Stormwater Master Plan

City of Inverness- PO 20220427-00

PREPARED FOR

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Executive Summary

The City of Inverness requested Vanasse Hangen Brustlin, Inc. (VHB) to assist in the development of a Stormwater Master Plan (SWMP). The SWMP identifies and documents flood-prone problem areas, evaluates the City's stormwater systems and reasons for area-specific failures, and makes recommendations on general improvements, including updates to the land development code and the identification of funding sources for recommended improvements.

The City identified areas that frequently experience flooding in the event of heavy precipitation which have been reviewed, mapped and categorized based upon the reason for flooding.

The problem areas focused in the downtown area mainly have back water and lack of an adequate drainage system as the underlying reason for flooding. Some of these areas contain small, clay pipes, which have limited capacity. Areas that border lakes have topographic and back water as main reasons for flooding. Lake elevations are a main contributing factor to the flooding issues in the City.

Secondly, the SWMD identifies opportunities and constraints for development within the stormwater-related sections of the City's Comprehensive Plan and Land Development Code. City of Inverness policies were compared to industry standards and best practices based on Southwest Florida Water Management District (SWFWMD) code. In addition, policies were assessed for any obstacles to implementing LID techniques, concurrency issues, and Level of Service Criteria.

Based on the review, the City's requirements generally exceed or meet the SWFWMD criteria. However, certain inconsistencies related to level of service and maximum slope were identified. Stormwater policies do not present obstacles to the implementation of Low-Impact Development techniques. However, there is an opportunity to provide guidance and incentives to implement LID through a low impact technical memorandum tailored for the City of Inverness.

There is an opportunity for the City to provide direction on how existing excess drainage capacity can be credited for existing and future development as related to obtaining a certificate of concurrency. Additionally, the LOS established within the Comprehensive Plan and Land Development Code should be consistent with SWFWMD standards.

Thirdly, the SWMD identifies opportunities and constraints for development within the stormwater-related sections of the City's Comprehensive Plan and Land Development Code. City of Inverness policies were compared to industry standards and best practices based on Southwest Florida Water Management District (SWFWMD) code. In addition, policies were assessed for any obstacles to implementing LID techniques, concurrency issues, and Level of Service Criteria.

The need for infrastructure improvements in the downtown area has been identified. Other low lying areas in the City also have been identified. These areas need further evaluation so they can be designed and budgeted in the City's Capital Improvement Plan.

1

Project Background

The City of Inverness has requested Vanasse Hangen Brustlin, Inc. (VHB) to assist in the development of a Stormwater Master Plan (SWMP). The creation of a SWMP is a key element to the overall improvement of the City and to encourage development opportunities by addressing flooding and water quality issues.

Despite improvements made in 2010, the City still needs an adequate stormwater plan and system. Main arterial roads are the only roads with stormwater infrastructure, generally consisting of curb inlets which feed the larger collection system. Collector roads, especially in residential areas, do not have drainage facilities or systems to prevent flooding during large storm events. The SWMP identifies and documents flood-prone problem areas, evaluates the City's stormwater systems and reasons for area-specific failures, and makes recommendations on general improvements, including updates to the land development code and the identification of funding sources for recommended improvements.

Scope of Services

The following Scope of Services is proposed to provide support to the Client and its preparation of a Stormwater Master Plan for the City of Inverness. VHB provided technical support to review existing conditions and future developments impacts.

1. Existing Conditions – VHB will research and review the City of Inverness stormwater data and records, as well as observed conditions.
2. Stormwater Code Review – VHB will review stormwater-related sections of the City's Comprehensive Plan and Development Code to analyze the planning area to identify the opportunities and constraints for future development.
3. Identification of Funding Strategies & Opportunities – VHB will research and develop a list of targeted funding strategies and opportunities for recommendation.
4. Recommendation & Infrastructure Improvements – VHB will summarize a list of recommended actions, projects and/or stormwater improvements to assist in the prioritization and implementation of the Stormwater Master Plan.
5. SWMP Master Plan – VHB will prepare a draft SWMP for adoption. This master plan is to serve for the City's Stormwater improvements and future developments.

2

Existing Conditions-Identification and Documentation

The increasing necessity for new development and infrastructure in the City has led to the analysis and documentation of stormwater system issues. The City has identified areas that frequently experience flooding in the event of heavy precipitation which have been mapped in **Figure 1, Project Location Map**. These areas have been analyzed and categorized based upon the reason for flooding. The analysis included a desktop review of the existing infrastructure, the existing topography, and the flood plain. The existing infrastructure information was provided by the City through the City's GIS data. Lastly, VHB engineers field visited each of the sites. The three main categories can be summarized by the following:

1. Topographically created – Water relies on local system to drain due to land boundaries.
2. Back Water – Water drains to a pond or lake that backs up due to elevation differences.
3. Lack of adequate drainage system.

Table 1 summarizes the flood prone areas and categorizes them based on the above listed categories.

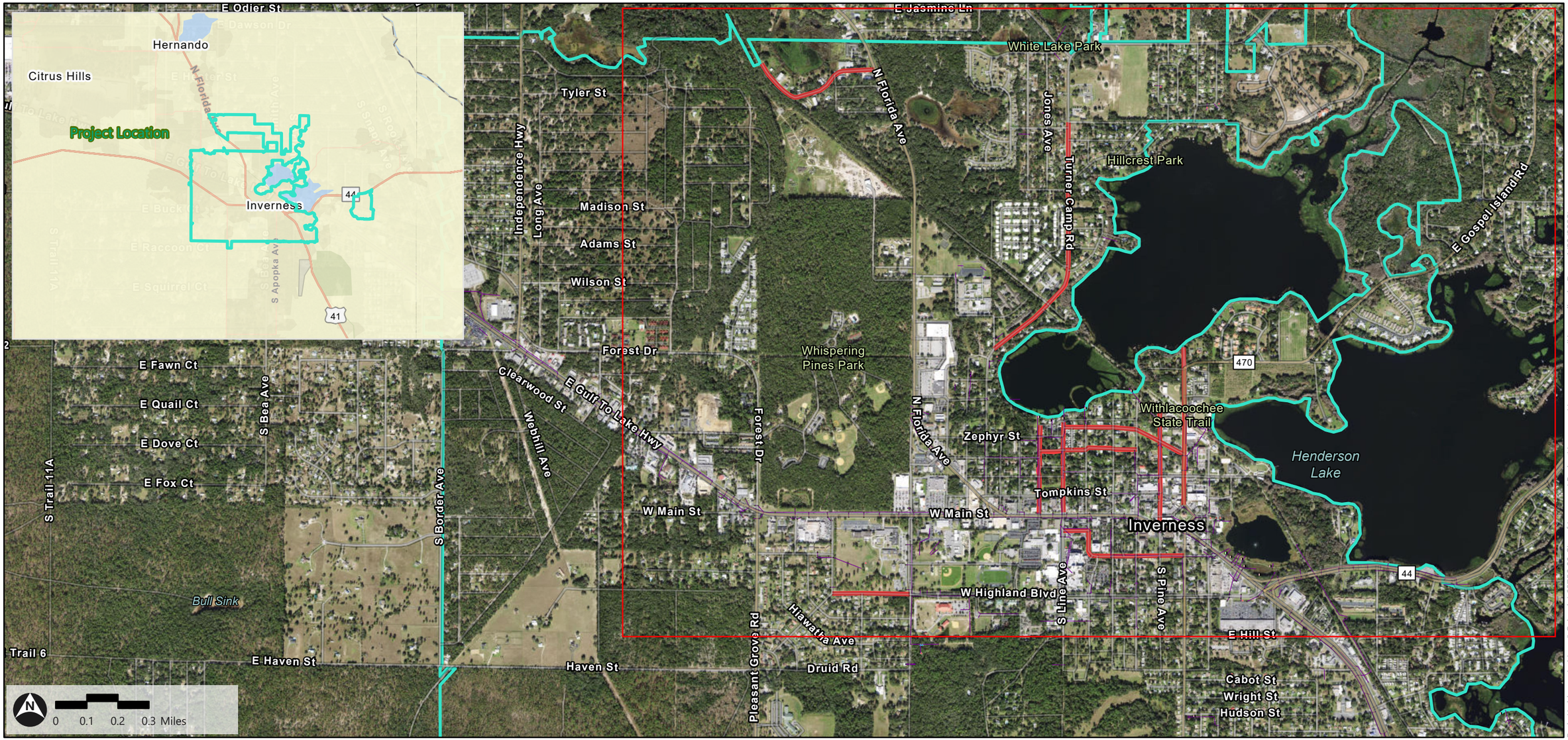
Table 1 Flood Prone Areas

Location	Category 1	Category 2	Category 3
White Lake Drive		x	x
Turner Camp Road		x	x
West Grace Street	x		
West Highland Boulevard	x		
Cherry Avenue		x	
Emery Street and Zephyr Street		x	x
North Line Avenue		x	
North Pine Avenue	x	x	x
North Apopka Avenue	x	x	x

1. Topographically created.
2. Back Water.
3. Lack of adequate drainage system.

Figure 1 Project Location Map

City of Inverness Stormwater Areas of Concern



City of Iverness

High Priority Areas - Lines

Inverness Stormwater System

Pipe

Basemap source: State of Florida, Earthstar Geographics, FDEP, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, FDEP, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA

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White Lake Drive – Categories (2) and (3)

White Lake Drive is north of Inverness, east of US Highway 41, and predominantly consists of commercial use buildings. This road does not have an established drainage system, shown in Images A-C: White Lake Drive. Runoff from the road drains directly north to White Lake. The elevation of the lake is relatively high with respect to the surrounding developed areas. With high precipitation, this can cause back water. Since the water has nowhere to go, it stages and causes flooding, affecting the developed areas nearby. Upon review of the area, the most affected building was MachineMAXX, with water staging up to the east side of the building, shown in Image D: East Side of MachineMAXX. The elevations on the east side of the building range from approximately 33 to 34 feet, and the lake has an approximate normal water level (NWL) of 32 feet. Previous aerial images show cars parked to the east of the building. However, during the site visit it was noted the water from White Lake inundated the area. The 100-year flood elevation for White Lake is 36.6 per the FEMA Flood Plain Map (Number 12017C0352D). An adequate drainage system for White Lake Drive is needed. Additionally, due to the small elevation difference between the lake and the buildings flooding may be inevitable. **See Figure 2, Flood Prone Areas.**

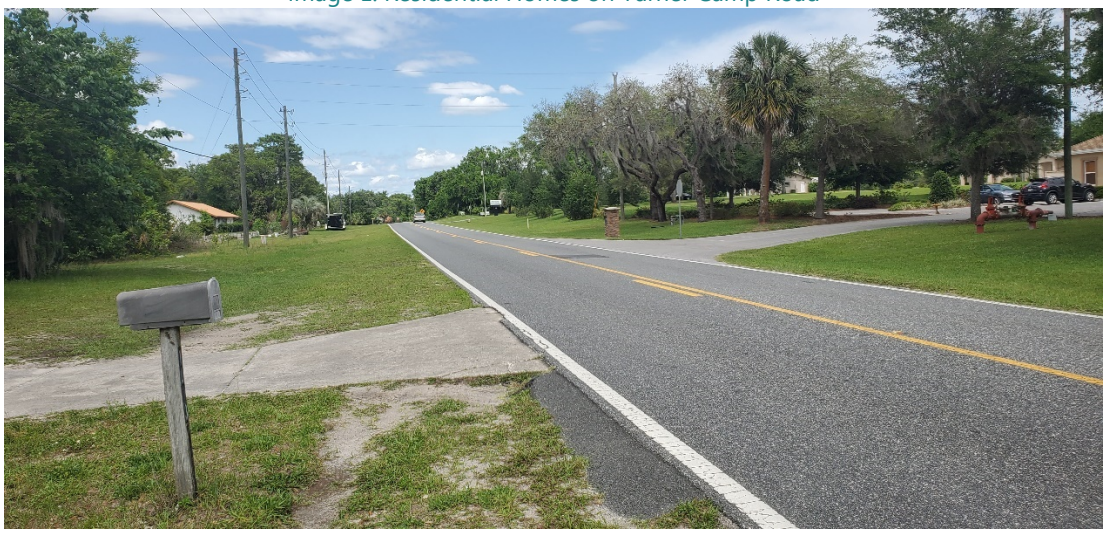
Images A-C: White Lake Drive

Image D: East Side of MachineMAXX

Turner Camp Road – Categories (2) and (3)

Turner Camp Road is in the northeast region of Inverness. The limits of the area of interest are from south of Deer Run Road to Ella Avenue. This segment of the road borders and drains to Henderson Lake. The houses directly on Henderson Lake have a minimum elevation of 44 feet and Henderson Lake has an approximate NWL elevation of 39 feet; this difference is a 5-foot difference as shown in Image E: Residential Homes on Turner Camp Road. The 100-year flood elevation for White Lake is 42.4 per the FEMA Flood Plain Map (Number 12017C0352D). Back water is an issue in this area due to the elevation of the Lake. This area is also lacking a drainage system, as shown in Images F-G: Turner Camp Road. With no proper drainage system, runoff from the road backs up to commercial and residential buildings, refer to **Figure 2, Flood Prone Areas**.

Image E: Residential Homes on Turner Camp Road



Images F-G: Turner Camp Road

West Grace Street– Category (1)

West Grace Street is located north of Citrus Memorial Hospital in the Medical Arts District of Inverness. The drainage system that servers this road has two outfalls. East of South Osceola Avenue, there are four inlets that drain West Grace Street which ultimately discharge to Cooter Lake. To the west of South Osceola Avenue, there are two inlets that ultimately discharge to Henderson Lake, refer to Images H-I: West Grace Street. The portion of the road that discharges to Cooter Lake has a back water issue due to the lake elevation. The portion that outfalls to Henderson Lake has a topographic issue due to the road being in a low point of the watershed and having a lack of drainage inlets. The pipe system that discharges to Henderson Lake is composed of twelve and eighteen inch clay pipes. The size and material of these pipes have a limited capacity and may not be adequate. This causes the water to pond, leading to flooding on the road. Please see **Figure 2, Flood Prone Areas**.

Images H-I: West Grace Street

West Highland Boulevard – Category (1)

The segment of West Highland Blvd, located south of Withlacoochee Technical College and north of a residential neighborhood, has no stormwater system between South Blvd and South Montgomery Avenue. There is a low point on the road at the intersection of West Highland Blvd and Camellia Avenue, causing the water to flow to the intersection, and stage. The area lacks an outfall and conveyance system for the runoff due to land boundaries. Please see **Figure 2, Flood Prone Areas**.

Cherry Avenue - Categories (2) and (3)

Cherry Avenue, between West Main Street and Zephyr Street, predominantly consists of single-family homes, except for the north end which consists of commercial properties and the south end which includes modular homes. The area generally drains form north to south towards Henderson Lake and has a drainage system that consist of a combination of curb and gutters, D-curb, curb inlets and ditch bottom inlets. Inlets are only located at four of the six intersections. There are long sections of the curb that do not lead to inlets. The drainage system on this road discharges to Henderson Lake. Cherry Avenue, at the intersection with Zephyr Street, has an elevation of 44 feet, and Henderson Lake has an approximate NWL elevation of 39 feet, and a 100-year flood elevation of 42.4. This causes back water during events of heavy precipitation. Please see **Figure 2, Flood Prone Areas**.

Emery Street and Zephyr Street - Categories (2) and (3)

The segments of Emery Street and Zephyr Street located between Cherry Avenue and North Seminole Avenue have a high point located in the vicinity of North Osceola Avenue. These streets drain either to the west or east of North Osceola Avenue. Emery Street has low D Curb and one inlet located on the east end and a couple located at the intersection of North Line Avenue. The existing stormwater infrastructure on Emery Street is not adequate, shown in Images J-K: Emery Street. Zephyr street has no stormwater infrastructure. Please see **Figure 2, Flood Prone Areas**.

Images J-K: Emery Street and Zephyr Street

North Line Avenue – Category (2)

Located between West Main Street and Zephyr Street, parallel to Cherry Avenue, North Line Avenue has an existing curb and gutter drainage system, shown in Image L: North Line Avenue. There are a total of seven inlets that discharge to two outfalls. To the south of Tompkins Street, there are two inlets that drain to retention area north of Citrus Memorial Hospital. To the north of Tompkins Street, there are five inlets that drain to Henderson Lake. These inlets are connected through a pipe system that consists of fifteen- and eighteen-inch clay pipes. The size and material of the pipes may not be adequate to support the runoff. The north end of the road is at an elevation of 42 feet, potentially back water from Henderson Lake. Please see **Figure 2, Flood Prone Areas**.

Image L: North Line Avenue

North Pine Avenue - Categories (1) and (2)

Located between West Main Street and David's World Cycle. To the North of the intersection with Dampier Street, North Pine Avenue has short sections of curb and gutter with curb inlets that outfall to Henderson Lake, shown in Images M-O: North Pine Avenue. The pipes that connect these inlets to the stormsewer system on the road are twelve-inch clay pipes. These pipes could potentially be damaged or insufficient, causing inadequate draining of the runoff from the road. To the south of Dampier Street, there are curb and gutter with curb inlets all the way to Main Street. A section of North Pine Avenue is in zone AE, a low elevation high risk flood zone. This section has an elevation of 42 feet, and the outfall elevation to the lake is 38 feet, causing back water and flooding concerns. Please see **Figure 2, Flood Prone Areas**.

Images M-O: North Pine Avenue

North Apopka Avenue - Categories (1) and (2) and (3)

Located between the Old Courthouse and East Vine Street, North Apopka Avenue has a curb and gutter system. The road is lacking a proper outfall system where the stormwater can properly discharge, an example of this is shown in Image P-Q: Current Outfall System. From Old Main Street to Dampier Street, there are no inlets, shown in Image R: North Apopka Avenue. The stormwater runoff from the businesses on this portion of the road is not adequately discharging, contributing to the issue. There are four inlets between Dampier Street and The Depot. To the north of Liberty Park, the curb decreases in size, decreasing the intake capacity. There are curb inlets to the north of Apopka ballfield, but it is unclear as to where they discharge. A site observation has identified a retention area on the corner of North Apopka Ave and East Vine St. There are inlets right before the discharge of the lake; it is unclear as to where they discharge to since they were full of debris and dirt, shown in Image S: Inlets on North Apopka Avenue. The inlet elevations on the road are very similar to the elevations of Henderson Lake, causing back water during heavy precipitation. The pipe system on the road consists of clay and concrete pipes, the latter having a larger diameter. The difference in material size may be a contributing factor to the intake capacity. Please see **Figure 2, Flood Prone Areas**.

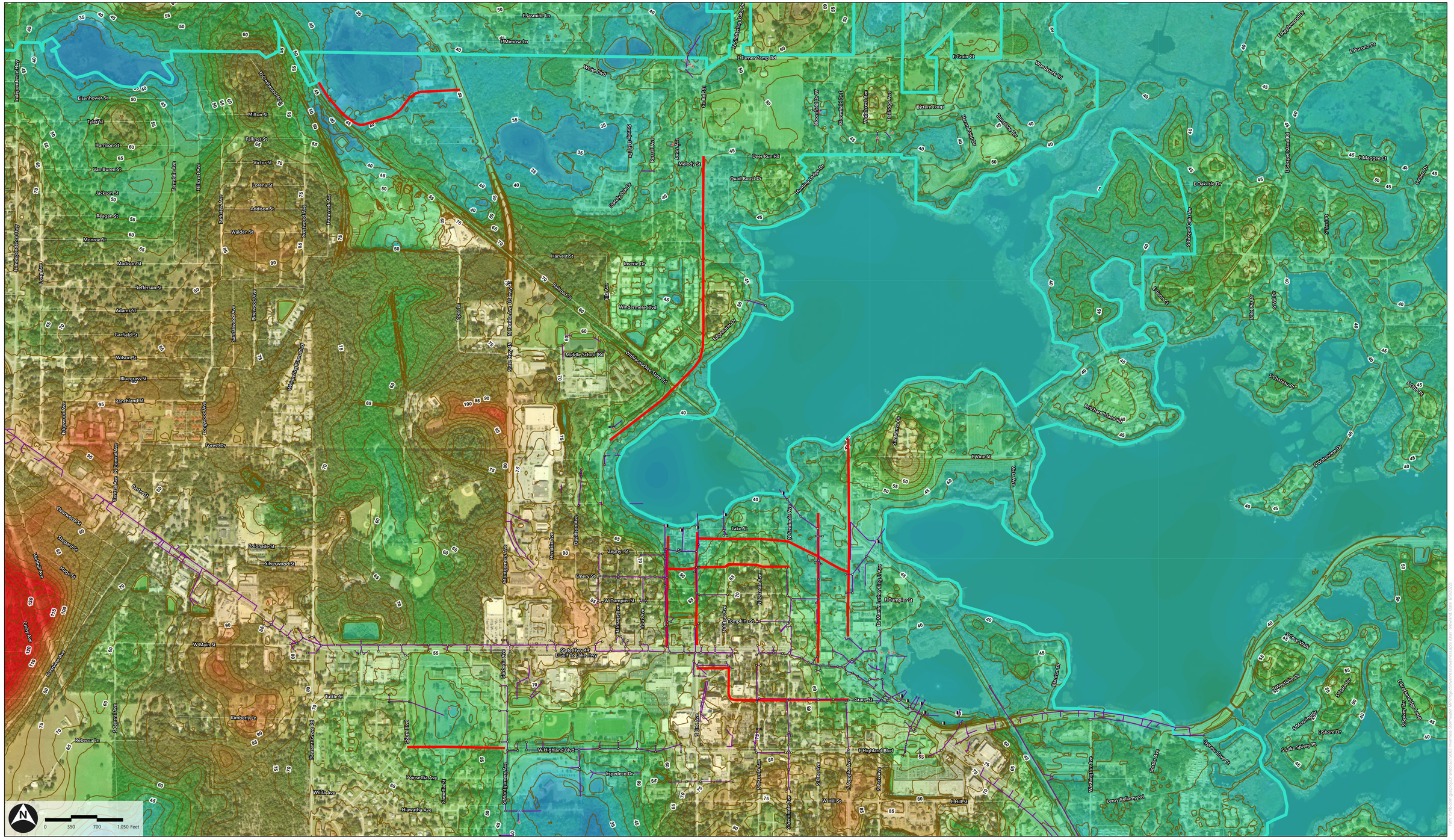
Images P-Q: Current Outfall System

Image R: North Apopka Avenue

Image S: Inlets on North Apopka Avenue

Figure 2 Flood Prone Areas

City of Inverness Stormwater Areas of Concern



Summary

The problem areas focused in the downtown area mainly have back water and lack of an adequate drainage system as the underlying reason for flooding. Some of these areas contain small, clay pipes, which have limited capacity. Areas that border lakes have topographic and back water as main reasons for flooding. Lake elevations are a main contributing factor to the flooding issues in the City.

3

Stormwater Code Review

Purpose and Methodology

The purpose of this memo is to identify the opportunities and constraints for development within the stormwater-related sections of the City's Comprehensive Plan and Land Development Code. City of Inverness policies were compared to industry standards and best practices based on Southwest Florida Water Management District (SWFWMD) code. In addition, policies were assessed for any obstacles to implementing LID techniques, concurrency issues, and Level of Service Criteria.

Each Inverness code section was given a rating of "meets", "inconsistent", "exceeds", or "not addressed by" the respective permitting agency code. Specific policies with design constraints related to LID techniques, concurrency, and Level of Service were also noted. The results of these analyses are summarized below. The complete code review tables are included as **Appendix A**.

Table 2 Code Review

Inverness Code Reference	Description	Inconsistency[1]
Comprehensive Plan		
CE Ch. 4	Aquifer recharge	Not addressed by SWFWMD
CE Ch. 4	Lake management plans	Not addressed by SWFWMD
FLUE Policy 1.2.6.3	Stormwater facilities within wellhead protection areas	Not addressed by SWFWMD
Land Development Code		
Sec. 19-5(1)	Post-development peak discharge	Inconsistent with SWFWMD Sec. 3.1(e). Does not differentiate for open vs. closed basin.
Sec. 19-5(3)	Side slopes of retention/detention areas	Inconsistent with SWFWMD Sec. 5.4.1(c). Inverness exceeds maximum slope established by SWFWMD.
Sec. 19-8(a)	Design standards – 10-year frequency	Not addressed by SWFWMD
Sec. 19-8(b)	Design standards – 50-year frequency	Not addressed by SWFWMD

1 Inverness code references are denoted as "inconsistent", "exceeds" or "not addressed by" SWFWMD code reference. "Inconsistent" shall mean Inverness code provides contradictory language or standard of design, and "exceeds" shall mean Inverness code provides additional language or a higher standard of design.

Policies and Codes with Design Constraints

Obstacles to Implementing LID Techniques

While existing stormwater policies reviewed for this report did not include provisions for Low-Impact Development techniques, no obstacles to the implementation of LID were identified. Other sections of the development code may conflict with implementation of LID techniques (i.e., transportation, public safety, open space and/or parking requirements) the design standards for those sections would need to be reviewed for consistency with any proposed LID implementation. Cost perceptions, both public and private, and developmental inertia from the private sector can also present obstacles to the implementation of LID techniques throughout the city.

Concurrency and Level of Service (LOS)

City of Inverness policies and codes related to concurrency management and LOS standards were analyzed to identify any inconsistencies with SWFWMD code.

Section 2.13 of the Inverness Land Development Code addresses concurrency management for proposed development. Inverness does not have a process for obtaining a certificate of concurrency. Instead, a project is considered to have met state concurrency requirements for drainage when level of service standards established under this section are met. The level of service standards for drainage systems and inconsistencies with SWFWMD code are identified below.

Table 3 LDC Section 2.13(E)(1) Level of Service Standards

Type of Use	Level of Service	Inconsistency with SWFWMD
Residential (Single-family)	First 1″ of run-off	Inconsistent. Single family residential is not specifically addressed. First one inch of rainfall is used but for other circumstances.
Non-residential developments (new subdivisions or planned developments)	25 year/24-hour duration rainfall (peak flow)	Inconsistent with SWFWMD Sec. 3.1(d&f) Land Development Code does not address closed or volume sensitive basins
Culvert structures	10-year design	Not addressed by SWFWMD FDOT criteria for roadside ditch culverts is 10-year design

Opportunities and Recommendations

Inverness requirements generally exceed or meet the SWFWMD criteria. However, certain inconsistencies related to level of service and maximum slope were identified as noted above. Stormwater policies do not present obstacles to the implementation of Low-Impact Development techniques. However, there is an opportunity to provide guidance and incentives to implement LID through a low impact technical memorandum tailored for the City of Inverness.

There is an opportunity for the City to provide direction on how existing excess drainage capacity can be credited for existing and future development as related to obtaining a certificate of concurrency. Additionally, the LOS established within the Comprehensive Plan and Land Development Code should be consistent with SWFWMD standards.

4

Identification of Grant Funding Strategies and Opportunities

Purpose

As a part of the Inverness Stormwater Master Plan Scope of Services, under Task 4, the Consultant Team has drafted a memorandum identifying and summarizing sustainability and resiliency-related Florida Department of Environmental Protection (FDEP) grant funding opportunities the city could pursue to support the Stormwater Master Plan. The summary memorandum provides a description of each grant program including intended project types. Table 4 provides additional details for each grant including minimum eligibility requirements and funding appropriation and schedules. Additional state or federal grant opportunities are included in the second section of the memo.

FDEP Opportunities

Resilient Florida Grants Program

› Provides grants to counties or municipalities for community resilience planning, such as vulnerability assessments, plan development, and adaptation projects to protect critical assets. "Critical assets" include:

1. Transportation assets and evacuation routes, including airports, bridges, bus terminals, ports, major roadways, marinas, rail facilities, and railroad bridges.
2. Critical infrastructure, including wastewater treatment facilities and lift stations, stormwater treatment facilities and pump stations, drinking water facilities, water utility conveyance systems, electric production and supply facilities, solid and hazardous waste facilities, military installations, communications facilities, and disaster debris management sites.
3. Critical community and emergency facilities, including schools, colleges, universities, community centers, correctional facilities, disaster recovery centers, emergency medical service facilities, emergency operation centers, fire stations, health care facilities, hospitals, law enforcement facilities, local government facilities, logistical staging areas, affordable public housing, risk shelter inventory, and state government facilities.
4. Natural, cultural, and historical resources, including conservation lands, parks, shorelines, surface waters, wetlands, and historical and cultural assets.

› Resilient Florida Grants include:

- Resilient Florida Planning Grant – Includes Comprehensive Plan amendments, vulnerability assessments, and projects/plans/policies that prepare for flooding sea level rise (SLR), and storm surge.
- Statewide Flooding and Sea Level Rise Resilience Plan Grant – Includes projects that address risks of flooding sea level rise, and storm surge to coastal and inland communities identified in a statewide vulnerability assessment (cities/counties), mitigate risks of flooding or SLR on water supplies/resources of state (water management district (WMD)s/flood control districts). The grant requires 50% cost share (per project) unless the project assists or is within a financially disadvantaged small community.
- Regional Resilience Entity Grant – Includes projects that provide technical assistance to counties and municipalities, coordinate multijurisdictional vulnerability assessments, develop project proposals to be submitted for inclusion in the Statewide Flooding and Sea Level Rise Resilience Plan.

Florida Resilient Coastlines Program (FRCP)

› FRCP offers grant funding for both Planning and Implementation projects that further coastal resilience. Within the project types accepted, there are certain priorities that the program and local governments have identified. The following highlight some of those priorities:

1. Peril of Flood – requires communities with a Coastal Management Element in their Comprehensive Plan to include a redevelopment component with principles used to eliminate inappropriate and unsafe development in the coastal areas. The component must include specific strategies, principles, and policies to reduce current and future flood risks in coastal areas. FRCP offers funding to assist communities in their effort to comply with the Peril of Flood statute. (Sec. 163.3178(2)(f), F.S. Comprehensive Planning for the Peril of Flood)
2. Vulnerability Assessments – involves measuring the impact of sea level rise and identifying the people, infrastructure, and land uses that may be affected. By using publicly available and reliable data, it is possible to identify the areas that are vulnerable to current and future sea level rise and related flooding.
3. Adaptation Plans (or Resilience Plans) – builds off a vulnerability assessment once preformed, providing an outline of specific adaptation goals and strategies for a community to use as a planning guide. These plans often incorporate social and economic factors along with flood risks, to create a holistic, actionable plan for building a community's resilience.
4. Economic Analysis – allows communities to directly compare the costs of investing in flood mitigation and adaptation strategies against the costs of damages and losses in various sea-level rise and flood scenarios.
5. Nature-Based Options – requires an assessment of ways to reduce the impacts of SLR, flooding and erosion through natural systems or processes known as Nature-Based Solutions, which are good options to mitigate threats while enhancing habitats.
6. Regional Collaboration & Outreach – helps to facilitate education with the public, which is a crucial step toward creating support for adaptation strategies. That's why each Resilience Planning Grant (RPG) recipient must host at least two public outreach events. Engagement strategies can include stakeholder education activities, providing public input in the planning process and providing support and guidance to a project or planning process.

› Florida Resilient Coastline Grants include:

- Resilience Planning Grants – Eligible activities include Compliance with "Peril of Flood" statute (Section 163.3178(2)(f) F.S.), Development of Adaptation Action Areas, Vulnerability Assessments, Adaptation Plans or Resilience Plans other than what's necessary for compliance with Peril of Flood Requirements, such as those for historic resources or stormwater management systems, and regional collaboration efforts.
- Resilience Implementation Grants – Includes projects that implement adaptation/resilience plans by supporting nature-based options for erosion and flood control, elevation of public structures, and projects specifically included in existing adaptation/resilience plans. Projects should be able to be completed in 10 months. Funding for the RPG program comes from the state budget; the total amount awarded will depend on funding made available by the Governor and Legislature. Individual awards up to $500,000.

Florida Coastal Management Program

› Florida Coastal Management Grants include:

- Coastal Partnership Initiative Grant Program – Through the Coastal Partnership Initiative (CPI), the Florida Coastal Management Program makes National Oceanic and Atmospheric Administration (NOAA) funds available on a competitive basis to Florida's 35 coastal counties and all municipalities within their boundaries that are required to include a Coastal Element in their Comprehensive Plan. Florida's public colleges and universities, regional planning councils, national estuary programs and nonprofit groups also may apply for CPI funds, if an eligible local government agrees to participate as a partner. CPI grants provide support for innovative, local, coastal management projects in four program areas: Resilient Communities; Public Access; Working Waterfronts and Coastal Stewardship.

  Example projects include habitat restoration, park planning and improvements, waterfront revitalization and improving communities' resilience to coastal hazards.

Nonpoint Source Funds

› Funding for control of water pollution from nonpoint sources is managed by the Nonpoint Source Management Program. Nonpoint source pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources, including stormwater. The goal of these grants is to reduce nonpoint source pollution from land use activities. Financial assistance is available to Florida's local governments, including county and municipal governments, special districts, water management districts, other state agencies, public universities/colleges, and national estuary programs located in Florida. Eligible projects include, but are not limited to:

1. Demonstration and evaluation of best management practices (BMPs).
2. Nonpoint pollution reduction in priority watersheds (e.g., areas with water quality restoration plans, etc.).
3. Example includes treatment of impaired waters.
4. Green Stormwater Infrastructure (GSI) / Low Impact Development for stormwater.
5. Ground water protection from nonpoint sources.
6. Public education programs on nonpoint source management (Clean Water Grant only).
7. Septic to sewer projects (Clean Water Grant only).

› Nonpoint Source Grants include:

- State Water-quality Assistance Grant (SWAG) – Projects include implementation of best management practices designed to reduce pollutant loads to waters not meeting water quality standards from urban stormwater discharges.
- Federal Clean Water Act Section 319(h) Grants – Projects include bioswales, green roofs, pervious pavement, plantings for bank stabilization, low-impact development projects, erosion control BMPs, education related to nonpoint source pollution, agriculture demonstration projects, septic to sewer projects (laying laterals from residences and/or businesses to main sewer line, connection to line, and grinding station), and monitoring activities for project to evaluate BMP effectiveness. Non-federal, matching funds or in-kind contributions are required.

Table 4 FDEP Grants

Grant	Eligibility	Funding Duration	Portal Open	Award Timeframe	Funding	Matching	No. Projects Selected
Resilient Florida Grants (ARPA grant not included)							
Resilient Florida Planning Grant	Counties / municipalities	3 years	July 1st to Sep 1st	Q3 of FY	$20 million (FY 21/22)	No	Listed TBD (FY 21/22)
Statewide Flooding and Sea Level Rise Resilience Plan Grant	Counties / municipalities / WMDs / flood control districts	3 years	July 1st to Sep 1st	Following July 1st after Legislative approval	$100 million (FY 22/23)	50% cost share	76 (FY 22/23)
Regional Resilience Entity Grant	Regional resilience entities made up of local governments formalized through an MOU/MOA or other similar instrument	1 year	May 1st to May 27th	Q1 of FY	$2 million (FY 21/22)	No	9 (FY 21/22)
Florida Resilient Coastlines Program					$5 million		
Resilience Planning Grants	Florida communities that are required to have a Coastal Management Element in their Comprehensive Plan.		Aug 1st to Oct 9th (2020)		$2.3 million (FY 20/21)	No	34 (FY 20/21)
Resilience Implementation Grants	Florida communities that are required to have a Coastal Management Element in their Comprehensive Plan.	1 year	Aug 1st to Oct 9th (2020)		$3.58 million (FY 21/22) $223k (FY 20/21)	No	12 (FY 21/22) 2 (FY 20/21)
Florida Coastal Management Program							

Coastal Partnership Initiative Grant Program	Florida's 35 coastal counties and all municipalities within counties' boundaries that are required to include a Coastal Management Element in their local Comprehensive Plan.	1 year	August 16th to Oct 15th	July 1st to June 30th	Max. $30k (Planning & Design projects) / Max. $60k (Construction & acquisition)	Yes	6 (FY 19/20)
Nonpoint Source Management Program							
State Water-quality Assistance Grant (SWAG)	Local governments and water management districts.	3 years	Anytime (review period Mar/ Apr and Sep/ Oct)	July 1st to June 30th	$5 million annually	No	
Federal Clean Water Act Section 319(h) Grants	State agencies, local governments and special districts, public universities and water management districts.	3 years	Anytime (review period Mar/ Apr and Sep/ Oct)	October 1st to Sep 30th	Approx. $5 to $6 million annually	Yes	

Other Opportunities

Southwest Florida Water Management District (SWFWMD)

- Cooperative Funding Initiative
- The Cooperative Funding Initiative (CFI) is a cost-share program that covers up to 50 percent of the cost of projects that help create sustainable water resources, enhance conservation efforts, restore natural systems and provide flood protection. All CFI funding decisions are made by volunteer Basin Board members who are well informed on the specific resources and challenges within their individual basins. Working with local governments and community partners allows the district to leverage its investment. Approximately $25 million is available yearly. 50/50 cash cost share between the Basin Boards and the cooperator. (In-kind services not eligible as a match.)

Florida Department of Emergency Management (FDEM)

- Floodplain Management Program
- Flood Mitigation Assistance Program
- Hazard Mitigation Grant Program
- Pre-Disaster Mitigation Grant Program
- Building Resilient Infrastructure and Communities (BRIC) Grant Program, as funded by the Federal Emergency Management Agency (FEMA)

Florida Department of Economic Opportunity (DEO)

- Community Planning Technical Assistance Grant
  - DEO Technical Assistance Grants assist counties, municipalities and regions in developing economic development strategies, meeting the requirements of the Community Planning Act, addressing critical local planning issues, and promoting innovative planning solutions to challenges identified by local government applicants; additionally, CPTA grants can also be used to assist with disaster recovery, resiliency, and economic development planning. Grant period is July 1st to June 30th (multi-year projects are not accepted). This program is typically cost reimbursement but may sometimes be fixed price agreements, with the typical award being up to $75,000. Anticipated funding announcements are posted annually on DEO's webpage, request submissions are due in April.
  - Eligibility: Counties and municipalities; and regional planning councils that propose projects on behalf of or for the benefit of counties, municipalities or the region and that have support, in writing, from the counties or municipalities affected by the proposed grant project.
  - Project Types: should relate to community planning and economic development strategies that implement the requirements in the Community Planning Act (see section 163.3168, Florida Statutes). DEO encourages communities to apply for projects related to planning for disaster recovery and community resiliency, especially related to flooding and the effects of sea level rise and meeting the requirements in section 163.3178(2)(f), Florida Statutes. Applicants are encouraged to seek funding for innovative, creative, or unique approaches to planning, development, and infrastructure in their community.
- Florida Job Growth Fund

- The Florida Job Growth Grant Fund is created within the department to promote economic opportunity by improving public infrastructure and enhancing workforce training. The Florida Job Growth Grant Fund may not be used for the exclusive benefit of any single company, corporation, or business entity. Grants fall in to three categories and are selected by DEO and Enterprise Florida Inc: Workforce training, SFWMD projects, and State or local public infrastructure projects to promote economic recovery in specific regions of the state, economic diversification, or economic enhancement in a targeted industry. Recent awards range from $90,000 to $10 million. Applications submitted through the DEO Florida Job Growth Grant Fund webpage.

United States Department of Agriculture (USDA)

› Community Facility Grant Program (AP)

- USDA Community Facility Grants can be used to assist low-income, rural areas and municipalities in developing essential public facilities for public bodies, not-for-profit corporations and Indian tribes and rural areas and municipalities with a population of less than 20,000. Funding is on a graduated scale, with larger percentages geared toward small and low-income communities. A maximum of 75 percent of project costs may be funded with this grant, depending on population and median household income of the community. Remaining costs may be funded with a rural development loan or matching funds from other sources. Pre-applications may be filed with the rural development office serving your area; applications may be filed year-round.

› Rural Development Water and Waste Disposal Loan and Grant Program

- The U.S. Department of Agriculture's Rural Development Department provides long-term low-interest loans and grants, as well as loan guarantees, to rural communities and small municipalities of 10,000 or less people. These loans and grants may be used to help fund new, upgraded, renovated and expanded water-supply storage and distribution systems and waste-collection treatment and disposal systems, including wastewater, solid waste and storm drainage. Applications may be filed with the Rural Development office serving your area; applications may be filed year-round. No match is required; however, joint funding of projects with private funds is encouraged.

National Fish & Wildlife Foundation (NFWF) National Coastal Resilience Fund

› The NCRF is a national program focused on enhancement of resilience for coastal communities. All projects under this program must demonstrate a dual benefit to both coastal communities and natural habitats. The NCRF supports projects that will result in the creation and/or restoration of natural systems in order to increase the resilience of communities from coastal hazards and improve habitats for fish and wildlife species. Award decisions will be made based on regional circumstances and needs, but all proposals must address the following priorities:

- Nature-Based Solutions: Projects must focus on identifying or implementing natural, nature-based or hybrid solutions,3 such as restoring coastal marshes, reconnecting floodplains, rebuilding dunes or other natural buffers, or installing living shorelines to both reduce climate risks to communities while enhancing habitats (hereinafter "nature-based solutions").
- Community Resilience Benefit: Projects must show clear benefits in terms of reducing current and projected threats to communities from coastal hazards, including, but not limited to: sea-level rise, lake-level change, coastal erosion, increased frequency and intensity of storms, and impacts from other chronic or episodic factors (e.g., nuisance flooding during high tides, permafrost melt) (hereinafter collectively "coastal hazards").
- Fish and Wildlife Benefit: Projects must help to improve habitats for fish and wildlife species. Proposals should be as specific as possible in identifying the anticipated benefits to habitats and species that will result from the project proposed.

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Doris Duke Charitable Foundation (DDCF)

› DDCF's Environmental Program strives to meet four main strategies through grant awards: 1) enabling strategic wildlife habitat conservation in an era of climate change; 2) reducing impacts on the landscape from increased energy development and energy demand; 3) encouraging land stewardship and sustainability; 4) helping to build a clean-energy economy.

5

Infrastructure Improvements and Recommendations

Infrastructure Improvements

As part of the Inverness Stormwater Master Plan Scope of Services, the Team drafted a memorandum summarizing the recommended actions, projects and/or stormwater improvements to assist the City in the prioritization and implementation of the Stormwater Master Plan.

The City identified areas that frequently experience flooding in the event of heavy precipitation. These areas have been mapped in **Figure 1, Project Location Map.** The summary memorandum provides recommendations for each of the identified locations prioritized. The improvements have prioritized based on a review of the recommendations with City staff.

Table 5 Prioritization Per City Needs

Location
1. North Pine Avenue
2. North Apopka Avenue
3. White Lake Drive
4. West Highland Boulevard
5. Turner Camp Road
6. Emery Street and Zephyr Street
7. West Grace Street
8. Cherry Avenue
9. North Line Avenue

1. North Pine Avenue

The segment of North Pine Avenue has an undersized drainage collection system that discharges to Henderson Lake. Before discharging to Henderson Lake, the stormwater runoff is routed to a sediment separator that provides treatment. The existing drainage collection system needs to be evaluated and upsized.

Two vacant parcels that are owned by the City of Inverness were identified. One is located south east of the intersection of North Pine Avenue and Zephyr Street (Parcel ID: 20E19S170050 01190 0110), and the other north east of the intersection of Emery Street and North Seminole Avenue (Parcel ID: 20E19S170050 01190 0020). Both share a property line. These properties should be considered for a dry retention pond, since the soils in this area are predominantly hydrological soil group A, Lake fine sands.

2. North Apopka Avenue

Segments of North Apopka Avenue between the Old Courthouse and East Vine Street have separate drainage collection systems that discharge to Henderson Lake. The existing drainage collection system needs to be evaluated and upsized.

No vacant parcels were identified in the project corridor. To improve the water quality discharging to Henderson Lake, a Nutrient Separating Baffle Box (NSBB) should be constructed at the outfall to remove debris and sediments from the runoff.

3. White Lake Drive

White Lake Drive does not have a stormwater collection or drainage treatment system and is adjacent to the flood plain on the north. Additionally, White Lake appears to be landlocked. A stormwater collection and drainage treatment system are recommended.

There are three vacant properties located along the north side of White Lake Drive, which should be considered for detention ponds. One lot is adjacent to a County Right of Way (ROW) that is labeled Orange Drive (Parcel ID: 20E19S070040 000A0 0030). The other two parcels are: Parcel ID: 20E19S070040 000A0 015 and Parcel ID: 20E19S070040 000A0 0130. The three parcels need to be evaluated for flood plain impacts.

Additionally, White Lake receives untreated runoff form US 41, which is a Florida Department of Transportation (FDOT) owned road. US 41, in the vicinity of White Lake Drive, is expected to be widened in the future. It is recommended that the City discuss the proposed improvements with the Department to identify improvements that can benefit both the City and the Department.

4. West Highland Boulevard

The segment of West Highland Boulevard, located south of Withlacoochee Technical College and north of a residential neighborhood, has no stormwater system between South Boulevard and South Montgomery Avenue. The area lacks an outfall and conveyance system for the runoff due to land boundaries.

There are two vacant properties located east of the intersection of West Highland Boulevard and Camelia Avenue which should be considered for a dry retention pond, since the soils in this area are predominantly hydrological soil group A, Candler fine sands. One lot is privately owned, and the other is owned by the Citrus County School Board.

5. *Turner Camp Road*

Turner Camp Road (CR 581) is within the City limits but is a County Road. The drainage system consists of open swales, side drains and cross drains that ultimately drain to Henderson Lake. The existing open drainage collection system needs to be evaluated.

No vacant parcels were identified in the project corridor. To improve the water quality discharging to Henderson Lake, a Nutrient Separating Baffle Box (NSBB) should be constructed at the outfall to remove debris and sediments from the runoff. Since this is a County road, coordination with the County should take place to identify who is responsible for the improvements.

6. *Emery Street and Zephyr Street*

Emery Street and Zephyr Street do not have dedicated drainage collection systems. Runoff is collected in the undersized drainage systems that sever the streets that run from south to north along them. A drainage conveyance system for these two roads, should be designed, and the runoff diverted to the drainage systems proposed for Cherry Avenue, North Line Avenue, North Pine Avenue and North Apopka Avenue.

7. *West Grace Street*

The segment of West Grace Street has an undersized drainage collection system that discharges to the drainage system that serves US Hwy 41 at two different locations. The east segment of West Grace Street discharges to the US Hwy 41 system, and then to Cooter Lake. The west segment of West Grace Street discharges to the US Hwy 41 system, which discharges to an FDOT pond located at the north east corner of the intersection of Tompkins Street and Chery Avenue. The FDOT pond discharges to Henderson Lake. The existing drainage collection system needs to be evaluated and upsized.

There is a vacant property located southeast of the intersection of South Pine Avenue and West Grace Street which should be considered for a dry retention pond, because the soils in this area are predominantly hydrological soil group A, Lake fine sands. This lot is privately owned.

8. *Cherry Avenue*

Cherry Avenue has an undersized drainage collection system that discharges to Henderson Lake without treatment. The existing outfall pipe, for the drainage collection system, is located on private property.

The City owns a parcel at the intersection of Cherry Avenue and Zephyr Street which it has considered using to construct a drainage pond. The existing drainage system should be evaluated and upsized as needed and the outfall pipe reconstructed in City ROW.

9. *North Line Avenue*

The segment of North Line Avenue has an undersized drainage collection system that discharges to Henderson Lake, without treatment via a 15” pipe, at the North Line Avenue ROW. Additionally, based on available records, the North Line Avenue drainage system is connected to the existing Cherry Avenue drainage system, which discharges via an existing outfall pipe located on private property. The existing drainage collection system needs to be evaluated and upsized.

No vacant parcels were identified in the project corridor. To improve the water quality discharging to Henderson Lake, a Nutrient Separating Baffle Box (NSBB) should be constructed at the outfall to remove debris and sediments from the runoff.

Recommendations

The need for infrastructure improvements in the downtown area has been identified. Other low lying areas in the City also have been identified. These areas need further evaluation so they can be designed and budgeted in the City's Capital Improvement Plan.

A

Appendix A: City of Inverness Stormwater Management Code Review Matrix

APPENDIX A - CITY OF INVERNESS STORMWATER MANAGEMENT CODE REVIEW MATRIX			
Comprehensive Plan	**Code Reference**	**Meets / Exceeds SWFWMD Handbook II**	**SWFWMD Code Summary**
Highly drained soils and proximity to the Floridian aquifer make suitable conditions for**aquifer recharge.**	Ch 4 CE	N/A	
Lake management plans are necessary to understand and protect each system.	Ch 4 CE	N/A	
Stormwater **drainage facilities** are required of new development	Ch 5 IE	Meets generally	
Post-development runoff do not exceed predevelopment rates.	FLUE Policy 1.1.1.11	Meets SWFWMD Sec. 3.1(d)	
Prohibit new stormwater facilities, septic tanks and hazardous waste generators within wellhead protection areas.	FLUE Policy 1.2.6.3	N/A	
Enforce construction of on-site stormwater management systems for new developments.	CE Policy 4.1.2.2	Meets generally	
Prohibit discharge of inadequately treated stormwater into waters of the state.	CE Policy 4.1.2.11	Meets SWFWMD Sec. 4.1(f)	
Level of Service			
Residential (single family) - **first one inch of runoff**	IE Policy 5.4.2.1	Inconsistent	Single family residential is not specifically addressed. First one inch of rainfall is used but for other circumstances.
Nonresidential developments and new subdivisions or planned developments -**25 year/24 hour duration rainfall**	IE Policy 5.4.2.1	Inconsistent with SWFWMD Sec. 3.1(d&f)	
All new stormwater control facilities treat stormwater for removal of pollutants	IE Policy 5.4.2.2	Meets SWFWMD Sec. 4.1	
Basins, swales, and culverts shall be designed to protect groundwater and surface water quality as well as accommodate stormwater flow	IE Policy 5.4.4.1	Meets generally	
Land Development Code			
Post-development peak discharge shall not exceed the predevelopment discharge rate for a 25 year, 24 hour duration storm event	Sec. 19-5(1)	Inconsistent with SWFWMD Sec. 3.1(e)	Does not differentiate for open vs. closed basin
Side slopes of retention/detention areas shall not be steeper than 1 vertical to 3 horizontal	Sec. 19-5(3)	Inconsistent with SWFWMD Sec. 5.4.1(c)	Max side slope is 4:1. 3.5:1 is considered a substantial deviation.
Design Standards			
10 year frequency storm for general design	Sec. 19-8(a)	N/A	
50 year frequency storm in depressed areas which have no outlet other than a storm sewer system	Sec. 19-8(b)	N/A	
Level of Service			
Residential (single family) - first one inch of runoff	Sec. 2.13(E)(1)	Inconsistent	Single family residential is not specifically addressed. First one inch of rainfall is used but for other circumstances.
Nonresidential developments and new subdivisions or planned developments - 25 year/24 hour duration rainfall	Sec. 2.13(E)(1)	Inconsistent with SWFWMD Sec. 3.1(d&f)	
Culvert Structures - 10 year design	Sec. 2.13(E)(1)	N/A	
Note: N/A = not specifically addressed by SWFWMD code			