

Section 11. - LOW IMPACT DEVELOPMENT (LID)

11.1 Intent

The City encourages the use of Low Impact Development (LID) Best Management Practices (BMPs) in the design of sites and subdivisions to better protect water quality and reduce flooding risks. LID is a stormwater and land use management strategy that strives to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation, and transpiration by emphasizing conservation, use of on-site natural features, improved site planning, and distributed stormwater management practices that are integrated into a project's design, especially its landscaping and open space. The City of Titusville LID matrix below is intended as a reference for design professionals to consider alternatives to conventional land planning and site design, especially as it concerns stormwater management.

11.2 Goals of Low Impact Development (LID)

- 11.2.1 Achieve multiple objectives – Comprehensive stormwater management helps achieve multiple objectives such as: managing peak discharge rates and total discharge volume; providing effective stormwater treatment to minimize pollutant loadings; maintaining or improving the hydrologic pattern at a site; and retaining or harvesting stormwater onsite for non-potable purposes. LID also promotes integrating stormwater systems into the landscaping and open space of a site creating more attractive and diverse systems.**
- 11.2.2 Preserve or restore natural features and resources – The conservation or restoration of natural features such as floodplains, soils, and vegetation helps to retain or restore hydrologic functions thereby achieving the multiple objectives above.**
- 11.2.3 Minimize soil compaction – Soil compaction disturbs native soil structure, reduces infiltration rates, and limits root growth and plant survival.**
- 11.2.4 Reduce and disconnect impervious surfaces – By minimizing impervious surfaces, especially directly connected impervious surfaces, more rainfall can infiltrate into the ground.**
- 11.2.5 Manage stormwater close to the source - Using source controls to minimize the generation of stormwater or pollutants that can get into stormwater needs to be the first step in managing stormwater.**
- 11.2.6 Use a BMP Treatment Train approach – Effective stormwater management requires a comprehensive approach that incorporates source controls with multiple structural stormwater BMPs (retention, detention, and filtration) often integrated into the landscaping to create an efficient stormwater management system. See Sec 7.4.5.3 “Treatment Train” of the Stormwater Management Technical Manual.**

11.3 Low Impact Development Plan

11.3.1 In order for a project to receive credit for utilizing LID BMPs, an additional single page plan sheet shall be provided to identify all LIDs proposed for a project area to include the following:

- 11.3.1.1 Each LID should be identified by type and reference ID that can be used to refer to the LID in the O&M documents as needed.
- 11.3.1.2 The boundaries of the drainage basin should be outlined for each LID
- 11.3.1.3 Plan sheet shall be no larger than 11"x17" to allow for attachment to O&M documents

11.4 Operations and Maintenance (O&M) Documents

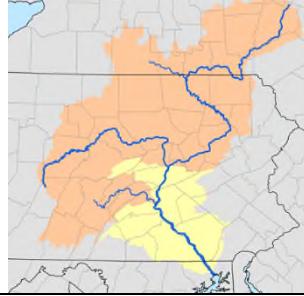
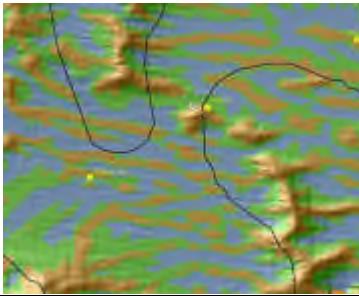
11.4.1 The proper operation and maintenance of the LID BMPs is as critical to the success of a project as is the design of the system and site. To ensure the system continues to meet its performance standards, O&M documents will be required to be submitted for each LID BMP. The Administrator may waive the O&M document requirement if it is determined to be unnecessary for a particular LID BMP. The required O&M documents shall include the following items:

- 11.4.1.1 Maintenance Covenant – A recorded document, this covenant shall establish the responsible private maintenance entity for ensuring that the LIDs included in the LID plan continue to be operational and are maintained in perpetuity. The maintenance covenant must name a secondary maintenance entity who will be responsible should the primary maintenance entity be dissolved, file for bankruptcy, or otherwise become unable to ensure the operability and/or provide the required maintenance.
- 11.4.1.2 Maintenance Schedule – An outline that provides the intervals necessary for inspection of the individual LID BMP(s) and their component elements. Included with this will be the date for the Annual Certification of the system to the City.
- 11.4.1.3 Maintenance Requirements – Outline sheets that provide the private maintenance entity with guidance of the maintenance and housekeeping steps necessary at prescribed intervals to ensure proper operation of the LID system on-site. Any manufacturer's requirements or documentation related to specific products being used shall be included.
- 11.4.1.4 Record Keeping – A portion of the O&M documents shall be devoted to recording inspections of the system as well as any modifications and maintenance activities that were required for its proper operation.
- 11.4.1.5 Inspection Forms – Copies of those forms required for certification of the site to the City.

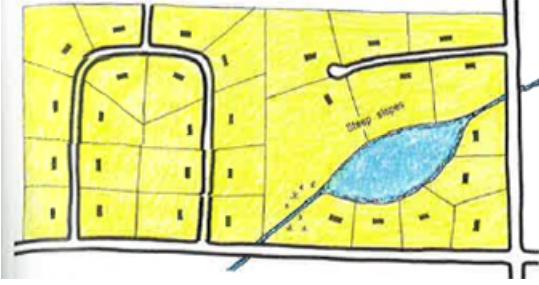
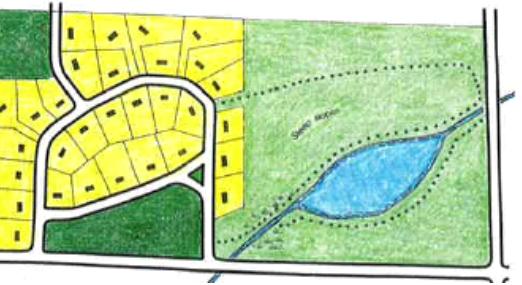
- 11.4.2 Examples of the Declaration of Covenants, Operations and Maintenance (O&M) Form, and Certification of System Compliance Form including all language required by the City are available by request.
- 11.4.3 The City will maintain a database of all LID properties and the ownership and responsible private maintenance entity for each property. Within this database will be the submitted LID plans for each site as well as an inventory of all LIDs associated with each respective site. It is the responsibility of the owner to ensure that notification is made to the City when a transfer of ownership occurs.
- 11.4.4 Inspection of the system in accordance with Maintenance Covenants shall be the sole responsibility of the property owner. Because LIDs vary in their inspection frequency, the inspection schedule shall state a certification period and designate a date range for the certification of the system. This inspection of the full system shall occur on an annual basis. It is the responsibility of the private maintenance entity to submit an inspection report to the City; although this inspection of the full system is a self-certification, property owners are highly encouraged to engage the services of a registered professional engineer or some other qualified professional with experience in the design in inspection of stormwater facilities to inspect the elements of the system, and make recommendations as needed to ensure that proper operation of the system is maintained. The City's Standard Inspection Form for Inspection of LID Sites, is available upon request.

11.5 Low Impact Development (LID) Best Management Practices (BMP) List

Table 11.1 Low Impact Development (LID) Best Management Practices (BMPs) List

Site Planning BMPs				
Section	BMP	Definition	Explanation	Requirements, Incentives, and Encouragements
11.5.1	Inventory Site Assets: Hydrology	Identify and retain the predevelopment hydrology to the maximum extent possible.	 Identify and retain the predevelopment hydrology to the maximum extent possible, including natural flow, conveyance paths and patterns, and drainage features. Replicate original site hydrology by maintaining predevelopment surface runoff, infiltration, and evapotranspiration rates and hydrologic assets of the site to the fullest extent possible.	Requirement: This BMP is required for all subdivision plat or site plan applications per Chapter 30, Article V, Sec. 30-422 "LID Analysis".
11.5.2	Inventory Site Assets: Topography	Use existing site topography to guide the road layout and stormwater conveyance features.	 Natural depressions should be maintained where possible to promote storage, infiltration, and treatment during typical stormwater events and to capture part of the treatment volume during extreme events	Requirement: This BMP is required for all subdivision plat or site plan applications per Chapter 30, Article V, Sec. 30-422 "LID Analysis".
11.5.3	Inventory Site Assets: Soils	Determine the hydrologic group classifications of soils and their capacity for stormwater infiltration. Designate on site all areas that will be vegetated or used in stormwater management.	 Compacting of soils will negatively affect their ability to allow stormwater to infiltrate.	Requirement: This BMP is required for all subdivision plat or site plan applications per Chapter 30, Article V, Sec. 30-422 "LID Analysis".

11.5.4	Inventory Site Assets: Vegetation	<p>Maximize the protection of trees and native vegetation.</p> 	<p>Vegetation helps with energy conservation, temperature moderation, dust filtration, and reduces wind, noise, and glare. Vegetation also provides soil stabilization and enrichment, erosion prevention, surface drainage improvement, aquifer recharge, water pollution reduction, and wildlife habitat.</p> 	<p>Requirement: This BMP is required for all subdivision plat or site plan applications per Chapter 30, Article V, Sec. 30-422 "LID Analysis".</p>
11.5.5	Protect Surface Waters and Wetlands	<p>Incorporate vegetated buffers and native plantings in site design to protect surface waters (IRL, lakes, ponds, etc.) and wetland edges.</p> 	<p>Vegetated buffers slow the velocity of stormwater sheet flow and allow for several treatment processes to remove pollutants prior to reaching the surface water.</p> 	<p>Requirement: This BMP is required along the banks of all watercourses, water bodies, or wetlands per Sec. 2.6.4 of the Environmental Protection Technical Manual. See Chapter 30, Article II, Division 4 "Shoreline protection" for shoreline protection measures.</p>
11.5.6	Preserve Open Space	<p>Consider all areas where open space and pervious areas can be protected.</p> 	<p>The greater the area of undisturbed, pervious, preserved open space, the less stormwater management required.</p> 	<p>Requirement: This BMP is required for types identified in Chapter 30, Article III, Division 3 "Open Space" of the Land Development Regulations.</p> <p>Incentive: Projects which preserve an additional 5% open space above the minimum required shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual. Where no minimum open space is required a minimum of 5% open space must be preserved to be eligible for LID incentives.</p>

11.5.7	Natural Area Conservation – Retain Tree Canopy and Natural Landscaping	<p>Retain native and large tree canopies to the maximum extent possible and plan new tree plantings in areas that will maximize tree canopy over the life of the project.</p> 	<p>Trees and landscaping help retain and enhance predevelopment interception and evapotranspiration capacity. Trees absorb stormwater to limit runoff, soil erosion, and flooding. Trees also provide shade to moderate temperatures, which helps reduce the urban heat island effect.</p> 	<p>Requirement: This BMP is required for development per Chapter 30, Article II, Division 2 “Trees and Vegetation (Preservation and Mitigation)”, AND Article III, Division 10, Subdivision 2 “Landscape Materials”, Sec. 30-324 “Landscape”.</p> <p>Incentive: Projects which preserve an additional 5% tree canopy or natural landscaping area above the minimum required shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual. Where no minimum preservation area is required a minimum of 5% native tree canopy or natural landscaping area must be preserved to be eligible for LID incentives. This incentive may include the tree mitigation incentive described in Chapter 30, Article II, Division 2 “Trees and Vegetation (Preservation and Mitigation)”, Section 30-34(i)(2) “Mitigation Plan”.</p>
11.5.8	Cluster Subdivision (Ch. 33, Article VII) and Conservation Subdivision Design (Ch. 33, Article VIII)	<p>Cluster the built infrastructure to reduce the length of roads, reduce total impervious area, and minimize overall site disturbance.</p>  <p>(Conventional Site Development)</p>	<p>This approach does not reduce the total number of permitted units per acre and provides the design engineer flexibility in planning to protect the most ecologically sensitive and valuable portions of a site. By reducing the total project impact, the use of both clustering and smaller lot sizes (in some cases) may allow the developer to increase the total number of developed units or lots, thereby increasing total project revenues.</p> <p><small>Conservation Subdivision: Construction Phase—Low Impact Development (LID) and Stormwater Treatment D. Penniman, M. Hostetler, and G. Acomb</small></p>  <p>(Clustered Site Development)</p>	<p>Incentive: Projects which elect to utilize the Cluster Subdivision or Conservation Subdivision Design development options or similar aggregated design and satisfy all related standards shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual.</p> <p>Encouraged: Proposed subdivisions within the Residential Estate (RE) zoning district are encouraged to utilize the cluster design development option per Chapter 33, Article VII Cluster Subdivision.</p>
11.5.9	Minimize Building Footprint	<p>Reduce the impervious footprint of the project and disturbance of the site by considering multi-story building design options.</p> 	<p>Buildings with more than one story maximizes the square footage to roof area ratio and lessens the stormwater runoff from the site.</p> 	<p>Requirement: Building footprint is limited by the maximum building coverage listed for each zoning district in Chapter 28, Article VI.</p> <p>Incentive: Projects which utilize multi-story buildings to reduce building coverage to 50% or less of the maximum building coverage permitted in the applicable zoning district shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual. For projects in zoning districts without a maximum building coverage the applicant must demonstrate the reduced building footprint by comparing the maximum one-story buildout potential with the proposed multi-story building.</p>

11.5.10	Minimize Total Impervious Surface Area	<p>Reduce the impervious surface area to reduce the amount of stormwater management required.</p>  	<p>Reducing impervious surface areas can minimize the degree to which the heat island effect is experienced in a community. Strategies to assist in accomplishing this include designing streets to reduce street width and the total street length; consider FDOT's context classification system to determine key design criteria of roadways. In a subdivision, narrower lots and a clustered design maximize the number of lots per unit length of pavement.</p> <p>Additionally, design smaller parking space dimensions and the fewest number of parking spaces necessary. On-street parking where permitted could be utilized to minimize the need for off-street parking areas. Consider using pervious pavement. Maximize infiltration capacity of parking areas by using structurally-reinforced bioswales rather than curbed landscape islands when permitted. Where possible, design impervious areas to first drain into interior recessed rain garden islands. Any improvements in the public right of way will require a right of way agreement between the applicant and the City. Required design standards for roads, sidewalks, parking, trails, and paths can be found in the City's Transportation Infrastructure Technical Manual (Section 9). <small>Low-Impact Development & Green Infrastructure: Pollution Reduction Guidance for Water Quality in Southeast Florida E. Bean, Ph.D., P.E. L. Jarrett, J. Kipp Searcy, M. Szoka</small></p> 	<p>Requirement: Impervious surface area is limited by the maximum lot coverage listed for each zoning district in Chapter 28, Article VI.</p> <p>Incentive: Projects which utilize LID design techniques to reduce lot coverage to 75% or less of the maximum lot coverage permitted in the applicable zoning district shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual. For projects in zoning districts without a maximum lot coverage the applicant must demonstrate the reduced total impervious surface by comparing the maximum impervious surface buildout potential with the proposed plan minimizing total impervious surface.</p>
11.5.11	Minimize Directly Connected Impervious Area (DCIA)	<p>Disconnect downspouts from roofs, small parking lots, courtyards, driveways, sidewalks and other impervious surfaces.</p> 	<p>Directly connected impervious areas (DCIA) allow runoff to be conveyed without interception by permeable areas that allow for infiltration and treatment. Direct runoff to flow onto adjacent pervious areas where it is filtered or infiltrated. <small>Pinellas County Stormwater Manual February 1, 2017</small></p>	<p>Incentive: Projects that demonstrate a reduction in DCIA of at least 25% over a conventional design shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual.</p>

11.5.12	Curb Elimination and Curb Cuts	<p>Eliminate curbs and allow stormwater to drain in sheet flow from roadways onto vegetated areas.</p> 	<p>Draining to vegetated areas reduces the rate and timing of peak discharge and can help meet pollutant removal requirements. Parking lots or other paved areas must be graded so that stormwater flows through the curb cuts onto the vegetated area.</p> <p><small>Low-Impact Development & Green Infrastructure: Pollution Reduction Guidance for Water Quality in Southeast Florida E. Bean, Ph.D., P.E. L. Jarrett, J. Kipp Searcy, M. Szoka</small></p> <p>Note: Any design incorporating swales in the right of way will require a right of way agreement between the applicant and the City.</p> 	<p>Incentive: Projects that design landscape islands, medians, or vegetated swales without curbs or with curb cuts for the collection of stormwater per Sec. 9.7 of the Transportation Technical Manual shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual.</p> <p>The curbing along private rights-of-way or internal to a site's design may be waived with an administrative waiver.</p> <p>The curbing along public rights-of-way may be waived with a Development Review Committee (DRC) waiver.</p>
Source Control BMPs				
11.5.13	Minimize Soil Disturbance and Compaction	<p>Clearly delineate the clearing, grading, and construction areas on the ground and instruct all construction personnel to minimize soil compaction over the entire site. Clearly designate areas intended for infiltration BMPs and do not permit heavy construction equipment to traverse these areas.</p> 	<p>Avoid compaction of soil throughout the site. Compaction of soils negatively affects the ability of stormwater to infiltrate. Use existing roads, future road areas, or previously compacted areas for materials staging.</p> 	<p>Required: Limitations on clearing, grading, and compaction adjacent to protected trees, canopy trees, or the protective root zone of such trees are described in Sec. 2.5 Tree Protection During Construction of the Environmental Protection Technical Manual.</p> <p>Incentive: Projects which demonstrate a plan to minimize soil disturbance and compaction over the entire site shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual.</p>
11.5.14	Build with the Landscape Slope	<p>Design buildings and infrastructure around existing topography, rather than re-contouring the land to fit the building design.</p> 	<p>Natural depressions promote storage, infiltration, and treatment of stormwater. Recontouring requires the removal of existing landscaping and compacts the soil.</p> <p><small>Escambia County Low Impact Design BMP Manual September 30, 2016 Dr. M. P. Wanielista, P.E. and E. Livingston</small></p> 	<p>Required: Streets are required to be designed as closely as practicable to the original topography per Chapter 30, Article III, Division 7, Sec. 30-229 of the Code. In the Area of Critical Concern, the reduction of natural topography is limited per Chapter 30, Article III, Division 6, Subdivision 2, Sec. 30-207(a)(4) of the Code.</p> <p>Incentive: Projects which meet the reduction of natural topography limitation described in Chapter 30, Article III, Division 6, Subdivision 2, Sec. 30-207(a)(4) shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual.</p>

11.5.15	Retain Native Landscapes at the Lot Level	<p>Minimize the planned area requiring imported or constructed landscapes.</p> 	<p>Native landscapes require fewer supplements and irrigation. Plant and maintain Florida-friendly or native vegetation wherever possible. Minimize use of turf grass and use it only where outside active recreation is planned and frequent. <small>Policies that Address Sustainable Landscaping Practices, UF/IFAS Publication #CIR1519 M. Romero and M. E. Hostettler</small></p> 	<p>Requirement: This BMP can be used to meet the requirements for residential development described in Chapter 30, Article III, Division 10, Subdivision 2, Sec. 30-324 of the Code.</p> <p>Incentive: Projects retaining 10% native vegetation per lot shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual.</p>
11.5.16	Florida-Friendly Landscaping and Fertilizers	<p>Plan your site for low-impact and resource-efficient landscapes that have the capacity to thrive without supplemental inputs of irrigation, fertilizers, pesticides, herbicides, etc.</p> 	<p>Minimizes the runoff of these supplements into receiving waterbodies. <small>Policies that Address Sustainable Landscaping Practices, UF/IFAS Publication #CIR1519 M. Romero and M. E. Hostettler</small></p> 	<p>Requirement: 10% percent of all required landscaping areas are required to use Florida Friendly Landscaping per Chapter 30, Article III, Division 10, Subdivision 2, Sec. 30-324 of the Code.</p> <p>Incentive: Projects using at least 50% percent Florida Friendly Landscaping shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual.</p>
11.5.17	Rainfall Interceptor Trees	<p>Retain and/or plant trees within 15 feet of impervious areas. Trees of species whose roots are known to cause damage to public roadways or other public works shall not be planted within minimum required distances of Chapter 30, Article III, Division 10, Subdivision 2, Sec. 30-321(j) "Pavement edges" and Subdivision 6, Sec. 30-372(a) "Planting standards" of the Code.</p> 	<p>Trees intercept stormwater and retain a significant volume of the captured water on their leaves and branches allowing for evaporation and providing runoff volume reduction benefits. Interceptor trees also provide enhanced aesthetic value, shade to cool pavement and reduce surface runoff temperatures, aid in the removal of air pollutants and noise reduction and help to reduce the heat island effect. <small>Urban Forests & Stormwater Management Water retention, infiltration, and transpiration January 11, 2018 S. Farmer</small></p> 	<p>Incentive: Projects preserving or planting trees within 15 feet of impervious surfaces and outside the required distances of Chapter 30, Article III, Division 10, Subdivision 2, Sec. 30-321(j) and Subdivision 6, Sec. 30-372(a) shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual.</p>

11.5.18	Install Efficient Irrigation Systems	When irrigation is necessary, use water conserving, low flow, programmable, and/or targeted irrigation systems.	Reduced demand for potable water. Landscaping beds with shrubs should be on separate zones from turf, and drip irrigation is recommended.	Required: All irrigation systems are required to have an automatic timer and rain sensor per Chapter 30, Article III, Division 10, Subdivision 6, Sec. 30-373 of the Code. Incentive: Projects using irrigation systems that incorporate low flow, separate water-use zones, and/or drip irrigation shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual.
Structural Stormwater BMPs				
11.5.19	Exfiltration Trench	A subsurface retention system consisting of a conduit such as perforated pipe surrounded by natural or artificial aggregate which temporarily stores and infiltrates stormwater runoff.	Stormwater passes through the perforated pipe and infiltrates through the trench sides and bottom into the shallow ground water aquifer. System provides a reduction of stormwater volume that reduces pollutant loads. Additionally, substantial amounts of suspended solids, oxygen demanding materials, heavy metals, bacteria, some varieties of pesticides and nutrients such as phosphorus may be removed as runoff percolates through the soil profile. <small>The Florida Development Manual: A Guide to Sound Land and Water Management, 1988 E. E. Livingston, J. Cox, and P. Sanzone</small>	Incentive: Projects that demonstrate a minimum 25% reduction of the total stormwater volume through the use of this BMP shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual. Projects using multiple BMPs to reach the reduction target will not be eligible for incentives.
11.5.20	Underground Storage and Retention	An underground storage system with a drainfield. Kirk Point Park is an example of the use of this BMP.	These systems are sometimes used where land values are high, and the owner/applicant desires to minimize the potential loss of usable land. <small>Escambia County Low Impact Design BMP Manual September 30, 2016 Dr. M. P. Wanielista, P.E. and E. Livingston</small>	Incentive: Projects that demonstrate a minimum 25% reduction of the total stormwater volume through the use of this BMP shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual. Projects using multiple BMPs to reach the reduction target will not be eligible for incentives.

11.5.21	Rain Gardens (Bioretention)	<p>Small retention basins that are integrated into a site's landscaping.</p> 	<p>Located in a landscape area or within parking lot islands to receive runoff from hard surfaces such as a roof, a sidewalk, a driveway, or parking area. Rain gardens slow down the rush of water from impervious surfaces, hold the water for a short period of time, and allow it to naturally infiltrate into the ground or evaporate. The combination of soil, microbes and vegetation provide filtration, sedimentation, adsorption, ion exchange of solids and metals as well as biological absorption and decomposition of organics and nutrients present in the stormwater. <small>Florida Field Guide to Low Impact Development Bioretention Basins/Rain Gardens University of Florida Program for Resource Efficient Communities, M. Clark and G. Acomb</small></p> 	<p>Incentive: Projects that demonstrate a minimum 25% reduction of the total stormwater volume through the use of this BMP shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual. Projects using multiple BMPs to reach the reduction target will not be eligible for incentives.</p>
11.5.22	Vegetated Swales	<p>A manmade trench meeting the definition in Chapter 403.803(14), Florida Statutes.</p> 	<ul style="list-style-type: none"> Has a top width to depth ratio of the cross-section equal to or greater than 6:1, or side slopes equal to or flatter than 3 feet horizontal to 1-foot vertical; Contains contiguous areas of standing or flowing water only following a rainfall event; Is planted with or has stabilized vegetation suitable for soil stabilization, stormwater treatment, and nutrient uptake; and Is designed to take into account the soil erodibility, soil percolation, slope, slope length, and drainage area so as to prevent erosion and reduce pollutant concentration of any discharge. 	<p>Incentive: Projects that demonstrate a minimum 25% reduction of the total stormwater volume through the use of this BMP shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual. Projects using multiple BMPs to reach the reduction target will not be eligible for incentives.</p>

11.5.23	Vegetated Natural Buffers	<p>Areas with natural vegetation set aside between developed areas and a receiving water or wetland for stormwater treatment.</p> 	<p>Buffers are intended for use to avoid the difficulties associated with the construction and maintenance of backyard swales on land controlled by individual homeowners. Potential impacts to adjacent wetlands and upland natural areas are reduced because fill is not required to establish grades that direct stormwater flow from the back of the lot towards the front for collection in the primary stormwater management system. This BMP can serve as a wildlife corridor, reduce noise, and reduce the potential for siltation into receiving waters.</p> <p>Vegetative natural buffers are not intended to be the primary stormwater management system for residential developments. They are most commonly used only to treat those rear-lot portions of the development that cannot be feasibly routed to the system serving the roads and fronts of lots. <small>Pinellas County Stormwater Manual February 1, 2017</small></p>	<p>Incentive: Projects using this BMP to provide additional buffers beyond those required in Chapter 30, Article III, Division 10, Subdivision 3 "Landscape Yard (Buffer/Screen)" of the Code shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual.</p>
11.5.24	Pervious Pavements	<p>Pervious pavement systems are retention systems.</p> 	<p>Treatment efficiency is based on the amount of the annual runoff volume infiltrated which depends on the available storage volume within the pavement system, the underlying soil permeability, and the ability of the system to readily recover this volume. <small>Permeable Pavement Systems: Technical Considerations, UF/IFAS Publication #AE530</small> <small>E. Bean, M. Clark, and B. Larson</small> See Sec. 7.7 "Pervious Pavement" of the Stormwater Management Technical Manual.</p> 	<p>Incentive: Projects using a minimum of 1,000 square feet of pervious pavement instead of an impervious surface, such as asphalt or concrete, shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual.</p>

11.5.25	Green Roofs with Cisterns	<p>A vegetated roof followed by storage in a cistern (or other similar device) for the filtrate that is reused for irrigation.</p> 	<p>The greenroof and cistern system functions to attenuate, evaporate, and lower the volume of discharge and pollutant load coming from the roof surface. Greenroof systems have been shown to assist in stormwater management by attenuating hydrographs, neutralizing acid rain, reducing volume of discharge, and reducing the annual mass of pollutants discharged. They are most applicable to commercial or public buildings, but have been successfully used on residences. <small>Escambia County Low Impact Design BMP Manual September 30, 2016</small> Dr. M. P. Wanielista, P.E. and E. Livingston</p> 	<p>Incentive: Projects that demonstrate a minimum 25% reduction of the total stormwater volume through the use of this BMP shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual. Projects using multiple BMPs to reach the reduction target will not be eligible for incentives.</p>
11.5.26	Stormwater Harvesting	<p>A system which uses diverted stormwater for beneficial purposes, such as a primary source of irrigation, thus reducing the stormwater volume and mass of pollutants discharged from a retention or wet detention system.</p>  	<p>Harvested stormwater can be used for numerous uses including outdoor irrigation, irrigating green roofs, washing vehicles, industrial cooling and processing, and toilet flushing. The use of stormwater in place of potable water has been estimated to save 75-95% of the cost of using only potable water. <small>Escambia County Low Impact Design BMP Manual September 30, 2016 Dr. M. P. Wanielista, P.E. and E. Livingston</small> Methodologies and design examples can be found in the St Johns Manual, Sarasota County LID Document, the FDEP Stormwater Handbook and Escambia County LID Manual, and others. These examples cover the Water Quantity and the Water Quality elements. The Water Quantity calculations are a variation of calculations commonly conducted for wet ponds. For the Water Quality calculations the state of the practice is the use the DEPs BMPTRAINS software which is in the public domain.</p>	<p>Incentive: Projects that demonstrate a minimum 25% reduction of the total stormwater volume through the use of this BMP shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual. Projects using multiple BMPs to reach the reduction target will not be eligible for incentives.</p>
11.5.27	Up-Flow Filter Systems with Biosorption Activated Media (BAM)	<p>A system where stormwater enters the bottom of the filters and exits from the top through a nutrient reducing media.</p>	<p>The value of a system using this flow direction is the filter that has a lower potential to plug with debris and particulates. <small>Alachua County Stormwater Treatment Manual, October 2018</small></p>	<p>Incentive: Projects using this BMP demonstrated to show at least 40% total nitrogen removal using the most current BMPTrains model shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual.</p>

11.5.28	Managed Aquatic Plant Systems (MAPS)	<p>An aquatic plant-based BMP that removes nutrients through a variety of processes related to nutrient uptake, transformation, and microbial activities. Examples of MAPS include planted littoral zones and floating wetland mats.</p> 	<p>Generally, wet detention systems by themselves can't achieve the required levels of nutrient removal from stormwater. MAPS can be incorporated into a wet detention BMP treatment train to provide additional treatment and nutrient removal after the wet pond has provided reduction of pollutants through settling and other mechanisms that occur within the wet pond. The long-term survival of littoral zones is best when they are not located adjacent to private lots. Consequently, littoral zones typically are located near the outfall of a wet detention pond or along areas with common ownership. Through the periodic removal of mature macrophytes from the floating wetland island or mat, accumulated nutrients are prevented from re-entering the aquatic ecosystem at senescence.</p> <p><small>State of Florida Best Management Practices for Stormwater Runoff, April 2015 Stormwater Management Academy, University of Central Florida</small></p> <p>See Sec. 7.4.5.3 "Treatment Train" of the Stormwater Management Technical Manual.</p>	<p>Incentive: Projects using this BMP to treat or manage at least 25% of the total stormwater volume on site shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual.</p>
11.5.29	Biofiltration Systems	<p>Biofilters or biofiltration systems use engineered media, such as Biosorpcion Activated Media (BAM), to enhance nutrient removal when native soils are inadequate for pollutant removal or infiltration. Examples include rain gardens, landscape planter boxes, and tree box filters.</p> 	<p>Biofiltration BMPs can serve both small and large watersheds. The large watersheds typically discharge into retention basins or wet detention systems. The wet detention systems will then use up-flow filters on the discharge to further remove nutrients. Small drainage areas discharge into retention areas or rain gardens that have BAM within them to limit nitrates. These systems are highly configurable and thus highly applicable for on-site treatment in urban development, especially in areas undergoing redevelopment.</p> <p><small>Escambia County Low Impact Design BMP Manual September 30, 2016. Dr. M. P. Wanielista, P.E. and E. Livingston</small></p> 	<p>Incentive: Projects that demonstrate a minimum 25% reduction of the total stormwater volume through the use of this BMP shall be eligible for the incentives identified in Sec. 11.6 LID Incentives Matrix of the Low Impact Development Technical Manual. Projects using multiple BMPs to reach the reduction target will not be eligible for incentives.</p>
11.5.30	Any other Low Impact Development Best Management Practice	<p>Other BMPs will be considered if scientific or engineering performance data demonstrates the effectiveness of the practice.</p>		<p>Incentive: Incentive eligibility for any other LID BMPs will be determined by the administrator on a case by case basis using scientific or engineering product performance data.</p>

Table 11.2 Low Impact Development Incentives Matrix

Low Impact Development BMPs		Parking Incentives					Open Space, Landscape, Buffer, & Setback Incentives				Other Incentives				See Noted Section for Specific Standards		
		On-Street Parking ² Sec. 30-283	Parking Count Flexibility ²	Reduced curbing requirements ^{1,2}	Reduced Parking Space Dimensions ² Sec. 9.17.1.1	Satellite (Shared) Parking ¹	BMP Permitted within Buffer ¹	BMP Area Credited as Landscaping ¹	BMP Area Credited as Open Space ¹	Reduced Building Setbacks ¹	Additional Building Height ³	Additional Density ³	Expedited Application	Reduced Stormwater Freeboard ¹	Wet Ponds Outside of ACC ¹		
Site Planning BMPs	Protect Surface Waters and Wetlands				●								●		●	11.5.5	
	Preserve Open Space				●	●							●		●	11.5.6	
	Natural Area Conservation - Retain Tree Canopy and Natural Landscaping	●			●	●				●			●		●	11.5.7	
	Cluster Design & Conservation Subdivision									●			●	●	●	11.5.8	
	Minimize Building Footprint		●								●				●	●	11.5.9
	Minimize Total Impervious Surface Area	●	●		●	●						●			●	●	11.5.10
	Minimize Directly Connected Impervious Area (DCIA)	●	●		●	●									●	●	11.5.11
	Curb Elimination and Curb Cuts	●	●		●											●	11.5.12
Source Control BMPs	Minimize Soil Disturbance and Compaction				●											●	11.5.13
	Build with the Landscape Slope				●	●				●						●	11.5.14
	Retain Native Landscapes at the Lot Level								●			●			●	●	11.5.15
	Florida-Friendly Landscaping and Fertilizers	●	●										●			●	11.5.16
	Rainfall Interceptor Trees	●	●	●					●	●						●	11.5.17
	Install Efficient Irrigation Systems															●	11.5.18
	Exfiltration Trenches	●	●		●	●	●								●	●	11.5.19
Structural Stormwater BMPs	Underground Storage and Retention Systems	●			●	●	●			●			●	●	●	●	11.5.20
	Rain Gardens (Bioretention)			●													11.5.21
	Vegetated Swales							●							●	●	11.5.22
	Vegetated Natural Buffers								●							●	11.5.23
	Pervious Pavements	●	●		●										●	●	11.5.24
	Green Roofs with Cisterns	●	●		●				●	●					●	●	11.5.25
	Stormwater Harvesting Systems	●	●		●	●				●					●	●	11.5.26
	Up-Flow Filter System with BAM	●	●		●				●		●				●	●	11.5.27
	Detention Pond with Managed Aquatic Plant Systems		●		●				●	●	●				●	●	11.5.28
	Biofiltration Systems (BAM-enhanced rain gardens, landscape planter boxes, and tree box filters)	●	●	●	●	●	●	●	●	●	●			●	●	●	11.5.29
Any other Low Impact Development BMP																	11.5.30

¹ An administrative waiver or exception is required to meet the standards described in Chapter 30, Article I, Division 1, Sec. 30-3 "Standards for administrative exceptions".² A Development Review Committee (DRC) waiver is required. Waivers to the Technical Manuals are described in Chapter 34, Article V, Division 5 of the Code.³ A public hearing may be required to permit the increase.

11.7 Minimum Parking Requirements for Development Utilizing Low Impact Development

11.7.1 Developments utilizing certain (LID) Best Management Practices (BMPs) as described in Table 11.2 shall be eligible for the incentivized rate of required parking spaces as described in Table 11.3. All other requirements in the Transportation Infrastructure Technical Manual Section 9 shall apply.

Table 11.3 - Minimum Parking Requirements for Development Utilizing Low Impact Development

Use	Spaces Required	Min Per Unit	Max Per Unit
ACLF's, Convalescent Homes, Nursing Homes, and Rest Homes	1 1	Every 5 patient beds, and Each Employee on largest shift	
Assembly Areas, Auditoriums	1	250 s.f. of GFA	
Churches, temples, places of worship	1	100 s.f. of GFA	200% of the minimum
Funeral Homes	1	150 s.f. of GFA	100 s.f. of GFA
Hospitals	1 1 1	Doctor space for every ten patient beds and Every four patient beds, and Every one and one-half employees, exclusive of doctor parking spaces.	
Hotels and Motels	1	Each rental unit and 25% the rate for each accessory use	
Manufacturing/Industrial	1	1,000 s.f. of GFA	
Medical/Dental Clinics and Offices	1	250 s.f. of GFA	150 s.f. of GFA
Multi-Family (R-2, R-3) and RMH (1&2) Developments. *See additional standards below.	1	1.4 dwelling unit	
*R-2 - Townhouses	2	With direct access to a public street	
*R-3 - Townhouses	2	Two spaces on the same lot as the dwelling unit or one (1) on site space and one (1) remote	

		guest parking space within three (300) hundred feet of the unit.	
*Duplex, triplex, quadraplex and other multifamily units	1	1.4 dwelling unit	
Museums	1	400 s.f. of GFA	
Personal Services	1	400 s.f. of GFA	
Private Child Care Center	1	500 s.f. of GFA	
Private Clubs, Fraternities, Lodges	1	200 s.f. of GFA	
Professional Offices	1	500 s.f. of GFA	250 s.f. of GFA
Public Use and Community Services	1	300 s.f. of GFA	
Restaurants (eating places)	1	200 s.f. of GFA	
Retail Sales and Services	1	300 s.f. of GFA	200 s.f. of GFA
Theaters	1	200 s.f. of GFA	
Warehouse	1	4,000 s.f. of GFA	
GFA = Gross Floor Area s.f. = square foot			

11.7.2 For any use not listed above, the number of parking spaces may be determined by a parking analysis using ITE parking generation rates, other data and the Urban Land Institute. The Administrator must approve all parking studies prior to acceptance.