

PROJECT FACT SHEET

Project Name:	Mitigation Localized Flooding - Development of a Green Infrastructure Master Plan in the Lower Rio Grande Valley	Completion date:	January 31, 2020
Project Location:	City of Mercedes, which is located in Hidalgo County, South Texas	Project ID:	TAA18-007
Goal 2:	Develop Green Infrastructure Master Plan	Technical Rep:	
Contact Person	University of Texas Rio Grande Valley Andrew Ernest, Ph.D. (Principal Investigator) andrew.ernest@utrgv.edu	EPA Advisor:	Abril Quiroz
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Project Background

The Lower Rio Grande Valley (LRGV) in southernmost Texas has been experiencing a population boom and currently consists of 1.2 million people. It also consists of rapidly expanding urbanized areas and is subject to periods of extreme rainfall. The LRGV only contains four major drainage outfalls, three of which are under the control of the International Boundary and Water Commission, a binational organization. Urbanization produces numerous changes in the natural environment through disturbing lands and replacing natural vegetation with impervious surfaces such as roads, driveways, parking areas, and building roofs and compact soils. Furthermore, urban stormwater runoff is a primary source of water quality impairment in receiving streams and water bodies. It is discharged into surface water untreated carrying various pollutants causing a decline in aquatic biota and degradation of water quality. Low Impact Development (LID) or Green Infrastructure (GI) are structural Best Management Practices (BMPs) - ecologically-based stormwater management approaches

to manage rainfall on the site favoring soft engineering through a vegetated or biologically based treatment network. The basic idea behind GI is to manage and control urban stormwater runoff by keeping as much stormwater runoff as possible on-site to give the water a chance to infiltrate into the soil or receive treatment. This can be achieved using on-site measures such as vegetated swales, rain gardens, green roofs, porous pavement and larger-scale practices such as retention ponds. The goal of a GI structure is to reduce or eliminate the contaminants collected by stormwater before its drains into streams and rivers.



Figure 1. Bioretention (left) and Permeable Pavement System (right) sectional layout

Project Description

The GI Master Plan will provide a unique innovative strategy that can be used as a demonstration tool and can be duplicated throughout the region. The main objectives of the GI Master Plan that the City of Mercedes wants to implement are to 1) minimize the environmental impact of the rainwater, 2) avoid localized, 3) stop the contamination of the water and 4) integrate it to the construction projects through the development of natural drainages. Through the GI Master Plan, the City intended to establish the general and specific guidelines for the management and treatment of rainwater to diminish its impact and to apply the strategies that allow for the construction of “green” structures. Through this project, the City of Mercedes and other participating local governments assessed GI facilities, and considered providing language that encourages GI in their policies.

Project Significance

The GI Master Plan is an approach for land development that works with nature to manage rainwater and it’s based in the preservation and recreation of natural landscape characteristics, minimizing impervious surfaces to create a functional drainage. The idea is that rainwater can be integrated as a natural attraction of urbanism instead of being considered a discarded product, therefore avoiding the creation of ponds and future contamination.

Project Cost

B2020 awarded amount	\$30,000
Total project cost	\$30,000
Project Length:	22 months
Benefited population:	Approx. 500,000

The Results

Outcomes

UTRGV in cooperation with the City of Mercedes identified 19 priority sites that may suffer from flooding and runoff accumulation depending on the rainfall depth (Figure 2). The team assessed each site separately and discussed the proposed BMP system installation to prevent any further flooding. The GI Master Plan includes the recommendation for construction of 29 permeable pavements and 24 bioretention systems within the visited sites. Also, the plan suggests that the city change the drainage policy to convey more stormwater runoff from the sites and include the GI structures as a major component to reduce the flooding.



Figure 2. Priority sites for flooding in the City of Mercedes

Outreach and Education

The project team conducted several educational outreach activities in order to promote the GI Master Plan concepts to local water managers, institutes of higher education, city and county officials, water professionals, professional organizations and water-related organizations. The project team completed two presentations in two stormwater conferences (local and regional) and one workshop to present the GI Master Plan with the City Representatives and LRGV SW Task Force partners during the project period.

1. 21st Annual Lower Rio Grande Valley Water Management & Planning Conference, May 21-24, 2019, South Padre Island, Texas (Poster Presentation)
2. 2019 EPA Region 6 Stormwater Conference, July 28 - August 1, 2019, Denton, Texas. (Oral Presentation)
3. January 30, 2020 – Final GI Master Plan Workshop at the City of Mercedes.

References:

Mahmoud, A., Alam, T., Yeasir A. Rahman, M., Sanchez, A., Guerrero, J., Jones, K.D., 2019. Evaluation of field-scale stormwater bioretention structure flow and pollutant load reductions in a semi-arid coastal climate. *Ecol. Eng.* X 1, 100007. <https://doi.org/10.1016/j.ecoena.2019.100007>

Significant project contributions

Educational outreach activities were performed by the project team to promote the Green Infrastructure (GI) to local officials, city and county managers, water professionals, professional organizations and water-related organizations. The LRGV NPDES Stormwater Task Force is comprised of 17 local governments and entities representing a total population of over 500,000. The GI Master Plan was presented to benefit residential, commercial, industrial educational, professional and government stakeholders through the delivery of innovative information, by providing a venue with opportunities to disseminate and share knowledge between stakeholders and by engaging young professionals, students, and educators with new science and engineering paradigms for managing stormwater in the LRGV. The implementation of the GI Master Plan in the City of Mercedes is expected to promote an increase in Green Infrastructure in the LRGV, reduce flooding within the city limits and enhance property values and quality of life in many communities.

