Planning for Sea Level Rise in the Matanzas Basin

Appendix G:
Smart Growth and Low Impact Development (LID)

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Applying Smart Growth and Low Impact Development Principles in the Matanzas River Basin

Introduction

This paper is part of a larger research project for adaptation to sea-level rise around the Matanzas Basin and the Guana Tolomato Matanazas National Estuarine Research Reserve in the northeastern part of Florida. Included within the paper are key policy options and research references for utilizing Smart Growth and LID tools within the Matanzas Basin area. The goal of this document is to provide an introductory framework of Smart Growth and Low Impact Development (LID) tools that can be integrated as part of an adaptation strategy to sea-level within the Matanzas Basin.

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Smart Growth and Low Impact Development

Smart Growth is a broad term used to describe a set of guiding principles that encourage compact, efficient development patterns. The goal of Smart Growth is to create and maintain communities that are attractive, convenient, safe and healthy. A primary objective is addressing sprawl and environmental concerns and mitigating these issues. In addition these communities are designed to foster civic interaction, encourage physical activity, while protecting the natural environment. As development pressures increase from the growing coastal populations it will make the uses of these practices even more critical.

Figure 1.1 Smart Growth Principles

Figure 1.2 Smart Growth and LID Principles in Matanzas Basin Image created by:Matt Wolfe

Application of Smart Growth Techniques in the Matanzas River Basin

Infill and Redevelopment in Urban Areas

The central tenet of smart growth and its various strategies is the incorporation of infill/redevelopment within the urban context. This strategy focuses on the ethos of encouraging and steering infill and new development into already developed areas. It reduces Greenfield development, increases natural land for conservation, and preservation of vital agricultural lands. This reduces new impervious surfaces, increases aquifer recharge, reduces interference with natural surface water/flow regimes, and reduces impacts on natural communities and species. Compact site/building design, preservation of open space and mix of land uses are primary ways to deal with the issues of sea level rise and its impacts in the Matanzas context area.

By steering infill development/redevelopment into the urban developed areas of St. Augustine, Palm Coast and Marineland, one of the primary benefits created will be improved water quality in the Matanzas River Basin region. Water quality is improved due to the decreased need for new impervious surfaces which are conduits for pollutant water runoff. In addition undeveloped and rural land is preserved as there is less demand to develop those areas using this development pattern.

Key Policy Options for Infill and Redevelopment

- Promote infill and redevelopment by preserving, upgrading and reusing existing properties within urban areas
- Restore and re-use brownfields
- Fix current infrastructure

Compact Building Design

The Matanzas River basin area with is coastal communities that have a natural boundary the water it is even more critical that land is used in the most efficient manner possible. This objective can be met with the introduction of a site/building design that is compact and clustered with small lots. Well-designed, appropriately scaled compact development utilizes less land, which in turn preserves natural areas and requires less funding for maintaining and building infrastructure. (United States Environmental Protection Agency 2009)

Through smaller building footprints, reuse of buildings and use of narrower street designs it can leave undeveloped land to absorb rainwater, thereby reducing the overall level of impervious surface in the Matanzas River Basin watershed.

(US EPA 2009) Compact and community building design techniques will reduce runoff, storm surge impacts, and stormwater drainage needs, contributing to the overall health of the Matanzas watershed. Compact buildings allow for development to maximize the use of land. By maximizing the land it allows land to be used for natural hydrologic functions within the urban framework that normally would be developed without integrating compact design elements. In addition, local governments find that, on a per-unit basis, it is more cost effective to provide and maintain services such as water, sewer, electricity, phone service and other utilities in more-compact neighborhoods than in dispersed communities.

Key Policy Options for Compact Building Design

- Engage in hazard mitigation planning with the emphasis of compact design elements.
- Promote compact, clustered development in the comprehensive plan and land development code
- Create incentives for infill/redevelopment in the urban areas such as Transfer of Development Rights (TDR), density bonuses and credits, tax incentives, tax increment financing (TIF)

Preservation of Open Space, Natural Areas, and Agricultural Land

A second technique of smart growth policy that should be used in the Matanzas area is the conserving of open space, preservation of natural areas and protection of vital agricultural land. By implementing land development code policies in conjunction with infill strategies that promote these objectives, it will benefit the Matanzas area in the following ways:

- Assess and protect critical natural buffers for protection of the urban areas and the Matanzas watershed.
- Protect the urban areas of St. Augustine, Palm Coast and Marineland from increased storm surges by maintaining natural landscape buffers.
- Second it limits the runoff of pollutants flowing into the vital waterways which are sources of freshwater for the region that are natural areas and buffers around these areas.
- Third it maintains the much needed use of agricultural land within the area.
- Fourth it protects vital wildlife habitat for a variety of species in the region by limiting new development on undeveloped land.
- Creates and protects coastal and natural features for recreational and public access

Key Policy Options for Preservation of Open Space

- Partner with community land trusts groups to preserve and protect critical lands and natural areas
- Dedicate funding for habitat preservation and open space conservation
- Write policies in land development code that require a certain amount of land to be set aside when development occurs in the region
- Develop an incentive based system that encourages developers to preserve open space and agricultural land

Mix of Land Uses

A component of both infill and redevelopment strategies is incorporating the mixture of different land use types. Mixed use development blends a combination of residential, commercial, or industrial uses where these uses are functionally and physically integrated. Mix use is a vital component of the overall smart growth strategy and should be encouraged in the urban areas of the communities in the Matanzas context area.

Mix use development promotes the following goals

- Promotes efficient use of land and infrastructure by building vertically and integrating multiple uses within a single building. The combination of residential/mix uses is one tool to achieve this goal.
- Preservation of undeveloped land
- Protects outlying rural areas and environmentally sensitive resources
- Reduces auto dependency and road congestion
- Creates compact development
- Enhanced sense of place

Key Policy Options for Mixed Use Urban Areas

- Adopt zoning policies and building codes that support mixed use development.
- Create overlay districts that permit horizontal and vertical mix of uses
- Create form based codes as applicable to prescribe building type, this is useful in St. Augustine specifically when needing to integrate contextual appropriate new buildings in the historic areas

Low-Impact Development (LID)

Low Impact Development (LID) is a collection of site planning principles and engineered treatment protocols utilized to manage both storm water runoff as well as water quality. (Coffman 1) Its focus is to create an eco-sensitive approach to stormwater management.

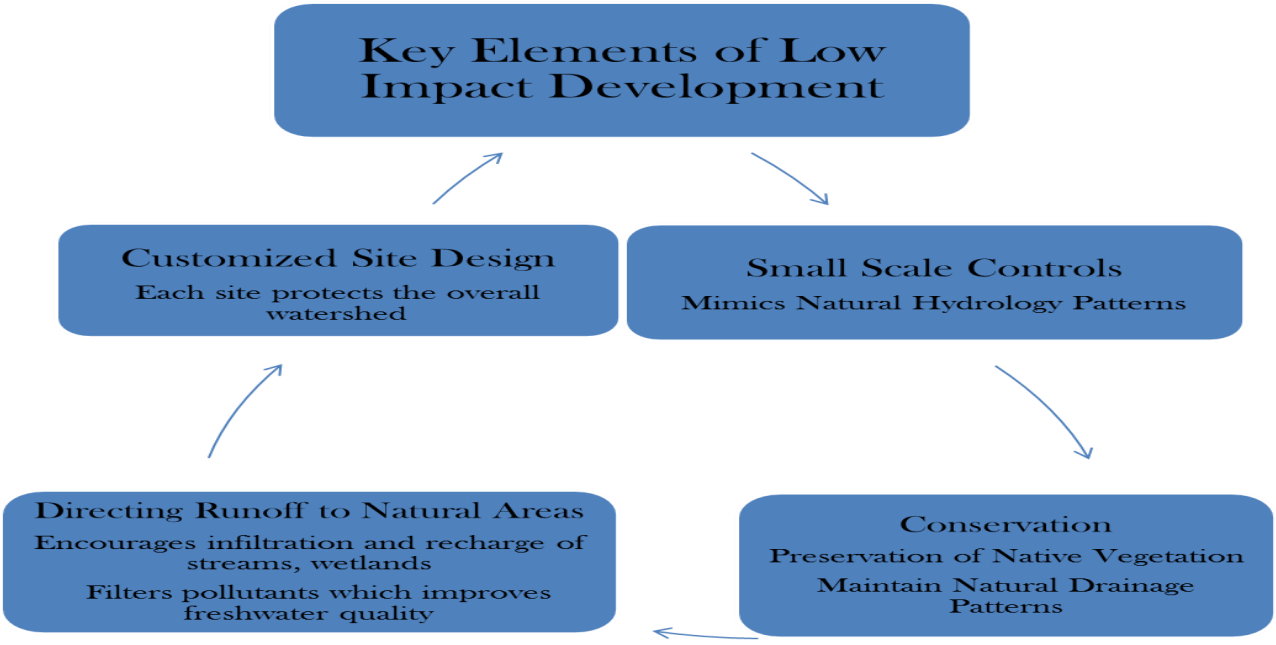

Figure 1.3 Elements of LID: Image created by Matt Wolfe

Application of LID Techniques for Matanzas River Basin

Storm Water Management

LID emphasizes storm water management at the lot-level where the goal is to replicate the pre-development hydrology which mitigates the impacts of development. LID's goal is to use multiple on site protocols to avoid stormwater runoff while increasing the landscape's ability to retain water runoff and capture pollutants. (Coffman 1)

These waterways and watersheds are of vital importance to the Matanzas area. It will be critical to protect these bodies of water as sea level rise will cause the intrusion of saltwater into the inland waterways due to higher storm surges, sea level rise inundation, and saltwater intrusion into the aquifer-making them more vulnerable to degradation.

- **Bioretention Cells**- these cells are large shallow landscaped depressions that are able to handle large volumes of water on site. Are suited for commercial areas, residential areas, and industrial areas.
- **Rain Gardens**-are native perennials planted within the landscape strategically to capture storm water runoff from impervious surfaces. These help to absorb water on site and create increased water quality due to its ability to filter the storm water runoff.
- **Permeable Pavements**-these can vary from paver blocks to full pervious parking lots and streets. This allows water to filter through these surfaces instead of directing storm water to central retention areas. By doing so it helps to preserve important land from being used as retention areas.
- **Cisterns**-are water storage devices that collect storm water thus limiting the demand for freshwater.
- **Bioswales/Grass Swales**-which primarily are used along residential streets and highways. They function to carry storm water to sewer inlets and act as a filtration device
- **Native Vegetation**-by increasing the use of this type of vegetation it helps to facilitate filtration of storm water. This type of vegetation has tremendous root structure which creates quality organic soil aiding in the filtration process.
- **Green Roofs**-roofs partially or completely covered with plantings enabling absorption of rainwater, insulation, and creating wildlife habitat.

Figure 1.5 Sustainable Site Plan-Image image from: Low Impact Development Center-SPU Manual

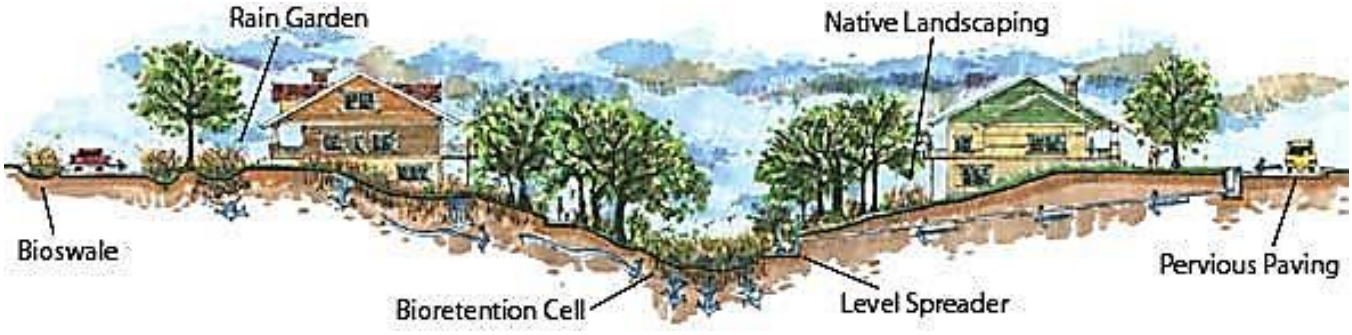

Figure 1.4 The LID Approach to Storm Water Management: Image by: Doug Adamson, USDA

Key Policy Options for LID Techniques

- Incorporate LID (i.e. green infrastructure tools) into local comprehensive plan
- When writing land development code make strong requirements for the integration of LID tools (small scale LID treatment practices) when new development/redevelopment is proposed
- Promote use of micro-site LID to community at large and its benefits

This is important because saltwater intrusion will potentially reduce freshwater availability and impact wells, and by reducing demands for freshwater from surface water bodies (such as the St. Johns) will reduce stress on these systems and help the associated ecosystems remain more resilient as sea levels rise. Allowing natural filtration of stormwater and maintaining natural hydrologic patterns and flows will help reduce ecosystem stresses, maintain water levels and flows in surface water bodies, and replenish the aquifer.

Case Study: Rosemary Beach, Florida

An example of the integration of smart growth and LID principles is the town of Rosemary Beach, Florida which is located along the Panhandle of Florida. The town is a clustered, seacoast development that preserves the natural dune system, wetlands and critical wildlife habitat of the area. A systematic approach was initiated when developing the town. The approach was the following:

- On a project scale, the developers optimized conservation of natural features (native vegetation, trees, wetlands, streams, and sensitive environmental areas), natural hydrologic patterns, and topography when developing the building envelope. The conservation areas were then used to treat runoff using their natural ability to filter and absorb runoff.

- At the individual lot level they minimized impacts of storm surge etc. by saving existing vegetation and soils, while limiting the use of impervious surfaces and new infrastructure.

- Used various LID engineered practices such as rain gardens, infiltration practices, and small scale detention swales.

Figure 1.6 Rosemary Beach, Florida image 30A local properties website

Figure 1.7 Rosemary Beach, Florida-image from visitsouthwalton.com

- Clustered lots in order maximize the use of the developed land and infrastructure freeing up needed land for natural protection from storms and effects of sea level rise.

This symbiotic relationship between the built environment and nature represents a way of meeting the needs for “smart growth” development and environmental concerns. Designing and planning with “nature” in mind goes a long way in meeting the objectives of growth and environmental protection. By developing projects that integrate and are sensitive to the natural environment it not only protects vital environmental areas, but also those natural areas provide protection for the development.

Combining the site specific techniques of smart growth and LID with the preservation of interconnected natural areas in the Matanzas River Basin context area (a green infrastructure network i.e. LID at the community and regional scale) can protect vital natural resources and help these communities become more resilient to natural hazards and climate change.

References

Adamson, Doug. The LID Approach to Storm Water Management. Digital image. USDA National Resources Conservation Service Montana, n.d. Web. 02 Nov. 2014. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/mt/water/?cid=nrcs144p2_057450>.

Beatley, Timothy. Planning for Coastal Resilience: Best Practices for Calamitous times. 1st ed. Washington, D.C.: Island, 2009. Print.

Carswell, Andrew T., and Vicino Thomas. The Encyclopedia of Housing. Thousand Oaks, CA: SAGE Publications, 2012. Print.

Center for Watershed Protection, 01 Jan. 2014. Web. 12 Nov. 2014. <http://www.cwp.org/>.

Smart Growth for Coastal and Waterfront Communities. Rep. no. EPA-231-K-09-001. United States Environmental Protection Agency, 01 Sept. 2009. Web. 29 Oct. 2014. <http://coastalsmartgrowth.noaa.gov/smartgrowth_fullreport.pdf>.

Duany, Andres, Jeff Speck, and Mike Lydon. The Smart Growth Manual. 1st ed. New York: McGraw-Hill, 2010. Print.

Form-Based Codes. Form-Based Codes Institute, 01 Jan. 2014. Web. 12 Nov. 2014. <http://www.formbasedcodes.org/>.

Lichten, Keith H., and Scott D. Struck. Low Impact Development Redefining Water in the City: Proceedings of the 2010 International Low Impact Development Conference, April 11-14, 2010, San Francisco, California. Reston, VA: American Society of Civil Engineers, 2010. Print.

"LID CENTER - GREEN STREETS." Low Impact Development. Low Impact Development Center,Inc., 01 Jan. 2008. Web. 12 Nov. 2014. <http://www.lowimpactdevelopment.org/greenstreets/>.

Low Impact Development Center,Inc., 01 Jan. 2014. Web. 2 Nov. 2014. <http://www.lowimpactdevelopment.org/>.

"Low Impact Development (LID)." United States EPA, 03 Oct. 2014. Web. 1 Nov. 2014. <http://water.epa.gov/polwaste/green/>.

Low Impact Development (LID): A Literature Review. Washington, D.C.: United States Environmental Protection Agency, Office of Water, 2000. US EPA. United States EPA, 01 Oct. 2000. Web. 01 Nov. 2014. <http://water.epa.gov/polwaste/green/upload/lid.pdf>.

"National Low Impact Development Clearinghouse." National Low Impact Development Clearinghouse. National Low Impact Development, Inc., 20 Mar. 2007. Web. 12 Nov. 2014. <http://www.lid-stormwater.net/clearinghouse>.

N.d. 30A Local Properties Website, Grayton Beach Florida. 30A Local Properties. Web. 29 Oct. 2014. <http://www.30alocalproperties.com/area-information/rosemary-beach/>.

Placemakers, LLC, 01 Jan. 2014. Web. 3 Nov. 2014. <http://www.placemakers.com/>.

Rosemary Beach, Florida. Digital image. Rosemary Beach, Florida. Visit South Walton, 01 Nov. 2014. Web. 26 Oct. 2014. <http://www.visitsouthwalton.com/rosemary-beach>.

"Smart Growth and Climate Change." Environmental Protection Agency, 30 May 2014. Web. 12 Nov. 2014. <http://www.epa.gov/smartgrowth/climatechange.htm>.

"Smart Growth." CityLab. Citylab Atlantic, 02 Jan. 2014. Web. 12 Nov. 2014. <http://www.citylab.com/topics/smart-growth/>.

"Smart Growth: Hazard Mitigation." Smart Growth America, 30 Aug. 2011. Web. 12 Nov. 2014. <http://www.smartgrowthamerica.org/tag/hazard-mitigation>.

Sustainable Site. Digital image. Low Impact Development. Low Impact Development Center,Inc., 01 Jan. 2014. Web. 04 Nov. 2014. <http://www.lowimpactdevelopment.org/spumanual.htm>.

"Walking the Walk - Getting in Touch with LID Design | Asla.org." American Society of Landscape Architects, 01 June 2011. Web. 12 Nov. 2014. <http://www.asla.org/ppn/Article.aspx?id=32264>.

Clausen, John C. Jordan Cove Watershed Project, Section 319, Final Report. Storrs: U of Connecticut, College of Agriculture and Natural Resources, Dept. of Natural Resources Management and Engineering, 2007. Print.

"Rosemary Beach in Northwest Florida | Rosemary Beach Vacations." Rosemary Beach Holdings, LLC, 01 Feb. 2014. Web. 5 Nov. 2014. <http://rosemarybeach.com/>.

Glossary of Terms

Mixed Use-development that combines two or more different types of land uses, such as residential, commercial, employment or entertainment located in same contained building.

Overlay District-is a layer of local planning regulation which incorporates zoning requirements of the underlying zone for a specific area.

Form Based Codes-is a land development regulation that creates predictable and definable built results and a public realm by using physical form (rather than a based on a separation of uses) as the main organizing principle for the code.

Housing Density-is the amount of development within a given geographical area.

Comprehensive Plan- describes the goals and aspirations of communities' goals in terms of community development. Comprehensive plans encompass large geographical areas, a broad range of topics, and covers a long-term time horizon.

Watershed-an area or ridge of land that separates waters flowing to different rivers, basins, or seas.

Tax Increment Financing (TIF) - is a public financing method that is used as a subsidy for redevelopment, infrastructure, and other community-improvement projects.

Transfer Development Rights (TDR)- Transfer of development rights (TDR) is a market based technique that encourages the voluntary transfer of growth from places where a community would like to see less development (called sending areas) to places where a community would like to see more development (called receiving areas).

Land Development Code- set of regulations that define land uses and zoning.

Clustered Development- development that is built close together rather then spread out over the geographical area.

Hazard Mitigation- any sustained action taken to reduce or eliminate the long-term risk to life and property from hazard events.

Brownfield Development- is land previously used for industrial purposes or some commercial uses.

Greenfield Development- land that has never been used (e.g. green or new), where there was no need to demolish or rebuild any existing structures.