill within depression basin. Fill within a depression basin may be allowed, provided the lowest elevation of excavation for the compensating storage volume is above the normal wet season groundwater table.*

- Alachua County Comprehensive Plan 2011 - 2030  
Conservation and Open Space Element Definitions

*Compensating Storage: Physical replacement of natural flood water storage volumes that would be displaced in areas of special flood hazard due to development. The volume of compensating storage shall be calculated assuming normal wet season ground water levels.*

In order to prevent potential impacts to off-site adjacent landowners, it is imperative that the 100-year flood elevations be determined and properly mapped in order to establish the current floodplain limits and storage volume. With that said, any proposed encroachment must mimic the current floodplain storage in order to prevent impacts upstream and downstream of the proposed encroachments. In order to offset the future encroachment impacts, the proposed compensating storage areas must be adjacent and hydraulically connected to the impacted floodplain. In order to create equivalent compensating storage, the volume must be excavated between the seasonal high groundwater table and the 100-year flood elevation (refer to Figure 2).



Based on careful examination of the current Zone "A" floodplain limits, the approximate limits of the jurisdictional wetlands, and the County's LiDAR topographic data, the floodplains within the Envision Alachua Sector Plan can be best characterized as broad but shallow depressions within the silviculture areas and adjacent to the wetland systems. Based on the concept depicted in Figure 2, concentrating the compensating storage areas adjacent to the wetland areas within the same elevation range provides an additional benefit to the overall wetland system that the current upland floodplains do not. The benefit is that the proposed compensating storage areas provide an environment for the wetland system to expand over time based on natural recruitment and mimicking the hydroperiod. The excavated areas for compensating storage can also be planted to expedite the expansion of the existing wetland system, thereby providing secondary environmental benefits.

It should be noted that Alachua County allows compensating storage to occur within the proposed stormwater ponds. However, it is our professional opinion that this methodology is not as reliable and effective as creating dedicated compensating storage outside of the stormwater pond, but adjacent to the impacted floodplain. The risk with the County's alternative is that the volume in the pond is typically occupied during the 100-year event by stormwater runoff from the contributing basin. Envision Alachua will provide compensating storage outside these proposed stormwater management ponds and adjacent to the impacted floodplains on a "cup for cup" basis. In other words, for every cubic yard of fill placed within an existing floodplain, a new cubic yard will be created adjacent to the floodplain thereby maintaining the historic floodplain volume, which in turn will prevent the flood stages from increasing.

Because the preferred floodplain management strategy as described herein is essentially a relocation and/or reshaping of existing floodplain storage, creating conservation easements over the newly excavated compensating storage areas would address any of the County's potential concerns related to perpetual function or future land use impact.

In closing, by implementing floodplain management on a "cup for cup" basis, the County is assured that the development of Plum Creek will not impact homeowners and land uses adjacent to the Plum Creek development. In addition, creating compensating storage areas adjacent to the existing wetland systems at the same elevation range of the existing hydroperiods provides an environment for the wetland systems to expand over time.

## Community Rating System

The goals of the National Flood Insurance Program (NFIP) are to provide flood insurance to property owners, to encourage flood loss reduction activities by communities, and to save taxpayers' money. As part of the NFIP, the Community Rating System (CRS) provides incentives and tools to further these goals<sup>1</sup>.

<sup>1</sup> National Flood Insurance Program Community Rating System  
*Coordinator's Manual* (FIA-15/2013)  
Expires: December 31, 2016

The CRS recognizes, encourages, and rewards, by the use of flood insurance premium adjustments, community and state activities that go beyond the minimum required by the NFIP. The purpose of the Community Rating System (CRS) is to support the NFIP by working towards the following goals:

- Goal 1 - Reduce and avoid flood damage to insurable property.
- Goal 2 - Strengthen and support the insurance aspects of the NFIP.
- Goal 3 - Foster comprehensive floodplain management.

In order to achieve these goals, the CRS, which started in 1990, created four (4) series of activities which consist of the following:

- 300 Series: Public Information Activities
- 400 Series: Mapping and Regulations
- 500 Series: Flood Damage Reduction Activities
- 600 Series: Warning and Response

Each series consists of activities and each activity consists of various elements. In summary, the CRS has 4 series, 19 activities, and 94 elements. The CRS is a voluntary incentive program. Each community who elects to participate reviews the various activities and pertinent elements and demonstrates to FEMA through local rules, regulations, ordinances, and other programs that it satisfies the goal of a specific activity and element. Based on the number of activities and elements that have been properly approved and accepted by FEMA, the community receives activity credit points. Based on the total number of points, the community receives a CRS Classification between 1 to 9, 1 being the best (largest premium reduction). The CRS Classification then dictates the percent discount the community receives for those flood insurance policy holders that are located within the Special Flood Hazard Area (SFHA).

Alachua County holds a CRS Classification of 6 which is considered quite an achievement. In fact, of the 1,313 communities that participate in the CRS program throughout the United States, only 313 have a CRS Classification of 6. In order for Alachua County to maintain or improve the CRS Classification, FEMA conducts a recertification visit every five (5) years. The purpose of the visits are to confirm that the previously approved and accepted activities and elements have proper documentation to maintain the activity credit points.

The Envision Alachua Sector Plan does not propose any activities that jeopardize the County's current standing in the CRS program. In fact, there are elements of the proposed stormwater management program that will complement some of the activities and elements of the CRS program. They are as follows:

- Activity 410 - Floodplain Mapping
  - ✓ Element 412.a (New Studies) - Credit is given for delineating an approximate A Zone where one does not currently exist and for re-mapping an approximate A Zone, both of which will be accomplished by the Envision Alachua project. Also, additional credit is given for establishing flood elevations in advance of development. This too will be accomplished by the Envision Alachua project.
  - ✓ Element 412.c (State Reviews) - Credit is given when the hydrologic / hydraulic study utilized to establish the flood elevations is reviewed and approved by a state or regional agency. Besides Alachua County, the study will also be submitted to the SJRWMD in support of the conceptual ERP application.
- Activity 420 - Open Space Preservation
  - ✓ Element 422.c (Natural Functions Open Space) - Credit is given for preserving open space in the floodplain. It is anticipated that specific areas within Envision Alachua will satisfy this element. For example, it is envisioned that the floodplains and floodways associated with Lochloosa Creek will be preserved as open space.
- Activity 450 - Stormwater Management
  - ✓ Element 452.a (Stormwater Management Regulations) - Credit is given for new development that prevents the increase in runoff as a result of urbanization. In addition, credit is also given for designing stormwater management facilities for a design storm greater than a 10-year event. Lastly, credit is given for implementing low-impact development regulations (LIDs). All these elements will be adequately provided for in the design of the Envision Alachua stormwater management systems.

In closing, the proposed Envision Alachua development will not reduce the County's existing FEMA credits and therefore will not jeopardize the County's current CRS Classification of 6.

## POLLUTANT LOADS

Given that the Envision Alachua Sector Plan is located within the Santa Fe River and Orange Creek watersheds, both of which include impaired water bodies and adopted Basin Management Action Plans (BMAPs), the proposed stormwater management system, at a minimum, must be able to reduce pollutant loads to current levels as required by the St. Johns River Water Management District (SJRWMD). More specifically, the Environmental Resource Permit Applicant's Handbook - Volume I, Part II (General Criteria), Section 2.0(e) states that the proposed activities shall provide reasonable assurance that the quality of receiving waters will not be adversely affected and that the water quality standards set forth in Chapters 62-4, 62-302, 62-520, and 62-550, F.A.C will be met. In addition, Lochloosa Creek, south of State Road 26, is classified as an "Outstanding Florida Waterbody (OFW)". The SJRWMD and Alachua County require that stormwater management systems that discharge to an OFW provide additional water quality treatment above the minimum criteria.

The anticipated increase (above existing conditions) in pollutant loads generated by the future development will require a multifaceted / integrated stormwater management system, including traditional stormwater ponds, in order to ensure that the post-development pollutant loads are the same or less than current conditions. The following three (3) elements will be implemented in order to achieve a no net increase in pollutant loads discharged to Newnans Lake, Lochloosa Creek, and Lochloosa Lake:

- Stormwater Management Ponds
- Low Impact Development (LID) Techniques
- Stormwater Reuse

### Stormwater Management Ponds

Given the existing topography, groundwater conditions, and adjacent wetland features, it is envisioned that centrally located large wet detention ponds will be implemented. These permanently wet stormwater ponds will provide several benefits ranging from focal points for passive recreational purposes and aesthetics to water quality treatment and flood protection volume. However, wet detention ponds alone do not provide sufficient removal of nitrogen and phosphorous to offset the anticipated increase in pollutant loads from development, hence the reason for a three-part strategy to reduce the pollutant loads. It should be noted that special construction features will be evaluated to prevent any potential nutrient loads from the subsurface Hawthorn Group formation.

## Low Impact Development (LID) Practices

In order to effectively capture the pollutants from the "first flush" effect, and achieve the percent reduction goals, it is imperative that the stormwater management system encompass LID practices, where feasible and applicable. The following LID practices are envisioned:

- The use of bioretention areas or rain gardens.
- The integral use of shade trees and open areas to reduce the impacts of paved areas.
- Minimize the directly connected impervious areas (DCIA).
- Narrowing street widths to the minimum width required to support traffic, on-street parking where appropriate, and emergency vehicle access.
- Porous Concrete/Permeable Pavement.
- Bio-swales.
- Rain Barrels and Cisterns.
- Biosorption Activated Media (BAM).



- Rain Gardens.
- Green Roofs.
- Minimize/Disconnect the Directly Connected Impervious Area (DCIA).



- Underground Vaults (Exfiltration).
- Landscape Practices.
- Fertilizer Control.
- Curb Cuts with Inverted Medians.
- Curb Elimination.



## Stormwater Reuse

To ensure that the pollutant load reduction goal is achievable, the remaining element of the multifaceted / integrated stormwater management plan will be the stormwater reuse component. This will involve stormwater pump stations to distribute stormwater runoff harvested from ponds to varying land uses in need of irrigation such as open spaces, agriculture, and possibly the manmade wetland system envisioned for the treated wastewater. A detailed water budget will be required to balance the required pollutant load reductions and provide sufficient base flow to the downstream natural systems.

In closing, the proposed Envision Alachua Sector Plan will rely upon a combination of several best management practices (BMPs) in order to demonstrate to the SJRWMD and the County that the pollutant loads discharged to Newnans Lake, Lochloosa Creek, and Lochloosa Lake will not increase due to development. In addition, Plum Creek is willing to partner with Alachua County, the SJRWMD, and the Florida Department of Environmental Protection (FDEP) to explore opportunities to reduce pollutant loads within the watershed and provide regional water quality benefits to all stakeholders. An example of such a regional water quality improvement project may involve a Nutrient Reduction Facility (NuRF) sited upstream of Lochloosa Lake to further reduce watershed pollutant loads above and beyond those required for the proposed development. This regional water quality project would specifically address the goals as outlined in the Orange Creek BMAP, as well as the upcoming Lake Lochloosa BMAP.

## HAWTHORN LAYER

Based on various technical publications, such as the "***Depth of the Phosphorus-Rich Hawthorn Group in Newnans Lake Watershed***", prepared by the St. Johns River Water Management District, the Florida Department of Environmental Protection, and the Alachua County Environmental Protection Department, dated December 2012, there is a good possibility that the Hawthorn Group formation is present within the Plum Creek holdings. Therefore, in an effort to determine the presence / absence of phosphate-rich soils, the depth to these soils, and the approximate thickness of the Hawthorne foundation, a preliminary subsurface and geotechnical site evaluation was performed by GSE Engineering & Consulting, Inc. It is worth noting that based on a preliminary subsurface investigation performed by GSE Engineering & Consulting, Inc., phosphorous enriched soils are typically greater than 15 to 20 plus feet below existing grade (refer to Section 5.0 of the GSE report for detailed discussions pertaining to their findings). In addition, the overburden (often associated with the Hawthorne Group Formation) soils exhibit very low phosphorous concentrations. Therefore, given the depth envisioned for the stormwater management ponds, it is highly unlikely that the project will encounter phosphorous rich soils in any significant amount.

## TECHNICAL MEMORANDUM

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In the unlikely event that the phosphate-rich soils are encountered during final design, measures will be implemented to eliminate the potential increase in phosphorous loads conveyed to the receiving water bodies, it is imperative that special measures take place during the design and implementation of the proposed stormwater management systems. This is also required by Alachua County as stated in the Land Development Code (Article IX - Stormwater Management, Section 407.91 – Standards). In order to address the potential impacts associated with the phosphorous rich soils, Envision Alachua will undertake the following steps:

- Perform a detailed subsurface investigation within the footprint of the proposed stormwater management ponds and compensating storage areas in order to establish the approximate extent and depth of the Hawthorn Group formation.
- If present, evaluate the grades of the stormwater management ponds and compensating storage areas to determine if the Hawthorn Group formation can be avoided. If not, a PVC and/or a clay liner can be installed along the side slopes and bottoms of the stormwater management ponds or compensating storage areas to prevent the phosphorus rich soils from contributing additional loads to the downstream systems.
- If the Hawthorn Group formation is excavated within the footprint of the stormwater management ponds or compensating storage areas, it will not be used as fill material within the Envision Alachua development unless precautions are undertaken to prevent phosphorus recycling.

Signature: \_\_\_\_\_

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Date: June 4, 2015

