3 A Sustainable Approach to Surface Water Management

Pinellas County is unique in that the County is reaching the state of build-out. For this reason, the County needs to take precautions to ensure that the quality of the surrounding surface waters are not negatively impacted by future development and the redevelopment, and intends to focus on the opportunity provided by redevelopment to improve, instead of exacerbate, conditions.

COMMITMENT TO SUSTAINABILITY

In October 2006, the Florida Green Building Coalition named Pinellas County the first jurisdiction in Florida to receive the coveted *Green Local Government* designation as a silver award winner. This award recognizes the steps that Pinellas County has taken to become a steward of the environment and the everyday actions taken by the County to ensure that the environment is not negatively impacted by our decisions. This designation also encourages the County to now move forward and to take additional steps to protect the environment above and beyond what the County has done to date. The discussion below describes new initiatives underway, or being considered for implementation in Pinellas County to improve upon redevelopment techniques, thereby improving surface water quality conditions. These innovative techniques may also serve to achieve other surface water management goals, such as retaining significant quantities of surface water runoff onsite so that the runoff from one site does not impact neighboring properties. Redevelopment offers a real opportunity for individual contributions to water quality improvement, and, with partnerships between the developer and the County, quality projects with a positive contribution to the surface water environment.

LOW IMPACT DEVELOPMENT (LID) AND REDEVELOPMENT OPPORTUNITIES

Low Impact Development is one example of a new program direction that could contribute to the County's sustainability commitment and to improving the quality of our surface waters and the environment as a whole.

Low impact development practices can reduce the quantity of stormwater leaving a site, improve the quality of stormwater, and have a positive impact on the surrounding natural systems in general. It is generally recognized that there needs to be more than just retention ponds in a development to deal with stormwater runoff and poor water quality. LID looks at natural systems within a watershed, such as the natural flow of water, and attempts to reduce the negative impacts of development by mimicking natural systems and the site's pre-development hydrology. LID practices can serve to remove pollutants from surface waters, including nitrogen, and can help improve the quality off the surface waters throughout the County. As Pinellas County redevelops, individual lot solutions and education regarding human impacts on the stormwater system are some solutions for water quality and flooding problems.

LID can be both encouraged and/or required, depending upon the situation. By offering incentives to developers to use sustainable practices, Pinellas County and the private development community can be partners in achieving surface water management goals. Some

development incentives may include the fast-tracking of permitting, the reduction of permitting fees and other tools in order to encourage sustainable development and improve upon surface water quality. Currently, the State's stormwater regulations appear to be an impediment to LID and sustainable building practices. For many developments, certain stormwater solutions are required, such as the use of curbs or the use of pavements and concrete. Such requirements can serve to impede alternative stormwater solutions such as LID practices that can help to improve stormwater quality in the County.

Redevelopment presents a particularly suitable opportunity for implementing LID practices on a lot-by-lot level. Some examples of LID practices that can be incorporated into individual lots include green roofs, cisterns or rain barrels, micro-irrigation, bioretention systems, and pervious pavers.

Green Roofs

Green roofs, or rooftop gardens, are believed to have originated with the Hanging Gardens of Babylon and, in fact, for many years, these types of roofs have been used throughout the world to cool and to heat buildings, including homes. During the 1900's, modern green roofs became very popular in Europe, especially Germany, and have recently begun their rise in popularity in the U.S. Green roofs have gained popularity for their ability to insulate homes, retain and treat stormwater runoff, provide aesthetic beauty and to help counter the urban heat island effect.

Green roofs consist of modules laid on a roofing surface. These modules contain plants and soil, the depth of which will depend upon the roof system. Green roofs can be designed to hold small plants or medium sized trees, depending upon the soil depth and strength of the original roof structure. By providing an extra layer on top of a building, green roofs are able to absorb the rays of the sun, keeping the outer layer of the roof from become heated during the day, and keeping the inside of the building cooler. When it rains, the stormwater does not run off the roof and onto the street below; the rainwater is partially absorbed into the green roof system. This allows water to be retained within the roof system and not contribute runoff to the stormwater system, potentially alleviating flooding and pollution issues.

A number of jurisdictions throughout the country have already begun offering incentives, and in some cases requiring, the installation of green roofs in development projects. The City of Chicago, for example, requires any development receiving public assistance to install a green roof, with the exception of schools and community centers. Other developments not receiving public assistance (planned developments and lakefront protection ordinance developments) are also required to install green roofs. The City of Chicago has created a Building Green/Green Roof Matrix to explain their policy and how it applies to certain types of development. Chicago is also setting an example for the community. The roof of their City Hall has been converted into a green roof. The City of Portland is also offering incentives for green roof development, offering one bonus square foot of additional floor area for each square foot of rooftop garden area constructed. The City of Toronto created the Green Roof incentive Pilot Program, offering financial incentives for eligible applicants to construct green roofs.

Here in Florida, the University of Central Florida has installed an intensive green roof on top of the Student Union in 2005. Graduate students at the University, concluded that the system there can reduce the runoff volume by 90%. At a second green roof installed by the Stormwater Management Academy, the New American Home, a 300 sq. ft. green roof and cistern system was designed. According to the Stormwater Management Academy, this Orlando home, where an average of 50 inches of precipitation falls each year, will contribute only 2.5 inches of runoff to the surrounding stormwater system while retaining the difference onsite for reuse.

Green roof on top of the student union at the University of Central Florida in Orlando retains stormwater runoff and provides a mini-ecosystem.

While green roofs are still being studied to determine exactly how much stormwater is retained by different systems, these roofs are becoming more and more popular within the U.S. and can offer a viable alternative to stormwater retention and treatment in a built-out area such as Pinellas County, where redevelopment on a lot-by-lot basis loans itself to small scale stormwater solutions.

Rain Barrels and Cisterns

Rain barrel used to collect rain water runoff from a roof.

Some green roof systems are also incorporating the use of rain barrels and cisterns to retain any excess stormwater onsite and use it for irrigation when rain is scarce. Individual homeowners have also begun to utilize rain barrels and cisterns to capture stormwater runoff from their roofs via the gutter system, and utilize that stormwater for yard and landscape irrigation later. Stormwater is captured in the gutters along the sides of roofs and diverted into holding tanks instead of onto impervious surfaces, which allow the stormwater to capture pollutants on its way into the storm sewer system. The Florida Extension service in Pinellas County holds rain barrel workshops for citizens once a month, to teach citizens how to capture the stormwater from their roofs and utilize it for irrigation purposes. These workshops also go over the maintenance of the systems and how to avoid algae growth and the appearance of pests.

Multiple rain barrels used to collect rain water runoff from a roof.

Graywater Reuse

It is also possible for the stormwater retained to be utilized for a household gray water system, routing the stormwater indoors to be used for flushing of toilets. Cisterns capture the water much like a rain barrel, but are larger in size, are made up of a more highly engineered container and are able to offer a small level of treatment of the stormwater before it enters the home through a retrofit of the existing plumbing system, or is pumped out for other non-potable water uses.

By educating residents on how to develop and maintain their own alternative irrigation techniques, such as through the use rain barrels and cisterns, there can be less dependence upon the potable water and less of an impact on the storm sewer system as residents will be able to capture a greater portion of stormwater runoff on their properties to utilize at a later time.

Micro-irrigation

Example of bioretention used in a parking lot in Pinellas County.

Micro-irrigation is a method which delivers water right to the roots of plants, in small volumes. This is accomplished through porous tubes laid in the ground from which water seeps when it is turned on, or through a bubbler system, adapted to existing sprinkler heads. This type of systems is in contrast to traditional sprinkler systems, where the systems may not be calibrated or maintained, often sending water on impervious surfaces and creating runoff into the stormwater system. While these systems do require regular maintenance to ensure that the lines do not clog and malfunction, they use significantly less water and contribute far less to the waste of potable water resources.

Drip irrigation systems can reduce the amount of water consumed by landscaping.

Bioretention

Bioretention is a best management practice that utilizes soils and vegetation to filter and absorb stormwater runoff on a site. Runoff is directed to vegetated areas, where pollutants are filtered out and the water is absorbed into the ground, instead of being directed into the storm sewer. These areas are usually depressed into the ground to allow for ponding in times of significant rainfall. Bioretention areas can be constructed on virtually any site. In parking lots, medians can be constructed so that they are depressed beneath height of the rest of the parking lot. These medians can be either built without curbs or with curb cuts around it, to protect the plants from automobiles. On individual lots, bioretention areas can be built on the property and filled in with native vegetation to mask the depression in the ground. Neighborhood streets can also be constructed without curbs, allowing water to flow over them and onto the adjacent vegetated right-of-way or into the swales along property lines.

***Drip irrigation for potted plants*.**

Bioretention projects would allow for more stormwater runoff to be treated and retained on-site instead of filtering it directly into the storm sewer, improving the overall quality of the surface waters of the County.

Pervious Pavers and Pavement

Another LID concept that has been gaining in popularity across the country is the use of pervious pavers for stormwater management. Pervious pavers allow stormwater to filter through the pavers and be absorbed into the ground, instead of contributing to the storm sewer system. The pavers capture and filter out pollutants before they enter the ground. Pervious pavers have also been used to cover the dripline of mature trees so that the trees do not have to be removed during construction and can be retained and maintained onsite. These pavers do require regular maintenance to ensure that they retain their porosity and are normally recommended for lower-traffic vehicular use areas such as parking lots, low-traffic neighborhood streets or driveways. By encouraging the use of pervious surfaces on individual lots, Pinellas County would be able to improve water quality of the surrounding surface waters and decrease the volume of stormwater runoff into the storm sewer system.

Example of pervious pavers installed in a parking lot.

LID IN PINELLAS COUNTY

The County continues to determine how LID may be able to fit into the urban landscape as we redevelop. There have already been two LID projects completed within the County. New swale systems have been installed at Walsingham Road from 119th-125th St., and a no-curb system was constructed in the Wall Springs Park Phase I development and in the Extension Services/Botanical Gardens parking lot. Further research regarding the feasibility and benefits of LID is underway by a number of organizations, particularly by the Stormwater Management Academy at the University of Central Florida, and the concept continues to be refined.

Example of a swale that is used for stormwater treatment in Pinellas County.

One of the drawbacks to LID is that the methodology behind the technology is not as readily accepted by the mainstream as structural stormwater management techniques are. Pinellas County has a desire to begin discussions with SWFWMD and other agencies regarding partnerships to explore LID techniques and to quantify the impacts of LID on stormwater management so that LID projects are included as viable stormwater management techniques and meet permitting requirements. In such partnerships, the County could become a model community for LID demonstrations, from which data could be gathered and criteria developed for future LID projects. This data is necessary to show statistical proof that LID concepts and techniques are a viable alternative to standard, structural methods of stormwater control and treatment. Such partnerships may one day lead to the acceptance and addition of LID techniques to State guidelines for stormwater management.