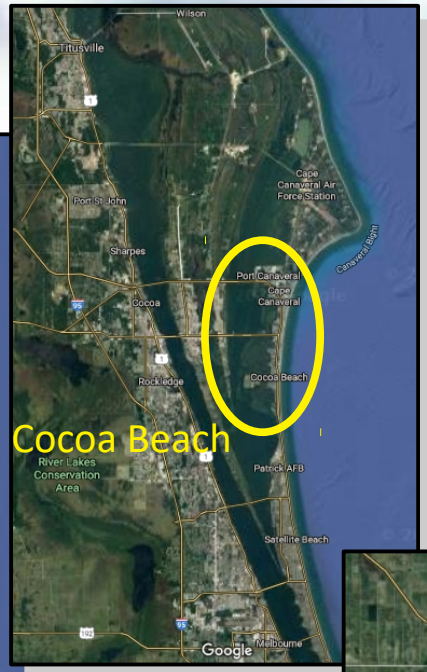
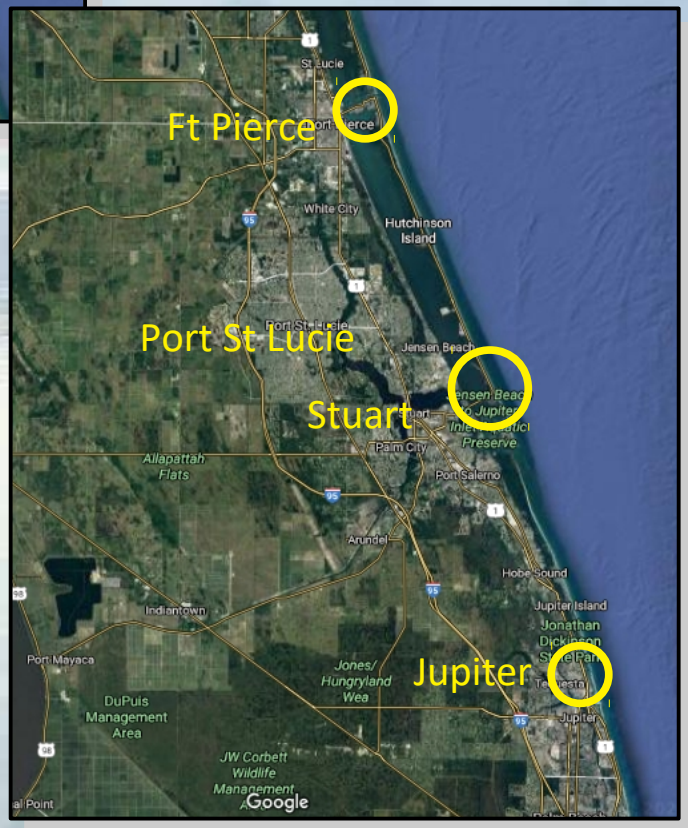
Low Impact Design

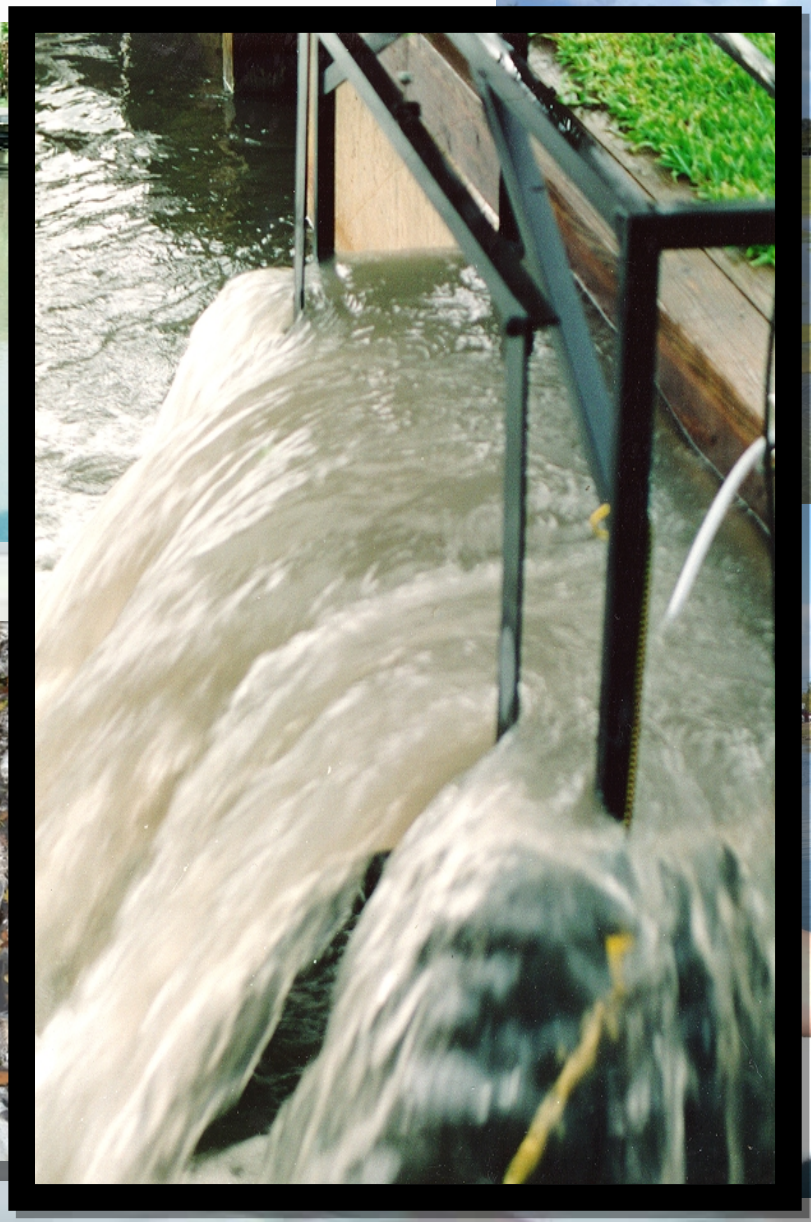
A Tool in the Restoration of the Indian River Lagoon

Our Indian River Lagoon (IRL)





THE PROBLEM – Huge Stormwater Flows/Volumes



THE PROBLEM – Water Quality

THE PROBLEM – Loss of Habitat

THE PROBLEM - Muck

"How did the pavement hurt the fish?.."

Pavement storm runoff contains a lot of hazardous pollutants
This runoff ends up in our lagoon & ocean
Our fish & marine life get sick and can die

Planting trees can help!..
They capture rain before it hits the ground
They add oxygen to the air & remove pollutants

We can save the fish!..
Remove unnecessary pavement
Add green landscape areas

For more information & helpful tips please visit our website:
www.cityofcocoabeach.com/stormwater
THANKS FOR STOPPING BY! - CITY OF COCOA BEACH

Building the Case for Low Impact Design – Impervious Creep

Cocoa Beach 1956

Cocoa Beach Today

Urbanization Infrastructure . . . Impervious Creep . . . green turns gray

Building the Case for Low Impact Design – Development Patterns

Cocoa Beach Land Use Breakdown

Private	Public Roadways
2104.2 acres	55.1 acres
97%	3%

Impervious & Redevelopment

Public Roadways are mostly **impervious** with
very little green areas for runoff infiltration

3% Public Roadways
cannot mitigate
97% Privately-Owned Development
Storm Runoff

Building the Case for Low Impact Design – Development Patterns

IMPERVIOUS SURFACES
can cause **FLOODING**
putting homes and properties
at **RISK**.

WATER QUALITY
FLOODING
RESILIENCE

Impervious & Redevelopment

Vast Amounts of
UPSTREAM IMPERVIOUS
causes
DOWNSTREAM FLOODING

Building the Case for Low Impact Design – Development Patterns

Conventional Stormwater System Deficiencies

many old systems are <u>now</u> filled in algae producing systems

BEST pollutant removal
is the day its built.

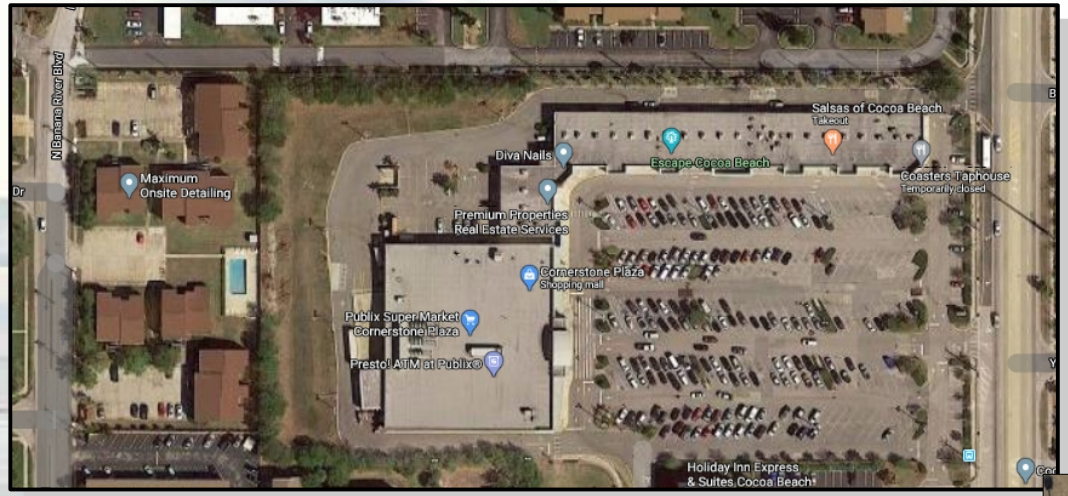
Many are now 30-40 years old.

Sustainable Stormwater Management

Low Impact Design (LID) & Green Infrastructure

allowing rain to percolate as close to where it falls as possible

Conventional Stormwater Design



Low Impact Design/Green Infrastructure

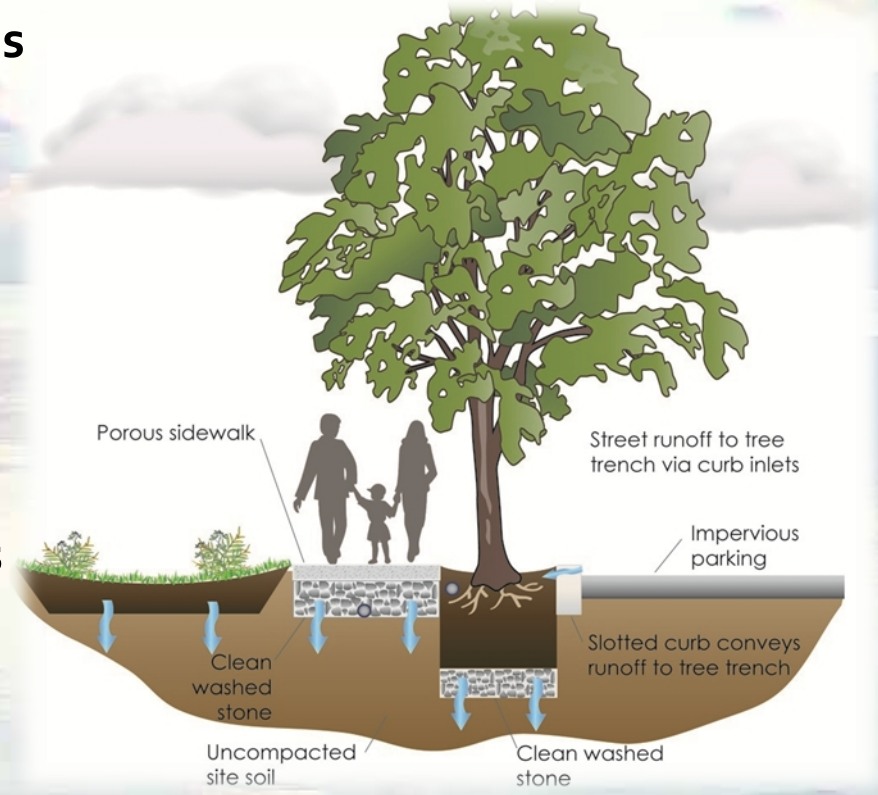
Sustainable Stormwater Management

Low Impact Design (LID) & Green Infrastructure

allowing rain to percolate as close to where it falls as possible

Tree Canopy/Urban Forest

Green Roofs/Walls



Rain Harvesting

Permeable Pavements

Rain Gardens

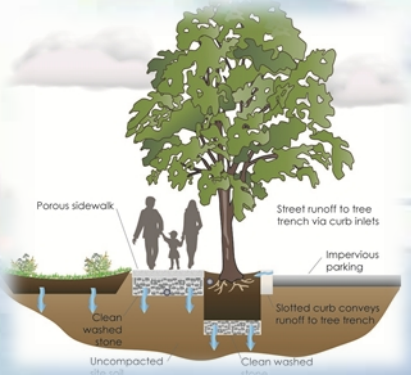
Underground Exfiltration

Sustainable Stormwater Management

Low Impact Design (LID) & Green Infrastructure

allowing rain to percolate as close to where it falls as possible

Why?



- Reduces Stormwater VOLUME to waterways
- Reduces Stormwater POLLUTANTS to waterways
- Reduces Stormwater INTENSITY at Storm Outfall
- Recharges Local AQUIFER
- Nourishes SOIL BIOTA/MICROBES – increases holding capacity
- Soil Biota/Microbes REDUCE TN/TP to GROUNDWATER
- Protects against SALTWATER INTRUSION
- Reduces DOWNSTREAM FLOODING/KING TIDES
- Promotes GREEN SPACE & NATURAL RESOURCES

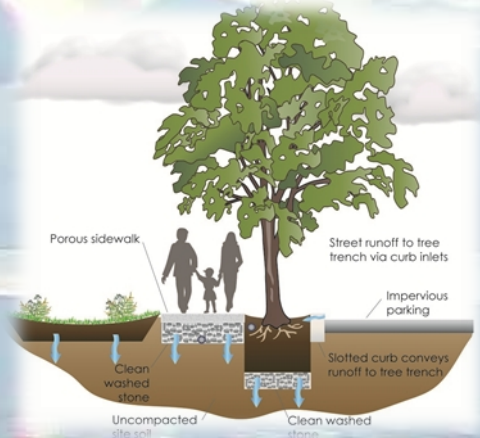
Sustainable Stormwater Management

Low Impact Design (LID) & Green Infrastructure

allowing rain to percolate as close to where it falls as possible

HOW?

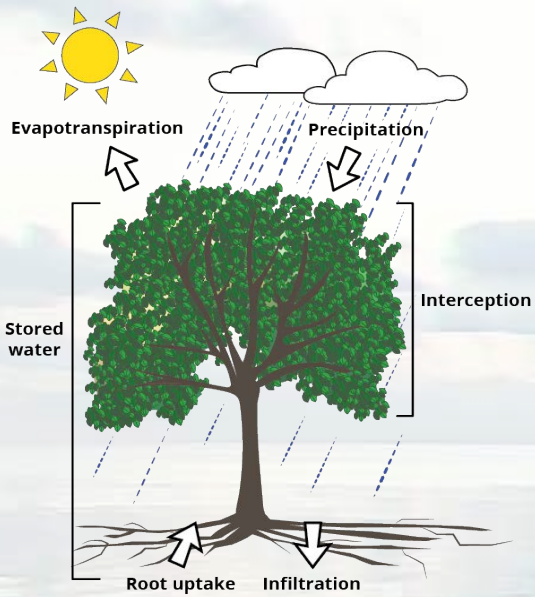
LID/Green Infrastructure Principles/BMPs



- Minimize Impervious Footprint
- Preserve Site Trees/Natural Areas
- Plant Tree Canopy
- All Green Areas recessed
- Pervious Pavement walkways and driveways
- Elevated Structures for buildings, decks and patios
- Underground Rain Storage/Rainwater Harvesting/Cisterns
- Explore Innovative BMPs – Green Roofs/Walls

Tree Canopy/Urban Forest

Trees are the premier stormwater BMP – they become more effective over time as they grow.
All other stormwater BMPs become less effective.



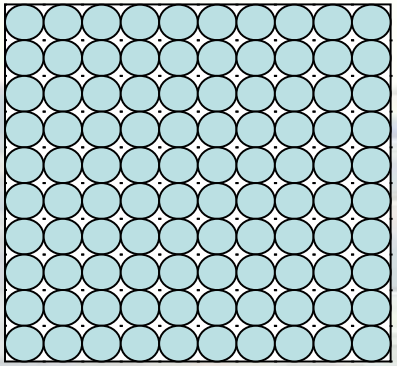
- capture & store rain
- slow down runoff
- moderate climate
- release oxygen
- cleanse air of pollutants
- provide habitat
- increase business & lower crime
- increase well being

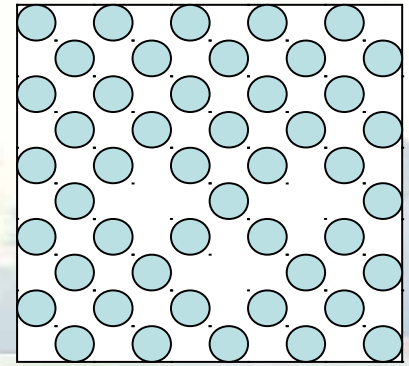
LID - Integrated Stormwater/Landscape Design

Tree Canopy/Urban Forest

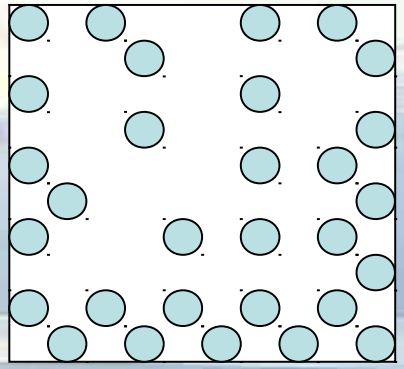
Subdivision Development Trends

Undeveloped Site

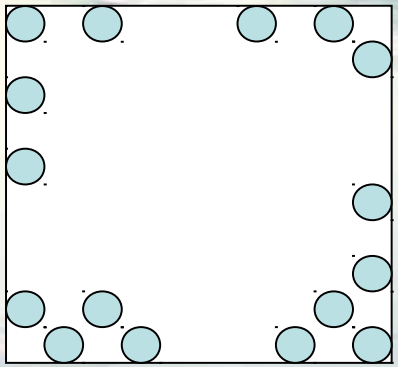




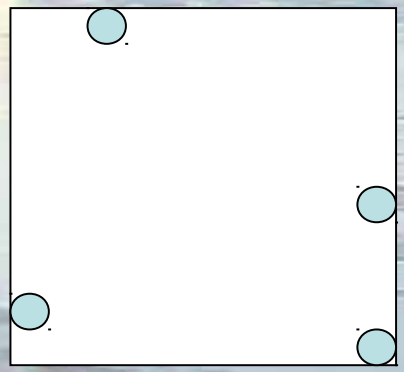
1930s
47% Canopy Retained



1950s
30% Canopy Retained



1980s
16% Canopy Retained



1990s
4% Canopy Retained

Data from Center for Urban Forest Research

Changing our Built Environment

allowing **rain** to **percolate** as **close to where it falls** as possible

TREE CANOPY

if rain doesn't hit the ground, its not stormwater runoff; can intercept 15-35% of annual rainfall

RAIN GARDENS

creating stormwater recharge areas to intercept runoff; recharge groundwater & abate saltwater intrusion

Changing our Built Environment

allowing rain to percolate as close to where it falls as possible

PERVIOUS PAVEMENTS & DECKING *not green infrastructure but allows rain to soak in*

Changing our Built Environment

allowing rain to percolate as close to where it falls as possible

ELEVATED STRUCTURES *minimizes building footprint, mitigates flooding & provides resilience*

Changing our Built Environment

allowing rain to percolate as close to where it falls as possible

Cisterns & Rain Water Harvesting *captures building footprint runoff for reuse/percolation & resiliency resource in storms*

Changing our Built Environment

allowing rain to percolate as close to where it falls as possible

UNDERGROUND STORAGE/EXFILTRATION *not green infrastructure but recharges aquifer*

Changing our Built Environment

allowing rain to percolate as close to where it falls as possible

Green Roofs & Walls *minimizes building impervious footprint & provides air quality and cooling effect*

Changing our Built Environment

allowing rain to percolate as close to where it falls as possible

Minutemen Corridor Stormwater LID Streetscape - 5-block main street improvement, 23 acres

Tree Canopy

Pervious Pavers

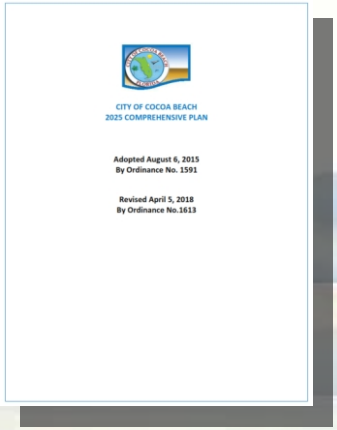
Rain Gardens

Tree Wells

Challenges – Changing the Norm

. . . getting the barge to turn

Comprehensive Plan

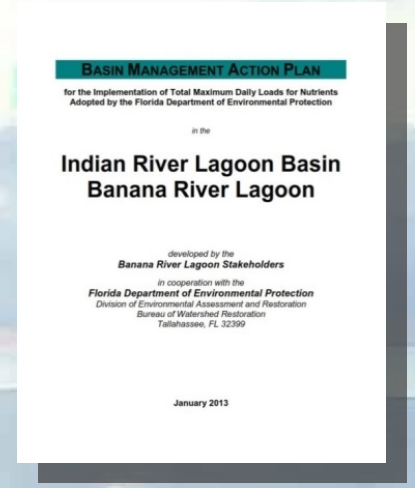

CITY OF COCOA BEACH
2025 COMPREHENSIVE PLAN

Adopted August 6, 2015
By Ordinance No. 1591

Revised April 5, 2018
By Ordinance No.1613

IRL BMAP

Indian River Lagoon BMAPs


BASIN MANAGEMENT ACTION PLAN

for the Implementation of Total Maximum Daily Loads for Nutrients
Adopted by the Florida Department of Environmental Protection

in the

Indian River Lagoon Basin
Banana River Lagoon

developed by the
Banana River Lagoon Stakeholders

in cooperation with the
Florida Department of Environmental Protection
Division of Environmental Assessment and Restoration
Bureau of Watershed Restoration
Tallahassee, FL 32399

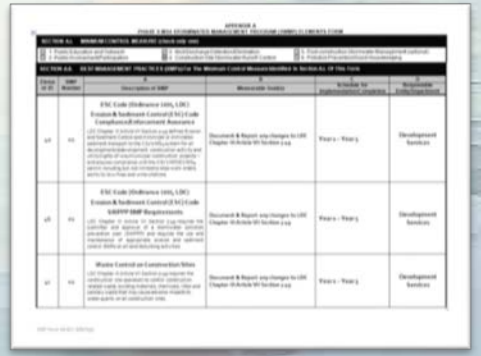
January 2013

Land Development Code


LAND DEVELOPMENT CODE CITY OF COCOA BEACH, FLORIDA

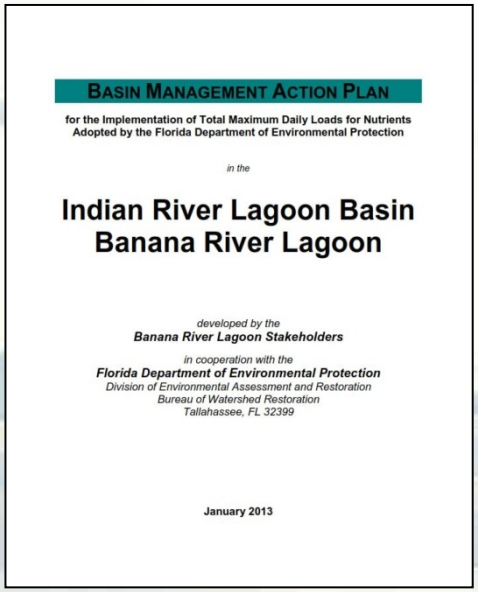
municode

SW NPDES Permit



Challenges – Changing the Norm

. . . getting the barge to turn



BASIN MANAGEMENT ACTION PLAN

for the Implementation of Total Maximum Daily Loads for Nutrients
Adopted by the Florida Department of Environmental Protection

in the

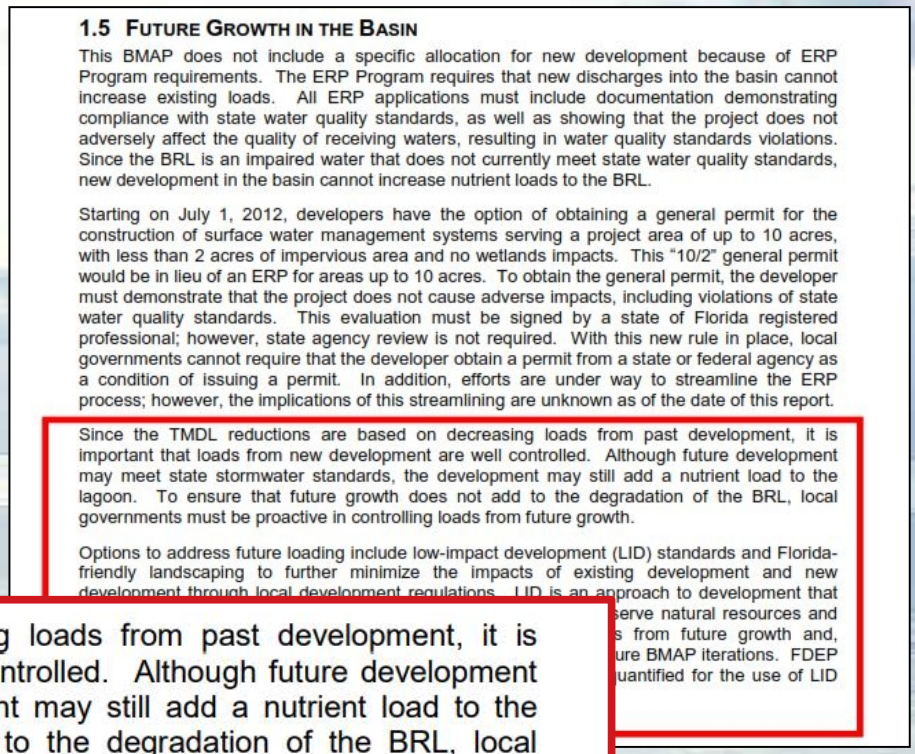
Indian River Lagoon Basin
Banana River Lagoon

developed by the
Banana River Lagoon Stakeholders

in cooperation with the
Florida Department of Environmental Protection
Division of Environmental Assessment and Restoration
Bureau of Watershed Restoration
Tallahassee, FL 32399

January 2013

Indian River Lagoon BMAP



1.5 Future Growth in the Basin

This BMAP does not include a specific allocation for new development because of ERP Program requirements. The ERP Program requires that new discharges into the basin cannot increase existing loads. All ERP applications must include documentation demonstrating compliance with state water quality standards, as well as showing that the project does not adversely affect the quality of receiving waters, resulting in water quality standards violations. Since the BRL is an impaired water that does not currently meet state water quality standards, new development in the basin cannot increase nutrient loads to the BRL.

Starting on July 1, 2012, developers have the option of obtaining a general permit for the construction of surface water management systems serving a project area of up to 10 acres, with less than 2 acres of impervious area and no wetlands impacts. This "10/2" general permit would be in lieu of an ERP for areas up to 10 acres. To obtain the general permit, the developer must demonstrate that the project does not cause adverse impacts, including violations of state water quality standards. This evaluation must be signed by a state of Florida registered professional; however, state agency review is not required. With this new rule in place, local governments cannot require that the developer obtain a permit from a state or federal agency as a condition of issuing a permit. In addition, efforts are under way to streamline the ERP process; however, the implications of this streamlining are unknown as of the date of this report.

Since the TMDL reductions are based on decreasing loads from past development, it is important that loads from new development are well controlled. Although future development may meet state stormwater standards, the development may still add a nutrient load to the lagoon. To ensure that future growth does not add to the degradation of the BRL, local governments must be proactive in controlling loads from future growth.

Options to address future loading include low-impact development (LID) standards and Florida-friendly landscaping to further minimize the impacts of existing development and new development through local development regulations. LID is an approach to development that

Since the TMDL reductions are based on decreasing loads from past development, it is important that loads from new development are well controlled. Although future development may meet state stormwater standards, the development may still add a nutrient load to the lagoon. To ensure that future growth does not add to the degradation of the BRL, local governments must be proactive in controlling loads from future growth.

Options to address future loading include low-impact development (LID) standards and Florida-friendly landscaping to further minimize the impacts of existing development and new development through local development regulations. LID is an approach to development that employs land planning, design practices, and technologies to conserve natural resources and reduce infrastructure costs. These activities could offset loads from future growth and, therefore, may reduce the reductions needed from the entities in future BMAP iterations. FDEP will continue to research how nutrient reduction credits could be quantified for the use of LID BMPs.

1000 Friends of Florida

Sierra Club Florida Chapter

Space Coast Association of REALTORS®

Brevard IRL Coalition

CCL Space Coast Chapter

Space Coast Audubon Society

Pelican Island Audubon Society

St Lucie Audubon Society

The Guardians of Martin County

Martin County Conservation Alliance

Indian Riverkeeper

Conservation Alliance of St Lucie County

Surfrider Sebastian Inlet Chapter

Florida Native Plant Society Conradina Chapter

Keep Brevard Beautiful

UCF Stormwater Management Academy

Friends of the Thousand Islands Sanctuary

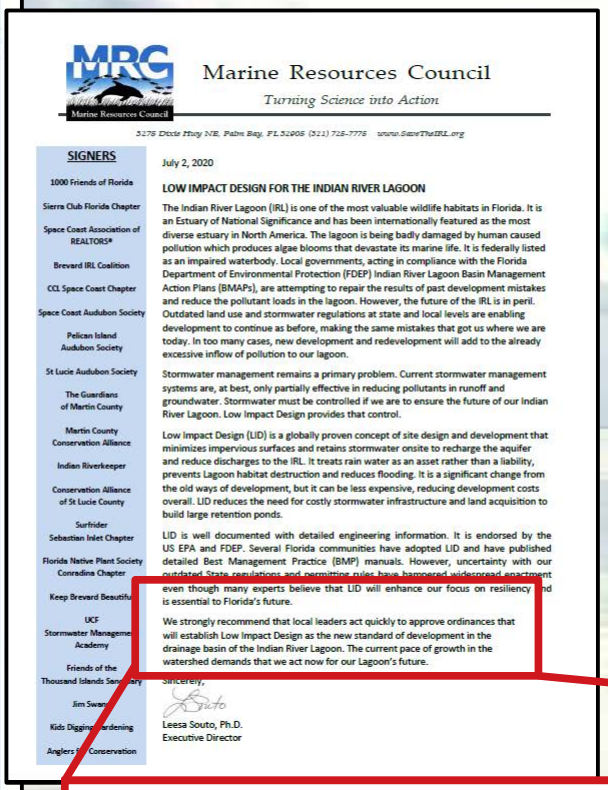
Jim Swann

Kids Digging Gardening

Anglers for Conservation

MARINE RESOURCES COUNCIL

Outreach



Marine Resources Council

Turning Science into Action

Marine Resources Council

5178 Dixie Hwy NE, Palm Bay, FL 32905 (321) 728-7778 www.SaveTheIRL.org

SIGNERS

1000 Friends of Florida

Sierra Club Florida Chapter

Space Coast Association of REALTORS®

Brevard IRL Coalition

CCL Space Coast Chapter

Space Coast Audubon Society

Pelican Island Audubon Society

St Lucie Audubon Society

The Guardians of Martin County

Martin County Conservation Alliance

Indian Riverkeeper

Conservation Alliance of St Lucie County

Surfrider Sebastian Inlet Chapter

Florida Native Plant Society Conradina Chapter

Keep Brevard Beautiful

UCF Stormwater Management Academy

Friends of the Thousand Islands Sanctuary

Jim Swann

Kids Digging Gardening

Anglers for Conservation

July 2, 2020

LOW IMPACT DESIGN FOR THE INDIAN RIVER LAGOON

The Indian River Lagoon (IRL) is one of the most valuable wildlife habitats in Florida. It is an Estuary of National Significance and has been internationally featured as the most diverse estuary in North America. The lagoon is being badly damaged by human caused pollution which produces algae blooms that devastate its marine life. It is federally listed as an impaired waterbody. Local governments, acting in compliance with the Florida Department of Environmental Protection (FDEP) Indian River Lagoon Basin Management Action Plans (BMAPs), are attempting to repair the results of past development mistakes and reduce the pollutant loads in the lagoon. However, the future of the IRL is in peril. Outdated land use and stormwater regulations at state and local levels are enabling development to continue as before, making the same mistakes that got us where we are today. In too many cases, new development and redevelopment will add to the already excessive inflow of pollution to our lagoon.

Stormwater management remains a primary problem. Current stormwater management systems are, at best, only partially effective in reducing pollutants in runoff and groundwater. Stormwater must be controlled if we are to ensure the future of our Indian River Lagoon. Low Impact Design provides that control.

Low Impact Design (LID) is a globally proven concept of site design and development that minimizes impervious surfaces and retains stormwater onsite to recharge the aquifer and reduce discharges to the IRL. It treats rain water as an asset rather than a liability, prevents Lagoon habitat destruction and reduces flooding. It is a significant change from the old ways of development, but it can be less expensive, reducing development costs overall. LID reduces the need for costly stormwater infrastructure and land acquisition to build large retention ponds.

LID is well documented with detailed engineering information. It is endorsed by the US EPA and FDEP. Several Florida communities have adopted LID and have published detailed Best Management Practice (BMP) manuals. However, uncertainty with our outdated State regulations and permitting rules have hampered wider spread enactment even though many experts believe that LID will enhance our focus on resiliency and is essential to Florida's future.

We strongly recommend that local leaders act quickly to approve ordinances that will establish Low Impact Design as the new standard of development in the drainage basin of the Indian River Lagoon. The current pace of growth in the watershed demands that we act now for our Lagoon's future.

Sincerely,

Leesa Souto, Ph.D.
Executive Director

- Local Environmental Groups
- City/County Environmental/Sustainability Boards
- City/County Elected Officials
- City/County Manager & Land Permitting Depts
- FL Legislative Elected Officials
- FL State Env Agencies – FDEP, SFWMD, SJRWMD
- Development Industry
- Site Development Engineering Firms

We strongly recommend that local leaders act quickly to approve ordinances that will establish Low Impact Design as the new standard of development in the drainage basin of the Indian River Lagoon. The current pace of growth in the watershed demands that we act now for our Lagoon's future.

Partners . . . so far

MARINE RESOURCES COUNCIL

The Guardians of Martin County

Martin County Conservation Alliance

Indian Riverkeeper

Conservation Alliance of St Lucie County

1000 Friends of Florida

Sierra Club Florida Chapter

Space Coast Association of REALTORS®

Brevard IRL Coalition

Surfrider Sebastian Inlet Chapter

Florida Native Plant Society Conradina Chapter

Keep Brevard Beautiful

UCF Stormwater Management Academy

Kids Digging Gardening

Anglers for Conservation

CCL Space Coast Chapter

Space Coast Audubon Society

Pelican Island Audubon Society

St Lucie Audubon Society

Friends of the Thousand Islands Sanctuary

Jim Swann

“The world as we have created it is a process of our thinking. It cannot be changed without changing our thinking.”
— Albert Einstein