



Mitigation Localized Flooding - Development of a Green Infrastructure Master Plan in the Lower Rio Grande Valley

*Texas-Coahuila-Tamaulipas-Nuevo Leon
Regional Workgroup*

KEY PROJECT HIGHLIGHTS:

- To view Master Plan and Best Practices, documents for this project visit: <https://rgvstormwater.org/projects/mitigating-localized-flooding-development-of-a-green-infrastructure-master-plan-in-the-lower-rio-grande-valley>.

- an ecologically based storm-water management approach favoring “soft” engineering to manage rain fall on the site through vegetated treatment;
- reducing/eliminating the contaminants collected by stormwater as it moves into water bodies;
- utilizing as much green space as possible in urban planning and aims to maximize the benefit from these green spaces;
- an integral component for a community’s sustainability while protecting the environmental by minimizing pollutants.

The Lower Rio Grande Valley (LRGV), in southernmost Texas, has been experiencing a population boom over the past decade. During periods of heavy rainfall, the region is prone to significant flooding due to the flat terrain and rapidly expanding urbanization, which is causing numerous changes in the natural environment through disturbing lands and replacing natural vegetation with impervious surfaces such as roads, driveways, parking areas, and buildings. The 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. The City of Mercedes in partnership with the University of Texas Rio Grande Valley (UTRGV) proposed to develop a demonstration green infrastructure (GI) master plan to mitigate localized flooding in a high priority region within the city limits and could also be duplicated in other cities throughout the LRGV. In addition to developing the Master Plan, the project team conducted outreach activities to promote the GI Master Plan and stormwater runoff management strategies to local water managers, institutions of higher education, city and county officials, water professionals, professional organizations and water-related organizations.

The main objectives of the GI Master Plan included 1) minimizing the environmental impact of the rainwater, 2) avoid localized flooding, 3) stop the contamination of the water and 4) integrate it to the construction projects through the development of natural drainages. The benefits of GI include:

In the development of the GI Master Plan, the GI Practices most preferred for the areas within Mercedes were permeable pavements/sidewalk and bioretention/bioswales. The project team identified 19 priority (Figure 1) locations within the city limits that were prone to flooding or runoff accumulation during small storm systems (<2” in rain). Most of these locations were located within historical downtown Mercedes or expressway areas.



Figure 1. Location of priority sites prone to flooding in Mercedes, TX.

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After visiting each location, the team proposed GI practices that the City could put in place to help minimize or resolve these issues (Table 1). The locations were grouped into 11 sites. In total, 29 permeable pavements and 24 bioretention systems were recommended. In addition, upon reviewing the existing Storm Drainage Policy, the team suggested that the city change the policy to convey more stormwater runoff from the sites and include the GI structures as a major component to reduce the flooding.

Table 1. Number of proposed LID practices that can be installed with the flooding area within the city of Mercedes.

Site Number	Permeable pavement / sidewalk	Bioretention / Bioswale
Site 1 (Location 1)	1	3
Site 2 (Locations 2 & 6)	2	3
Site 3 (Locations 3, 4 & 5)	7	1
Site 4 (Location 7)	1	4
Site 5 (Locations 8 & 9)	3	3
Site 6 (Location 10)	-	1
Site 7 (Location 11)	1	2
Site 8 (Location 12)	4	2
Site 9 (Locations 13, 14, 15 & 17)	5	2
Site 10 (Location 16)	3	3
Site 11 (Locations 18 & 19)	2	-
Total	29	24

The City identified the top two high priority sites among the 19 for the project team to evaluate and choose to demonstrate the use of GI technology to reduce flooding (Figure 2). The team selected a site close to Mercedes Independent School District (adjacent to site #17) where students and their families pass daily.

The site had no sidewalk so pedestrians use and must walk on a vegetated strip which was inconvenient to use especially after rainfall events. In addition, the location



Figure 2. Priority Site near Mercedes ISD permeable pavement Design

received large amounts of runoff from the surrounding area which made it unsafe to be used. After conducting a geotechnical study on what type of soil was present and a survey of the area, the team engineered a permeable sidewalk system.



Figure 3. Before and after photos of high priority location, including engineer design of cross section of permeable pavement.

The third phase of the project included outreach activities to promote GI Best Management Practices (BMPs) to local water managers, institutions 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.

- 21st Annual Lower Rio Grande Valley Water Management & Planning Conference, May 21-24, 2019, South Padre Island, Texas (Poster Presentation)

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- 2019 EPA Region 6 Stormwater Conference, July 28 - August 1, 2019, Denton, Texas. (Oral Presentation)
- January 30, 2020 – Final GI Master Plan Workshop at the City of Mercedes.

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.

The project team developed an online website which includes the project scope, technical presentations and project information. To view these documents, please visit: <https://rgvstormwater.org/projects/mitigating-localized-flooding-development-of-a-green-infrastructure-master-plan-in-the-lower-rio-grande-valley>.

(Note: Some source language for this article was taken directly from the Project's Final Factsheet and Report submitted by Dr. Ahmed Mahmoud, Ph.D. from the University of Texas Rio Grande Valley)