Why Are Low Impact Design/Development and Green Infrastructure Important?

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Defining Low Impact Design/Development (LID) and Green Infrastructure (GI)

- How are LID and GI related?
  - Some GI doesn't directly involve stormwater (e.g. critical ecosystems protection).
  - Some GI can be implemented at regional or community scales.
  - Some LID techniques may not be "green" meaning vegetated (e.g. pervious pavements).

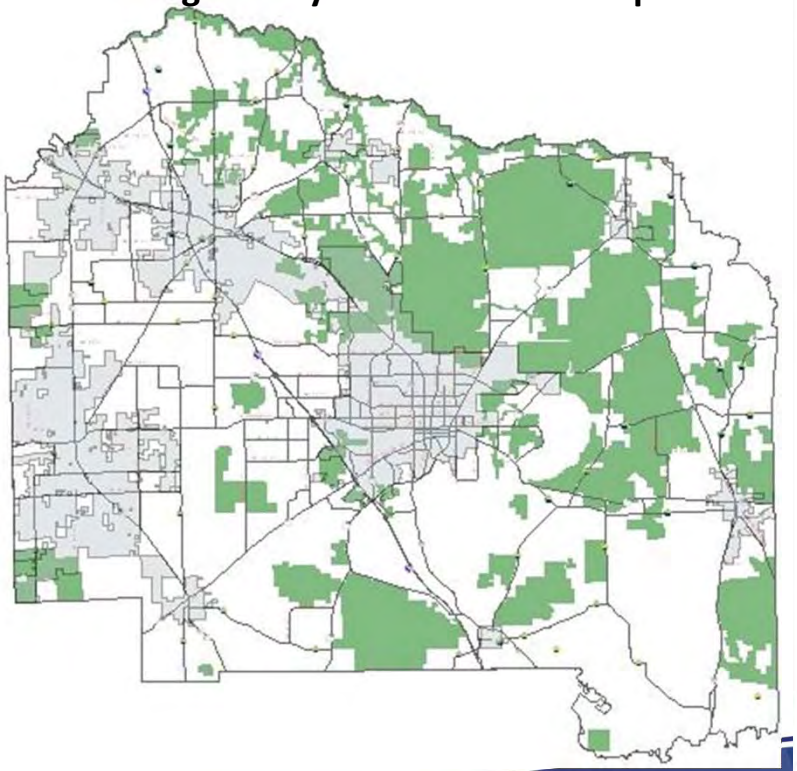
- Both approach runoff management to protect the built environment from flooding and water resources from pollution.

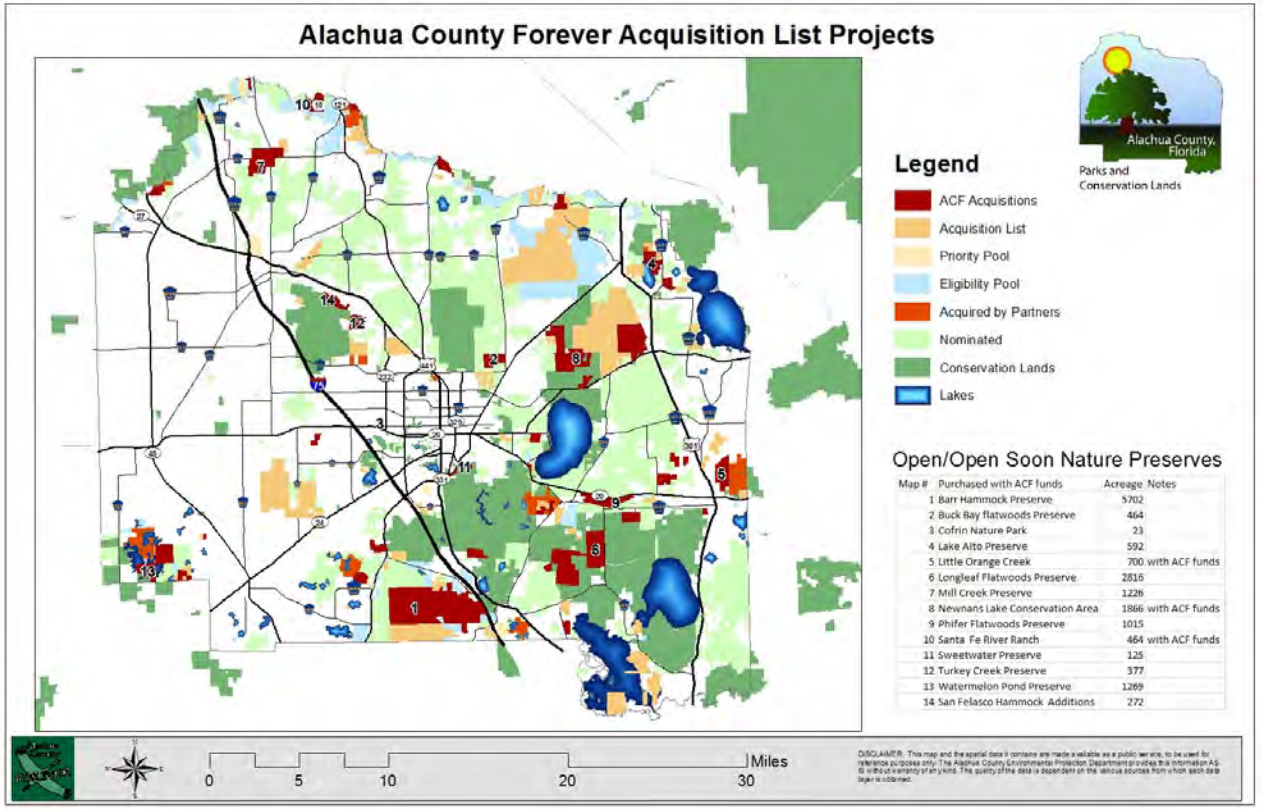
GI and LID Implementation Scales

- Community: Land use planning, Conservation Land acquisition
- Site/Subdivision/Parcel: Site planning and design
- Individual/Household: Education & Outreach

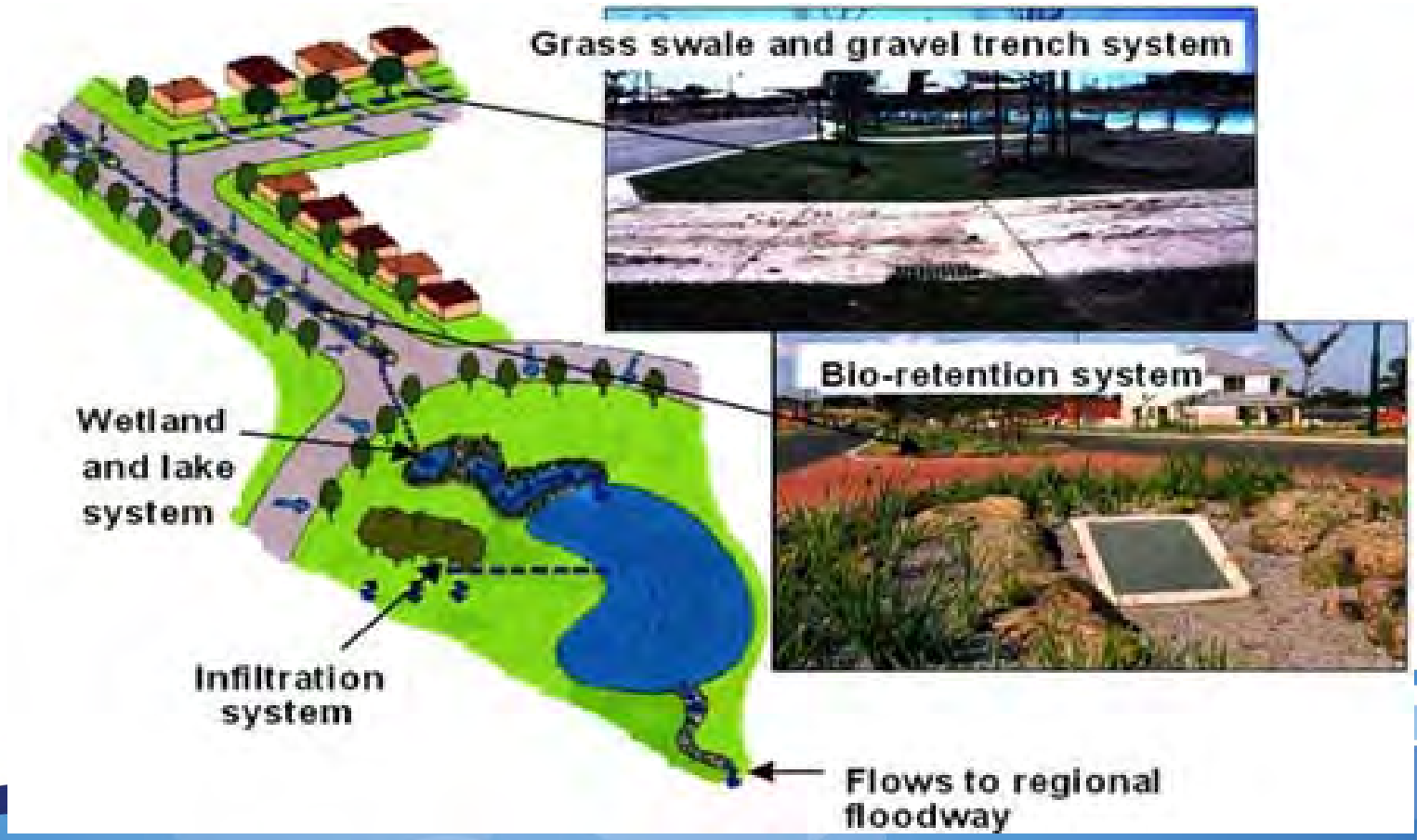
GI At the Community Scale

Strategic Ecosystems Location Map





GI and LID at the Site Scale



There is an LID for everyone!

Rural				Urban
Natural Area	Rural Agriculture	Suburban/ Large Lot	Urban/ Small Lot	Urban/ Activity Center
Leave unimpacted Preserve and protect	Cluster design Vegetated swales Bioretention Rain barrel/ cistern	Vegetated swales Vegetated natural buffers Bioretention Rain barrel/cisterns Curb elimination/ cuts Native plantings Enhanced stormwater ponds	Vegetated swales Bioretention Rain barrel/cisterns Permeable surfaces Soil amendments Exfiltration Curb cuts Green roofs w/ cisterns Native plantings Enhanced stormwater ponds	Green roofs w/cisterns Cisterns Permeable surfaces Soil amendments Exfiltration Curb cuts Tree filter boxes Native plantings Recessed parking Islands

This is not an all inclusive list!

Some GI and LID Examples

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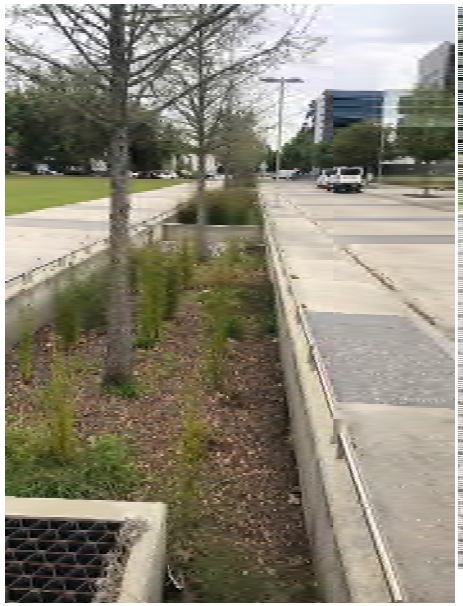
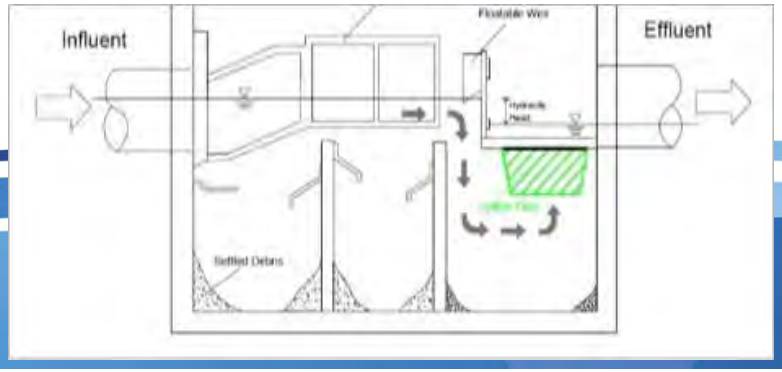




Some GI and LID Examples: Madera Subdivision

- Clustered design
- Retention of native vegetation and soils (site fingerprinting)
- Underground storage (exfiltration tank)
- Pervious pavers
- Narrow roads
- Florida Friendly Landscaping
- Maintained hydrologic regime
- On-site bioretention
- Educational signage
- Stem wall construction
- Energy efficient home design
- Floodplain protection

What can LID and GI do for you?

Tipping the Scales: What to focus on is governed by community needs.

Flood Protection and Runoff Reduction and Control

- Conservation land and buffers (waterbody, floodplain, wetland, karst feature) protect from excess runoff and pollution.
  - Also protect built environment from flooding.

- Some LIDs reduce runoff from developed areas. Others capture and treat runoff near its source.
  - Hydrologically functional landscape in development.

A Better Stormwater Mangement System

- Hydrologically functional sites:
  - Lessen the burden on centralized stormwater retention/detention ponds.
  - Lessen burden on stormwater conveyance systems.
  - Resiliency to climate change.

Changing Rainfall

Florida Climate Change Center: climatecenter.fsu.edu

- Over the last century average annual rainfall in Florida, Georgia and Alabama has increased 10%.
- Frequency of rain events greater that 2” of rain has also increased.
- More frequent and intense hurricanes? Still unknown.

Don’t Forget Water Quality!

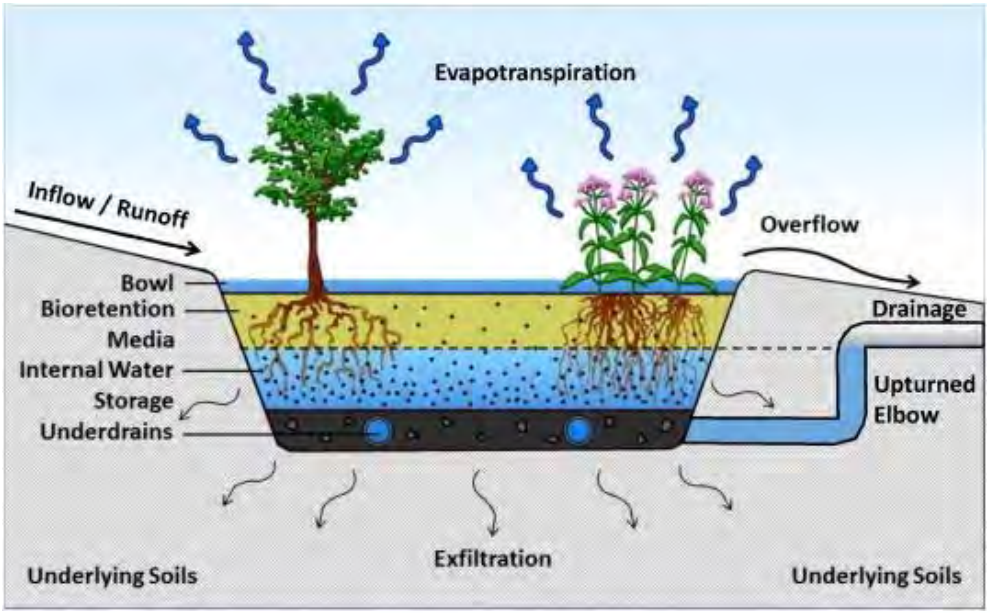
- LID reduces runoff which reduces pollutant load.
- LID can be combined with conventional stormwater practices in a treatment train increasing overall pollutant removal.
- LID techniques can be designed to encourage denitrification.
- Water quality treatment can be distributed across the site.

Why Distributing Water Quality Treatment is a Good Idea…

Water Quality Issue: Nutrients

Enhancing LID For Nutrient Removal

- Much of the focus has been on nitrogen removal by encouraging microbial denitrification.
- Pollutant removal media:
  - Some proprietary, some not.
  - Some mineral based, some not (mulch, wood chips, etc.).
  - Often good at phosphorus removal too!
- Internal water storage to create saturated zone.



Implementing LID/GI

- Retrofit projects: Design, Permit, Build.

- New development:
  - Incentive based: need to have enough of an incentive.
  - Required by codes: most likely to generate opposition.

Obstacles to GI and LID Implementation

- Perception of increased cost of development.
- Possible loss of developable land.
- Maintenance and compliance (especially on private property).
- How to model LIDs in stormwater calculations.
- Acceptance by regulators.
- Conflicts with existing land development codes, comp plans, etc.
- Lack of Statewide design specifications and details.
- Runoff and pollution from development isn't a problem. Current stormwater management approaches are enough.
- Florida is just…different.

Regulatory Hurdles: Real or Perceived?

- Consistency with Comprehensive Plan.
- Conflict with Land Development Regulations or Water Management District Rules.
  - How do LIDs count for water quality credit?
  - How do LIDs count for runoff quantity calculations?
- Statewide or Water Management District design standards?

In Conclusion

- Green Infrastructure and Low Impact Design can provide significant hydrologic benefits over traditional stormwater management.
- LID practices can be modified to enhance nutrient removal.
- Some work on design standards and quantification of benefits needs to better integrate LID/GI into existing permitting.

Questions?