

Low Impact Development Guide

Community and Economic Development Department

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What is Low Impact Development (LID)?

LID refers to practices that use or mimic natural processes that result in the infiltration, evapotranspiration or use of stormwater in order to protect water quality and associated aquatic habitat. According to the [U.S. Environmental Protection Agency](#), stormwater is defined as “runoff generated from rain and snowmelt events that flow over land or impervious surfaces, such as paved streets, parking lots and building rooftops, and does not soak into the ground”.

Benefits of LID

LID is an approach to land development or redevelopment that works with nature to manage stormwater. As part of a greater effort to better manage the City of Cape Canaveral’s unique challenges as a barrier island and the affect that has on the Banana River Lagoon, it is important to develop guidelines to reduce stormwater impacts while improving overall water quality. LID practices typically retain rain water and encourage it to soak into the ground rather than allowing it to run off into ditches, storm drains, or waterbodies where it would otherwise contribute to flooding or pollution. Finally, LID practices not only double as natural stormwater infrastructure, but can enhance neighborhood beauty through landscaping.

- **Improved Water Quality.** Stormwater runoff can pick up pollutants such as oil, sediments, and other nutrients from impervious surfaces and discharge them to surface waters. Using LID practices in the City will reduce pollutant-laden stormwater reaching local waters such as the Banana River Lagoon.
- **Reduced Number of Costly Flooding Events.** The City of Cape Canaveral relies on Best Management Practices (BMP) to divert runoff to local waterways. Flooding can occur when large volumes of stormwater enter surface waters very quickly and in a short time-frame. Holistically incorporating LID practices reduces the volume and speed of stormwater runoff and decreases costly flooding and property damage.
- **Restored Aquatic Habitat.** Rapidly moving stormwater erodes stream banks and scours stream channels, destroying habitat for fish and other aquatic life. Using LID practices can reduce the amount of stormwater from reaching a surface water system like the Banana River Lagoon, and help to maintain natural stream channel functions and habitat.

- **Improved Groundwater Recharge.** Runoff that moves too quickly through stormwater systems and into surface waters cannot soak into the ground. LID practices retain more rainfall on-site, allowing it to enter the ground and be filtered naturally by soil as it seeps down into the water table.
- **Enhanced Neighborhood Beauty.** Traditional stormwater management infrastructure includes pipes, outfalls, concrete channels and basins. Using LID can broadly increase property values and enhance communities by making them more beautiful, sustainable and wildlife friendly.

Stormwater Management, LID, and the Lagoon

The Banana River Lagoon is part of the Indian River Lagoon system, which is a significant component of the National Estuary Program (NEP). A large portion (71%) of the IRL is within Brevard County. As a consequence, this ecosystem is extremely important. Over the years, stormwater runoff and other various discharges have led to harmful levels of nutrients and sediments entering the lagoon. As a result, efforts have been ongoing to address the sources of pollution. Local governments have been proactive in implementing projects and techniques that seek to address excess loading. One approach includes LID or green infrastructure (GI). These types of best management practices (BMPs) use natural stormwater management to help control and minimize runoff and prevent additional pollutants from getting in the water. According to the *Save Our Indian River Lagoon Project Plan 2018 Update*, LID practices such as permeable pavement, bioswales, green roofs, bioretention basins, rain gardens, and tree boxes are the most efficient removal techniques. As a community that is mostly built out, efforts to incorporate LID into residential properties is very important. With this in mind, the following information is intended to educate and encourage residents to adopt LID practices to the maximum extent possible. Not only can these techniques create aesthetic value, but they can help improve the quality of the lagoon.

LID Site Design Considerations

- **Undeveloped Areas.** New construction LID techniques include protecting open spaces and natural areas such as wetlands, installing bioretention areas (vegetated depressions), underground storage tanks, and reducing the amount of pavement through pervious or permeable pavement materials.
- **Developed Areas.** Post-development LID practices range from directing roof drainage to attractive rain gardens or rain tanks, to completely retrofitting streets with features such as stormwater planters that capture and infiltrate rainwater.

Residential LID Practices

LID practices, which emphasize using natural vegetation to control stormwater, add value and beauty to residential spaces. LID practices such as bioswales, rain gardens and trees intercept stormwater before it moves to stormwater systems or major waterbodies. Additionally, these techniques improve water quality and offer cost savings by reducing the need for stormwater conveyance and treatment infrastructure. The process of scoping and selecting LID practices is influenced by soil type, land use, terrain, average rainfall and other factors.

Examples Include:

- Dry or Gravel Swales
- Pervious or Permeable Pavements
- Planter Boxes
- Rain Barrels or Small Cisterns
- Rain Gardens
- Vegetated Swales (Bioretention or Bioswales)



Dry or Gravel Swales



Pervious or Permeable Pavements



Planter Boxes



Rain Barrels or Cisterns



Rain Gardens



**Vegetated Swales
(Bioretention or
Bioswales)**

Commercial LID Practices

On a larger (or commercial) scale, LID practices that are properly sited and designed offer cost-effective treatment in a wide range of conditions and locations, and usually serve as an important first line of defense against high volume storm events. As with residential properties, the process of siting and selecting LID practices for commercial use is influenced by soil type, land use, terrain, average rainfall and other factors. Designs must consider hydraulic performance under both low-flow and high-flow conditions, and incorporate elements that can manage excess flow as needed.

Examples Include:

- Backup Infiltration
- Bypass Devices
- Cisterns

- Dry or Gravel Swales
- Green Roofs or Green Walls
- Overflow Channels or Drains
- Pervious or Permeable Pavements
- Rain Gardens
- Stormwater Planters
- Underdrains or Exfiltration Tanks
- Vegetated Swales (Bio-retention or Bioswales)



Backup Infiltration



Bypass Devices



Cisterns



Dry or Gravel Swales



Green Roofs or Green Walls



Overflow Channels or Drains



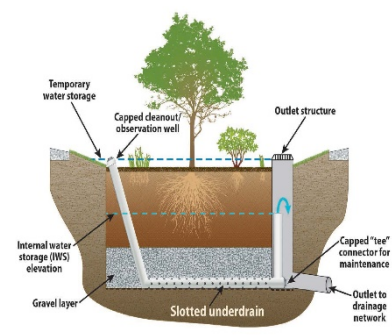
Pervious or Permeable Pavements



Rain Gardens



Stormwater Planters



Underdrains or Exfiltration Tanks



**Vegetated Swales
(Bioretention or
Bioswales)**

Examples of Completed City LID Designs

The City of Cape Canaveral has implemented several LID-based designs and practices on City-owned and maintained properties. Examples include but are not limited to:



Figure 1. Wagner Park on North Atlantic Ave. LID attributes include permeable walkways, Florida native plants, a bioswale and limited use of grass as ground cover.



Figure 2. Cape Canaveral Community Garden. LID attributes include a 500-gallon rainwater collection tank and permeable coquina ground cover.



Figure 3. Manatee Sanctuary Park. LID attributes include floating vegetative islands called Beemats that remove excess nutrients via their aquatic plants.



Figure 4. Rover's Space Dog Park. LID attributes include permeable walkways, xeriscaping and turf in replacement of maintenance intensive sod.

References

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