LID vs. GSI: Development Process

Avoidance (LID)
- Map natural infrastructure
- Preserve open spaces, natural areas, trees and native soils
- Retain natural hydrologic and topographic features in site plan

Minimization (LID)
- Limit and disconnect impervious surfaces
- Mimic and maximize pre-development hydrologic processes
- Integrate practices that provide co-benefits and multifunctional areas

Mitigation (GSI)
- Implement runoff source control measures
- Employ natural processes to treat and retain stormwater
- Provide treatment and attenuation in multiple areas across the site

Intro to LID+GSI Community Scoping and Code Audit Tool, MRC LID Conference (Oct. 2022), Eban Bean
Low Impact Development (LID) Ordinance Concepts and Recommendations
Agenda

Introduction

Katrina Locke, Volusia County

LID/GSI Examples

Michelle Morrison, ECFRPC

Draft LID Ordinance Recommendations

Jerry Murphy, UF/IFAS

LID Code Audit Tool Overview

Eban Bean, UF/IFAS

Project Next Steps

Katrina Locke
<table>
<thead>
<tr>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
</tr>
</thead>
</table>
| **LID Regional Roundtable (RR)**  
- LID technical experts from permitting, design, implementation  
- Understand LID barriers & challenges  
- Brainstorm LID opportunities & strategies | **Develop LID Ordinance Recommendations**  
- Review RR lessons learned  
- Review comp plans & LDRs  
- Review Best Practices & implementation cases  
- Draft LID Ordinance recommendations for Volusia | **Volusia ENRAC Meeting**  
- Introduce grant project  
- Share RR lessons learned  
- Discuss LID Ordinance recommendations | **Volusia ENRAC Meeting**  
- Discuss Draft LID Ordinance Recommendations |
| **Volusia ENRAC Meeting**  
- Introduce grant project  
- Share RR lessons learned  
- Discuss LID Ordinance recommendations | **Develop LID Implementation Guidebook**  
- Incorporate Best Practices  
- Include sample LID GOPs & LDRs  
- Include sample implementations | **Regional Resilience Collaborative Green, Gray, Blue Infrastructure TAC Meeting**  
- Discuss Draft LID Ordinance recommendations & Implementation Guidebook | **Share Results**  
- Conduct virtual meeting to share LID Ordinance Recommendations & Implementation Guidebook |
LID/GSI Examples

Michelle “Mo” Morrison
East Central Florida Regional Planning Council, Planner
mmorrison@ecfrpc.org
LID/GSI Examples

LID/GSI Implementation Examples
- Commercial
- Residential
- Municipal

SJRWMD Collaboration Potential

LID/GSI Policies and Codes
- Volusia
- Ormond Beach

LID/GSI Example Incentives
LID GSI Implementation: Commercial

Grove Roots Brewing Co. (Winter Haven, FL)
- Infill, redevelopment
- Reduced and disconnected a previously 100% impervious area from the City’s piped stormwater conveyance system
- Infiltrates ~100% stormwater on site
- Integrated system of roof gutters/downspouts, infiltration basins, parking areas graded to flow into grassed swales, open areas, and trees
- Parking lot bioswales
- Mechanical reworking of compacted soil

Source: Winter Haven From Gray to Green Enhanced Stormwater Permit Design Manual (Appendix D)
LID GSI Implementation: Commercial

**True Value Hardware (Philadelphia, PA)**

- Redevelopment of store, two vacant buildings, asphalt parking, gravel and lawn, with ~26,000 sf impervious area
- Rain garden, 2 subsurface infiltration basins
- Staged construction prevented compaction of the native soils in areas where infiltration was proposed

Holton Blackstone & Mayberry Office (Nashville, TN)
- Pervious pavers, bioretention, pea gravel/infiltration

Metro Office Building (Nashville, TN)
- Pervious asphalt (replaced with pervious pavers), bioretention islands, bioretention area

Source: http://maps.nashville.gov/LID_Sites/
LID GSI Implementation: Commercial

Whole Foods chose to feature the above-ground cistern next to its entrance as a memorable symbol of the retailer’s values and commitment to sustainability. (© Regency Centers)

Whole Foods (Raleigh, NC)
- Rain chain, cistern for irrigation & toilets, subsurface infiltration system, bioswales, bioretention, underground detention chamber

Source: https://developingresilience.uli.org/case/market-at-colonnade/
LID GSI Implementation Examples: Multi Family

*Tupelo Vue (Winter Haven, FL)*

- 5-story apartment complex
- Infill, redevelopment
- Infiltrate ~100% stormwater on site
- Integrated system of roof gutters/downspouts, infiltration basins/ponds, grassed bioswales and open areas, and trees
- Drainage and biological capacity of soils restored through mechanical reworking of soils and soil amendments using native topsoil
- Redevelopment included removal of all existing impervious areas (structures and pavement)
- Under-building parking reduced impervious area by 50%
- LID practices located within routinely maintained landscaped areas

Source: Winter Haven From Gray to Green Enhanced Stormwater Permit Design Manual (Appendix D)
LID GSI Implementation: Residential

El Prado Stormwater Garden (Tampa, FL)

- SWFWMD Cost-Share Funding Project
- Created to address stormwater flooding in residential areas
- Amended soils, bioretention, gravel pathway & storage areas, native vegetation

Source: https://gsiphotosflorida.org(photo/stormwater-drainage-at-el-prado-stormwater-garden/
The Nature Conservancy All Rights Photo credit: Roberto Gonzalez
LID GSI Implementation: Residential

Sunbridge Weslyn Park (Osceola County, FL)

- Florida-Friendly Landscaping
- Requirement: Homeowners must abide by landscaping standards

Source: LID Regional Roundtable Presentation by Pierce Jones, UF/IFAS Program for Resource Efficient Communities (2.2.23)

https://issuu.com/tdc6900/docs/sb_communitystandards_landscaping_weslynpark_final
LID GSI Implementation: Residential

The Villages (Sumter County, FL)
- Florida-Friendly Landscaping
Escambia County Office Complex (Pensacola, FL)
- Largest FL Green Roof (33,000 sf), Biofiltration, native vegetation, energy savings

Source: https://gsiphotosflorida.org/project/escambia-county-office-complex/
Cascades Park (Tallahassee, FL)

- 25-acre public park with wildlife, ponds, interconnected multi-use trail system, amphitheater, restaurant, historic markers, playgrounds, open space
- Former brownfield site with runoff, erosion, flash flooding issues
- 2021: Construction on adjacent 5-acre mixed use live-work-play-stay destination
- Biofiltration, bioretention, rain garden, wetland

Source: https://gsiphotosflorida.org/project/cascades-park/
The Nature Conservancy All Rights Photo credit: Tyler Jones
LID GSI Implementation: Institutional

Sandra Stetson Aquatic Center (Deland, FL)
- Stetson Institute for Water & Environmental Resilience
- GSI Demonstration project
- Biofiltration, rain garden, floating wetland beemat system, native vegetation

Source: https://gsiphotosflorida.org/project/stetson-aquatic-center/
The Nature Conservancy All Rights Photo credit: Tyler Jones
Impacts to our Communities

- **Groundwater availability**
  - Changes in rainfall, water demand and recharge
  - Saltwater intrusion

- **Localized flooding**
  - Increased nuisance/tidal flooding
  - Increased extreme weather events
  - Increased storm surge height

- **Water quality and wetland habitat**
  - Loss of inundation and filtering ability
  - Changes in wetland communities
  - Increased salinity in groundwater and coastal areas

Source: Tom Frick, SJRWMD Chief Resilience Officer
SJRWMD Resilience Priorities

Saltwater intrusion
- Enhancing recharge (e.g., AWS)
- Monitoring and modeling
- Permitting

Flood protection
- Structures and land management
- Wetland acquisition and enhancement
- Monitoring and modeling

Nature-based solutions
- Wetland acquisition and enhancement
- Living shorelines

Source: Tom Frick, SJRWMD Chief Resilience Officer

Ocala Wetlands Recharge Park (cost-share funding)
https://www.sjrwm.com/streamlines/ocala-recharge-park/#gsc.tab=0
SJRWMD Collaboration Potential

- WMD permit by state law
  - Local jurisdictions can impose stricter requirements (responsible for enforcement)
- Provide technical assistance
- Potential to expedite LID projects
- Consider public pilot projects
  - Collect data (pre- and post-)
  - Benefits future projects
  - Demonstration for private projects
- Cost-share funding
  - Identify hotspots (flooding/water quality)
  - Apply for funding
LID/GSI in Comprehensive Plan
Volusia County

DRAINAGE
Policy 9.1.2.6 Volusia County will encourage the use of low-impact development/green infrastructure as a method of stormwater management.

GROUNDWATER AQUIFER RECHARGE
Policy 10.1.1.13 Volusia County shall encourage the use of green infrastructure and low impact development.

COASTAL
Policy 11.9.1.9 Volusia County will promote green infrastructure as a tool for resiliency and the protection of water quality and coastal systems.

CONSERVATION
Policy 12.1.3.6 Volusia County shall encourage the use of green infrastructure to protect the ecological functions of natural drainageways.

Future Land Use
Policy FG 4.1 Sustainable Development Area (SDA) districts shall promote protection of green infrastructure, natural resource protection, water and energy conservation, and low impact compact development.
Sec. 72-547. - Conservation subdivisions. ... (13) Innovative development practices that are consistent with the purposes of conservation development are strongly recommended. These include, but are not limited to, low impact development, Dark Skies, Water Star, Firewise, US Green Building Council LEED certified development, Florida Green Building Coalition designation or other county approved certifications which promote sustainability, or water neutrality, or for environmental restoration of degraded wetlands or habitat. Provisions of the land development regulations, excluding the provisions of section 72-547, may be waived by DRC to the extent they are in conflict with the above innovated development practices.
UTILITIES

OBJECTIVE 2.2. DEVELOPMENT REVIEW
Policy 2.2.6. Drainage and stormwater management systems shall use natural systems to the greatest extent possible, and land development modifications shall resemble natural features to the greatest extent practicable.

FUTURE LAND USE

OBJECTIVE 2.6. SUSTAINABILITY
POLICY 2.6.5. Encourage integration of passive solar design, green roofs, active solar and other renewable energy sources into development projects through the Land Development Code.

CONSERVATION

OBJECTIVE 7.3. SUSTAINABILITY
POLICY 7.3.4 Create, protect and manage systems of green infrastructure (i.e., urban forests, parks and open spaces, green roofs, natural drainage systems).

POLICY 7.3.6 Encourage site design techniques that restore natural “green infrastructure” (i.e., urban forests, parks and open spaces, natural drainage systems) instead of relying solely on engineered systems that require higher energy and carbon inputs.
CONSERVATION

GOAL 12. LOW IMPACT DEVELOPMENT

FOR NEW DEVELOPMENT AND REDEVELOPMENT, APPLY BETTER SITE DESIGN AND LOW IMPACT DEVELOPMENT (LID) TECHNIQUES, AND PURSUE COMMITMENTS TO REDUCE STORMWATER RUNOFF VOLUMES AND PEAK FLOWS, TO INCREASE GROUNDWATER RECHARGE, AND TO INCREASE PRESERVATION OF UNDISTURBED AREAS.

OBJECTIVE 12.1. LAND DEVELOPMENT CODE AMENDMENTS

Policy 12.1.1. Integrate into the Land Development Code (LDC) the source control concept which places a greater importance on managing smaller, cost-effective landscape features located on each lot rather than through costly pipe and pond stormwater management design.

The remaining policies in this objective use phrases such as:

• Maintain or improve infiltration, frequency and volume of discharges, and groundwater recharge
• Integrate alternative stormwater management practices
• Reduce the use of centralized best management practices (BMPs)
• Amend the LDC and Construction Details to permit LID designs
Sec. 1-20. - Codes and standards adopted by reference.

(e) Low Impact Development Manual for the City of Ormond Beach. The Low Impact Development Manual as published by the city planning department, is adopted.
Sec. 3-18. - Surface water runoff control.

(l) Low impact development.

(1) Applicability. The inclusion of low impact development (LID) techniques, in whole or in part, in the planning, design, construction, and operation of a site within the City of Ormond Beach is fully elective on the behalf of the developer. Any developer may choose to include the integrated management practices (IMPs) closely associated with LID in a site with regards to stormwater management.

(8) Any development or redevelopment that wishes to incorporate the LID requirements set forth herein into the project shall have all fees associated with conceptual plan review waived and all LID related plan check processes shall be expedited.
LID GSI Incentive Examples

Ormond Beach
- Plan review fees waived
- Process expedited

Apopka
Incentives for green building features including vegetated roofs, pervious pavement, rain gardens, street-side swales, cisterns, underground storage basins, and rain gardens:
- Additional height
- Additional lot coverage
- Parking reduction

Orlando
- Rebates for Florida-Friendly landscaping, irrigation, and rain barrels
- Reduced stormwater fees and permitting/site development credits for certain LID-GSI projects
LID GSI Incentive Examples

Titusville
- Parking reductions
- Setback reductions
- Additional density
- Expedited applications

St. Petersburg
- Stormwater fee credit (up to 52%) to non-single-family property owners to operate and maintain onsite detention or retention stormwater management systems

Sebastian
- Stormwater fee credit (up to 50%) to non-residential property owners who reduce water pollution by implementing LID and GSI practices
LID GSI Incentive Examples

Tallahassee
- Stormwater on-site mitigation loan program to prevent or reduce future interior flooding for residents

Tampa
- Fast-track review for green commercial and residential construction implementing LID and GSI techniques that improve water quality and provide for on-site water catchment

Orange County
- Free rain barrels

Alachua County
- Stormwater fee credit for properties that implement LID practices
- Technical assistance for LID practices
- Rebate program for rain barrels and rain gardens
Doral (LID Requirements)

ARTICLE XVI. - LOW IMPACT DEVELOPMENT PRACTICES

New buildings and redevelopment sites shall incorporate the following low impact development (LID) practices into project design, site and building plans:

Developers shall implement the following non-structural LID practices to the maximum extent practical.

Developers shall implement a minimum of two structural LID practices from the following list, where one meets the water quantity requirement and the other meets the water quality requirement, per Section 11.0 of the 2021 LID Master Plan Update and the SFWMD ERP Applicant's Handbook Volume II.

Maintenance is required to preserve the efficacy of the implemented LID practice(s).
Doral (LID Incentives)

Incentives. To encourage developers to design site plans using more than the minimum required LID practices, the city may offer the following incentives:

(1) Expedited review of permits
(2) Implementation of open space credit
(3) Reduced application fee or alternative fee schedule for LID projects
(4) Developer/builder award or recognition program
LID GSI Parking Examples

Apopka
Incentives for use of pervious pavement on at least 50 percent of parking lot and driveway area include:
- Additional height
- Additional lot coverage
- Parking reduction

Groveland
Requires the application of permeable parking lot surfaces for commercial developments proposed within high aquifer recharge areas

Winter Haven
Requires all off-street parking lots to provide for the attenuation and treatment of stormwater and landscape and buffer areas to be designed and located to filter, store and/or convey the expected stormwater flows from surrounding paved areas through the use of LID techniques
Doral

New buildings and redevelopment sites shall incorporate the following low impact development (LID) practices into project design, site and building plans:

Developers shall implement the following non-structural LID practices to the maximum extent practical:

\[(d)\] *Minimization of total impervious areas.*

Utilize alternative roadway, sidewalk, parking lot, and driveway designs to minimize imperviousness and promote natural infiltration.

Utilize stabilized grass or other similar surfaces for parking spaces provided above the minimum requirement.
Jerry Murphy, JD, AICP, CFM
UF/IFAS Program for Resource Efficient Communities
State Specialized Program Agent (SSPA) – Flood Resilient Communities
murphyge@ufl.edu
Other Recommendations: Channel Protection Flow

**Channel Protection Flow** – protect the integrity of natural stream channels. Matching the pre-development infiltration rate addresses one of the major adverse impacts to stream channel morphology, however, the other major adverse impact—increases in the peak rate of runoff—must be addressed. Channel Protection Flow addresses the increases in the peak rate of runoff and the adverse impacts on the hydromorphology of the stream channel.

**Example**

- “Natural stream channels must be protected from both changes in the peak rate and volume of post-development stormwater.”
Conveyance Flow – ensure that the system has adequate capacity for the regulatory storm event.

Example:

• “Open drainage or enclosed conveyance systems must be designed to provide adequate capacity for the flows leading to, from, and through stormwater management systems for the 10-year, 24-hour storm event.”
Flood Protection – to be coordinated with other floodplain regulations to maintain the post-development peak runoff rate the same or less than the pre-development peak rate.

Example:

• “The total area of the sub-watershed area must remain unchanged, with only those connected impervious areas included in the peak rate calculation for post-development conditions. The area of the excluded impervious area will be considered as Forest in Fair Condition for the purposes of the hydrologic analysis.”
Other Recommendations: Redevelopment

High Density Residential and Non-Residential Redevelopment Projects

• Many developed sites lack adequate stormwater treatment.
• Apply to projects that modify, e.g., ≥10,000 sq. ft. of site area.
• Determine the extent of existing impervious area from an as-built site survey.
• Exclude wetlands, watercourses, open water bodies, and lands protected by easement.
• Comply with groundwater recharge and water quality standards for the entire site.
Other Recommendations: Industrial

Land Uses with High Pollutant Loads

- Prevent adverse impacts on ground and surface water
- Enumerate uses with potentially high pollutant loads
- Provide standards for groundwater recharge volume for roof areas
- Provide for adequate treatment of full water quality volume

Examples include:

- Industrial sites; Loading and storage of hazardous substances; gas stations; Exterior vehicle maintenance and service facilities; equipment storage areas.
Implementing and Integrating GSI + LID Strategies in Development – Incentives for retrofits

Example:

“GSI + LID System Retrofits for Non-residential Sites.
(1) To the maximum extent feasible, redevelopment projects in non-residential areas of the county will employ GSI + LID concepts to retrofit stormwater management to reduce runoff volumes and provide attenuation of non-point source pollutants.
(2) GSI + LID retrofits can be incorporated within the existing infrastructure.
(3) GSI + LID planters, curb extensions, modular wetland systems, and bio-retention systems are acceptable GSI + LID systems for non-residential retrofits.”
Other Recommendations: Waivers

Waiver of GSI + LID Requirements – there is always an exception.

Example:

• “An applicant may request the County waive a requirement.
• “The waiver request application must include supporting materials.
• “The Commission will obtain the professional opinion from the County Engineer regarding the waiver request as part of the staff recommendation and report on the application.
• The Commission will take one of the following actions:
  (1) Grant the waiver, (2) Deny the waiver, (3) Offer the applicant the option of obtaining a third-party review, subject to provisions, with no waiver guarantee.
LAND PLANNING

Four Divisions:

I. Definitions and Interpretation

II. Zoning

III. Land Development Regulations

IV. Overlay Zones
I. Definitions and Interpretation

• provide definitions for new and unfamiliar terms, e.g., GSI, LID, treatment train, etc.

• Include any necessary language to assure that GSI and LID requirements and incentives are understood and appropriately implemented

II. Zoning

• Review for any conflicts, but probably not a lot here.
Volusia County LDC Chapter 72

III. Land Development Regulations

1. Development Procedures and Requirements
2. Subdivision Regulations
3. Final Site Plan Review Procedures
4. Design and Construction Standards of Improvements
5. Installation, Guarantee, Inspection of Required Improvements
7. Flood Hazard Management
8. Stormwater Management
10. Tree Preservation
Volusia County LDC Chapter 72

III. Land Development Regulations - continued

11. Wetland Alteration Permits
13. Potable Water Well Field Protection
14. Concurrency Management
15. Environmental Standards for Beach and Dune Protection
16. IRL Surface Water Improvement and Management Overlay
17. Gopher Tortoise Protection
18. Manufacturing Site Plan Program
20. Pending Applications, Conflicting Provisions, Enforcement, etc.
IV. Overlay Zones

1. Enterprise Community
2. Osteen
3. Deleon Springs Business Corridor
4. Wilbur-by-the-Sea
5. Southwest Activity Center
Art. III. Land Development Regulations

Div. 8. Stormwater Management

Sec. 72-776 Purpose and Objectives

modify to include post-development ≤ pre-development; empower GSI + LID techniques to reduce quantity and improve quality of stormwater runoff.

Sec. 72-778. - Stormwater management permit review.

include procedure for reviewing post-development ≤ pre-development; empower GSI + LID techniques.
Sec. 72-779 Performance review and design standards modify to incorporate *Environmental Site Design* and references to the GSI + LID *Guidance Manual*. 
(a) **Road design.**

1. Road alignments must follow the existing land contours to the maximum extent practical to minimize excessive cut and fill.
2. Minimize the extent of connected impervious surface area to the maximum extent practical, including minimizing drainage structures in the road, e.g., catch basins, connecting pipe, etc., and employ vegetated swales along the road in appropriate locations.
3. Utilize GSI + LID treatment strategies to treat runoff at the source and not at the end of the drainage system.
4. Utilize multiple GSI + LID treatment strategies in series (treatment trains) to increase the effectiveness of the systems pollutant removal from the stormwater.
(b) **Driveway Layouts.**

1. Use impervious area disconnection strategies to intercept and infiltrate driveway runoff before runoff reaches the road.
2. Allow runoff from driveways to travel across vegetated areas for a minimum of 75’ to facilitate infiltration.

(c) **Lot Design.**

1. Design lots to minimize site clearing utilizing site fingerprinting, i.e., delineating the smallest possible area for clearing and site disturbance where roads, structures, and other improvements are proposed.
2. Layout structure, driveway, and on-site sewage disposal systems to minimize the extent of soil disturbance and grading on the lots.
Lot Design - continued.

3) Utilize the natural topography when siting proposed structures to minimize site disturbance, e.g., create a walkout basement for a house on a natural 15-20% slope.

4) Preserve the infiltrative capacity of native soils by not disturbing areas of the site that aren’t necessary for development or redevelopment.

5) Employ source controls—e.g., cisterns, rain barrels, rain gardens—to collect, minimize, and reuse runoff and promote infiltration; disconnect impervious surface areas to allow runoff to sheet flow across vegetated overland surfaces.

6) Use meadow filter strips at the downhill limits of development to filter runoff prior to any discharge from lots.
Div. 8. Stormwater Management - continued

Sec. 72-779. Performance review and design standards

Sec. 72-780. Issuance of development permit.

Sec. 72-781. Plan adherence.

Sec. 72-782. Maintenance – extremely important, consider regular inspections, performance bonds, other implementation measures.

Sec. 72-783. Variance.

Sec. 72-784. Emergency exemption.
Jerry Murphy, JD, AICP, CFM
UF/IFAS Program for Resource Efficient Communities
State Specialized Program Agent (SSPA) – Flood Resilient Communities
murphyge@ufl.edu
Volusia County Community Scoping Exercise

LID Regional Roundtable Discussion

February 2, 2023

Eban Z. Bean¹, Lesley Bertolotti², & Lynn Jarrett³

¹Ag. & Bio. Engineering, UF|IFAS
²The Nature Conservancy - Florida
³Program for Resource Efficient Communities, UF|IFAS
Enabling Low Impact Development and Green Stormwater Infrastructure

A CODE AUDIT TOOL FOR FLORIDA COUNTIES AND MUNICIPALITIES

<table>
<thead>
<tr>
<th>Points</th>
<th>Criteria</th>
<th>Example Code Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Practice is clearly described and approved or is allowed with design approval.</td>
<td>Where feasible, parking lot islands and perimeter landscaped areas shall be designed and installed to function as stormwater management areas, following design standards for bioretention found in the Stormwater Design Manual. If not feasible, native plants, suitable for the site shall be used.</td>
</tr>
<tr>
<td>3</td>
<td>Practice is encouraged, but some ambiguity or potential conflict exists.</td>
<td>Parking lot islands and perimeter landscaped areas are encouraged to be designed as part of the site’s stormwater management system, based on bioretention standards in the Stormwater Design Manual. Trees must be planted at a maximum interval of 20 feet.</td>
</tr>
<tr>
<td>2</td>
<td>Practice is mentioned, but without standards or guidance for use.</td>
<td>Landscaped areas in parking lot perimeters and islands may be designed and used as stormwater bioretention areas.</td>
</tr>
<tr>
<td>1</td>
<td>Code is silent or significant limits exist, but practice could possibly be used.</td>
<td>Landscaping in parking lot islands and perimeters must achieve a minimum of 75% cover within two years of planting.</td>
</tr>
<tr>
<td>0</td>
<td>Practice is prohibited or very unlikely to be approved.</td>
<td>Parking lot perimeters shall be graded into a berm with a minimum slope of 2:1, covered with landscaping that will form a dense evergreen screen within two years of planting.</td>
</tr>
</tbody>
</table>
Code Audit Process: Pre-Audit

Lay the groundwork

• Establish a core team (3-4)
• Educate staff and decisionmakers
• Plan for Scoping Exercise and Code Audit
• Budget time and/or costs for internal/external audit

Community Scoping Exercise

• Assess GSI in the community and local acceptance of GIS, identify local natural resources, identify water quality and stormwater challenges and solutions
• ID specific code sections or topics for the audit
Community Scoping Exercise

• Guided questions for Core Group and Liaisons
  • How does stormwater or water quality affect your community?
  • What natural assets function as stormwater infrastructure?
  • What LID+GSI is currently in your community?
  • How accepting is your community? Elected officials?
  • Who would be allies? Who would be opponents?

• Goal:
  • Identify strategies for auditing and updating codes
  • Guide sections of Code Audit Spreadsheet Tool to complete
  • Discussion amongst municipal departments and organizations
Community Scoping Exercise Sections

I. LID+GSI IMPLEMENTATION IN YOUR COMMUNITY
II. COMMUNITY ACCEPTANCE OF LID+GSI
III. NATURAL INFRASTRUCTURE IN YOUR COMMUNITY
IV. STORMWATER AND WATER QUALITY
V. REVISING CODES AND POLICIES
I. LID+GSI IMPLEMENTATION IN YOUR COMMUNITY

• LID+GSI in the community:
  • Wetland and floodplain preservation and restoration
  • Conservation or protection of open lands and natural areas
  • Urban forest or tree canopy protection and restoration
  • Cluster or Conservation Subdivisions
  • Sustainable landscaping designs and plants such as Florida-friendly landscaping designs and plants
  • Bioretention areas, such as plantings in parking lot islands
  • Rain gardens
  • Swales
  • Permeable pavement
  • Biosorption activated media filters
  • Beemats
I. LID+GSI IMPLEMENTATION IN YOUR COMMUNITY

• Implementation of LID+GSI is average
• LID+GSI use motivated by:
  • Aesthetics, Community benefits, Water quality, Stormwater volume or flooding, water conservation, demonstration/education
• Successful projects:
  • Demonstration project at Sandra Stetson Aquatic Center.
  • Nutrient reduction project, verified water quality Improvement.
  • Victoria Park planned unit development.
  • Delfina regional library expansion, pervious pavement in amphitheater.
  • None enhanced the community, or became part of the identity, but none failed either
• Maintenance is complaint driven
II. COMMUNITY ACCEPTANCE OF LID+GSI

• Highly rated LID+GSI Benefits: reduce flooding & pollutants, smaller infrastructure, improved infiltration and groundwater/aquifer recharge, natural area preservation, aesthetics

• There are efforts to increase GSI in community, but no outreach based on LID+GSI implementation or incentives for GSI

• Obstacles discouraging GSI: Water management district rules

• Supporters of GSI: Stetson University, VCARD, Soil and water Conservation District, NGO's, environmental groups
  • Skeptics (rather than opposition) object to GSI

• Language can be jargony – need clear everyday definitions
III. NATURAL INFRASTRUCTURE IN YOUR COMMUNITY

• Natural resources:
  • Coastal shorelines (ocean or estuarine)
  • Dunes
  • Mangroves
  • Springs and Aquifers
  • Wetlands
  • Rivers and streams
  • Lakes
  • Forests
  • Prairies
  • Well drained soils
  • Karst geology

• Community recognizes they provide:
  • Value to the community, esp. for outdoor recreation
  • Flood attenuation
  • Water quality protection
  • Regional cooling
  • Wildlife habitat
III. NATURAL INFRASTRUCTURE IN YOUR COMMUNITY

• Protective code designations include:
  • Natural resource management area, environmental core overlay, OFW, environmental future land uses and zoning categories, wildlife corridor; codes in place to protect natural infrastructure.

• No requirements for stormwater treatment before infiltrating to groundwater or sinkholes, or surface waters (State regs govern)

• Waterbodies are protected by buffers: 25 or 50 feed (no vegetation or maintenance reported)
IV. STORMWATER AND WATER QUALITY

• Waters are impaired for nutrients, DO, heavy metals, and chlorophyll-a. There are multiple load reduction requirements (WMD requires nutrient reduction in TMDL areas, community is doing stormwater retrofits, septic-sewer conversion, treatment plant upgrades.

• Retrofitting and redevelopment with LID+GSI or traditional infrastructure may alleviate flooding caused by older developments, elevated groundwater, and climate change.

• BAM, septic tank improvement may address water quality problems caused by fertilizer, wastewater, non-point sources, and “Jeff’s cows”
IV. STORMWATER AND WATER QUALITY

  - Stormwater code does not include LID or GSI to address runoff from New or Re-development projects.
- Community has a stormwater master plan.
- Stormwater fee: Ad valorem assessment generates funds to address water quality and flooding projects (baffle boxes, BAM, etc.)
  - No fee reduction for on-site stormwater system
- Comp Plan’s “Peril of Flood” mitigation includes natural infrastructure, but the hazard mitigation plan does not identify GSI as a mitigation option.
V. REVISING CODES AND POLICIES

• Comprehensive plan encourages LID and GSI.
  • Think code & comp plan are average – included in comp plan, not in LDC

• Community attitudes on changing code
  • Mixed - some want more progressive policies, some want fewer protections. Many people want change, but don't know what they want.
  • Staffing/time restrictions and vested interest in status quo are biggest impediments to community’s codes

• Barriers to implementing in code: LID not specifically addressed, so more cumbersome
V. REVISING CODES AND POLICIES

• Which code sections could be improved to support LID+GSI?
  • zoning
  • site plan
  • storm water
  • street
  • parking
  • erosion and sediment
  • water quality

• Specific LID+GSI topics community could improve on?
  • Mostly stormwater
  • Also site planning
Code Audit Process: Conducting Audit

Adapt the CAST
- Full audit, section of audit, or individual topics
- Gather applicable codes and ordinances

Perform the Code Audit
- Work through questions, finding & referencing code locations
- Record comments and score questions
- Seek input from liaisons

Summarize Results
- Calculate and compare scores by category or topic
- Identify relative strengths & weaknesses of sections
- Report findings
Code of Ordinances
Supplement 56 Update 2
Online content updated on May 11, 2022
CODE OF ORDINANCES City of GAINESVILLE, FLORIDA Codified through Ordinance No. 210666, adopted January 20, 2022 and Ordinance No. 200744, adopted February 17, 2022. (Supp. No. 56. Update 2)

VIEW WHAT'S CHANGED

This Code of Ordinances and/or any other documents that appear on this site may not reflect the most current legislation adopted by the Municipality.

Adopted Ordinances Not Yet Codified
The listing below includes all legislation received by Municipal Code since the last update (printed or electronic) to the Code of Ordinances. This legislation has been enacted, but has not yet been codified.

Ordinance No. 210163
Adopted 5/5/22
AN ORDINANCE OF THE CITY OF GAINESVILLE, FLORIDA, AMENDING SECTION 9.1.1 ELECTION DISTRICTS OF THE CODE OF ORDINANCES BY REDISTRICTING THE CITY OF GAINESVILLE INTO FOUR RATABLY OR EQUALLY PROPORTIONED ELECTION DISTRICTS AS REQUIRED BY LAW, MAKING FINDINGS; PROVIDING A SEVERABILITY CLAUSE; PROVIDING A REPEALING CLAUSE; AND PROVIDING AN IMMEDIATE EFFECTIVE DATE.
## Code Audit Spreadsheet Tool (CAST)

### Enabling Low Impact Development and Green Stormwater Infrastructure

**A CODE AUDIT TOOL FOR FLORIDA COUNTIES AND MUNICIPALITIES**

<table>
<thead>
<tr>
<th>Points</th>
<th>Criteria</th>
<th>Example Code Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Practice is clearly described and approved or is allowed with design approval.</td>
<td>Where feasible, parking lot islands and perimeter landscaped areas shall be designed and installed to function as stormwater management areas, following design standards for bioretention found in the Stormwater Design Manual. If not feasible, native plants, suitable for the site shall be used.</td>
</tr>
<tr>
<td>3</td>
<td>Practice is encouraged, but some ambiguity or potential conflict exists.</td>
<td>Parking lot islands and perimeter landscaped areas are encouraged to be designed as part of the site’s stormwater management system, based on bioretention standards in the Stormwater Design Manual. Trees must be planted at a maximum interval of 20 feet.</td>
</tr>
<tr>
<td>2</td>
<td>Practice is mentioned, but without standards or guidance for use.</td>
<td>Landscaped areas in parking lot perimeters and islands may be designed and used as stormwater bioretention areas.</td>
</tr>
<tr>
<td>1</td>
<td>Code is silent or significant limits exist, but practice could possibly be used.</td>
<td>Landscaping in parking lot islands and perimeters must achieve a minimum of 75% cover within two years of planting.</td>
</tr>
<tr>
<td>0</td>
<td>Practice is prohibited or very unlikely to be approved.</td>
<td>Parking lot perimeters shall be graded into a berm with a minimum slope of 2:1, covered with landscaping that will form a dense evergreen screen within two years of planting.</td>
</tr>
<tr>
<td>Section Topic</td>
<td>Section</td>
<td>Total Points</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Local Government Planning and Policy</td>
<td>Comprehensive Plan</td>
<td>0</td>
</tr>
<tr>
<td>Local Government Planning and Policy</td>
<td>Zoning</td>
<td>0</td>
</tr>
<tr>
<td><strong>Average for Local Government Planning and Policy</strong></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Protecting Nature</td>
<td>Natural Resources Protection Management</td>
<td>0</td>
</tr>
<tr>
<td>Protecting Nature</td>
<td>Coastal Areas</td>
<td>0</td>
</tr>
<tr>
<td>Protecting Nature</td>
<td>Trees</td>
<td>0</td>
</tr>
<tr>
<td>Protecting Nature</td>
<td>Sensitive Groundwater</td>
<td>0</td>
</tr>
<tr>
<td><strong>Average for Protecting Nature</strong></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Stormwater and Water Quality</td>
<td>Stormwater Management</td>
<td>0</td>
</tr>
<tr>
<td>Stormwater and Water Quality</td>
<td>Pollutant Reduction</td>
<td>0</td>
</tr>
<tr>
<td><strong>Average for Stormwater and Water Quality</strong></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>The Built Environment</td>
<td>Site Plan Review</td>
<td>0</td>
</tr>
<tr>
<td>The Built Environment</td>
<td>Building &amp; Landscape</td>
<td>0</td>
</tr>
<tr>
<td>The Built Environment</td>
<td>Streets</td>
<td>0</td>
</tr>
<tr>
<td>The Built Environment</td>
<td>Parking</td>
<td>0</td>
</tr>
<tr>
<td>The Built Environment</td>
<td>Permeable Hardscape</td>
<td>0</td>
</tr>
<tr>
<td>The Built Environment</td>
<td>Construction</td>
<td>0</td>
</tr>
<tr>
<td>The Built Environment</td>
<td>Subdivisions &amp; Greenfield</td>
<td>0</td>
</tr>
<tr>
<td>The Built Environment</td>
<td>Education &amp; Demonstration</td>
<td>0</td>
</tr>
<tr>
<td><strong>Average for The Built Environment</strong></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td><strong>Average for full audit</strong></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>
### B8. Do the goals, objectives, and policies of the future land use element of the comprehensive plan include protection of natural areas and open spaces?

<table>
<thead>
<tr>
<th>Tips</th>
<th>Code References</th>
<th>Notes, Ideas and Strategies</th>
<th>Score</th>
</tr>
</thead>
</table>
| Protecting remaining natural areas inside urban services area should be a stated priority as well as preventing urban sprawl into rural areas. | Comprehensive Plan, Conservation and Open Space Element, and Objective 1.2 (p. 248)  
The goal of this element is “to conserve, manage, and restore or enhance the natural and human-related resources to ensure long-term environmental quality for the future.” | Several areas in the comprehensive plan refer to protecting natural areas and open space. No further action is needed. | 3      |

### G2. Are sand dunes and other coastal terrestrial habitats protected from development in code?

<table>
<thead>
<tr>
<th>Tips</th>
<th>Code References</th>
<th>Notes, Ideas and Strategies</th>
<th>Score</th>
</tr>
</thead>
</table>
| Requiring setbacks for new or expanded structures and impervious surfaces, and limitations on clearing or grading near protected areas are common provisions. Martin County’s Shoreline Protection Zones and related Preserve Area Management Plans are good examples. | Code Chapter 10, Building Regulations, Article V Coastal Construction, Sec. 10: Construction shall be located a sufficient distance landward of the beach to permit natural shoreline fluctuations and to preserve dune stability  
Article X Resource Protection, Division 2. Dunes, Sec.26: It shall be unlawful to remove, cover, or destroy natural vegetation growing upon any dune within the town without a permit from the town administrator. | Although Code requires development to be “a sufficient distance from the beach”, the distance is not specified or required to be set by a qualified person.  
The prohibition on removing native vegetation on dunes is left to the discretion of the town administrator. This ordinance could be stronger.  
Discuss options for strengthening these protections with Environmental Protection staff. | 1      |
Code Audit Process: Post Audit

Adoption Strategy
- Prioritize code amendments for local needs
- Gather applicable codes and ordinances
- Draft suggested code revisions

Hurdles Beyond Codes
- Find allies and promote social acceptance
- Evaluate and address financial concerns
- Develop GSI capability (e.g., construction, inspection & preventative maintenance knowledge & procedures)

Follow Through
- Implement code revisions
- Develop a pilot or other early GSI projects
- Monitor, maintain, educate, and publicize
Next Steps

- Code Audit Tools
  - Identifies opportunities, gaps, or problem areas
- Pilots
  - Alachua County
  - Cocoa Beach, FL
- Phase II (currently contracting UF/TNC/FDEP)
  - Example code language to address audit results
Eban Z. Bean, Ph.D., P.E.
Assistant Professor & Extension Specialist
Urban Water Resources Engineering
ezbean@ufl.edu
Next Steps

**May**
- **Volusia ENRAC Meeting**
  - Discuss Draft LID Ordinance Recommendations

- **Revise**
  - Revise LID Ordinance recommendations and Implementation Guidebook based on ENRAC & regional meetings

- **Share Results**
  - Conduct & record webinar introducing LID Ordinance Recommendations & Implementation Guidebook

**June**
- **Grant Project End 6.13.23**
  - Submit LID Ordinance Recommendations & LID Implementation Guidebook to FDEO
  - Share webinar recording, LID Ordinance & Implementation Guidebook (ECFRPC website)

**Volusia Staff Meeting**
- Meet with planning staff to discuss details of LID Ordinance recommendations