San Marcos

Stormwater Master Plan

May 2, 2018

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October 30, 2015

TABLE OF CONTENTS

INTRODUCTION 1

THE VISION 2

CATALYSTS 3

Quality 4

Quantity 5

ACTION 6

CREEK AND RIVERINE FLOODING 7

URBAN FLOODING (Local Drainage) 8

DISASTER RECOVERY 9

WATER QUALITY 10

REGULATORY IMPROVEMENTS 11

Clean Water Act – MS4 11

Code SMTX 12

Floodplain Damage Prevention Ordinance 13

RESULTS 14

MOVING AHEAD 15

APPENDIX AND LIST OF REFERENCES 16

INTRODUCTION

For decades San Marcos has participated and led numerous strategic initiatives to improve the management of stormwater quantity and quality within its jurisdiction. From the first Flood Insurance Study (FIS) published in 1978 to the construction of major NRCS reservoirs from 1981 to 1991, to the establishment of a water quality rules and a drainage utility in the late 90's, and all of the recent efforts described in this Stormwater Master Plan, San Marcos is a leader when it comes to developing cutting edge stormwater regulations, responding to disasters and implementing solutions.

This document summarizes recent efforts by various agencies that make up the City of San Marcos' Watershed Master Plan. It is intended to "time stamp" these efforts and identify the "next steps." The purpose of this master plan is to:

- Improve regulations to guide development;
- Ensure compliance with local, state and federal regulations; and
- Emergency preparedness.

The major challenges facing the City include:

- Projected growth in population;
- Threats to water quality and endangered species;
- Increased frequency of flooding; and
- Sustainability.

The City's **Land Development Code** (LDC) addresses stream erosion, development within the floodplain and the protection of water quality of stormwater runoff. Through regulations and planning, San Marcos exceeds the minimum standards established through National Flood Insurance Program (NFIP) and plays an active role in the Edwards Aquifer Recovery Implementation Program (EARIP).

The City's **2018 Capital Improvement Plan** (CIP) reflects the City's commitment to improving the quality of life for its residents by programing strategic projects that address the many challenges in both managing the quantity and quality of stormwater runoff. The City leverages local dollars with state and federal funds to address many issues through an integrated approach. The City's 10-year CIP includes $89 million for design and construction projects which will go a long way to meet discrete site specific needs and at the same time allow for partnering on regional initiatives such as mitigating floods on the Blanco River and protecting the quality of the Edwards Aquifer.

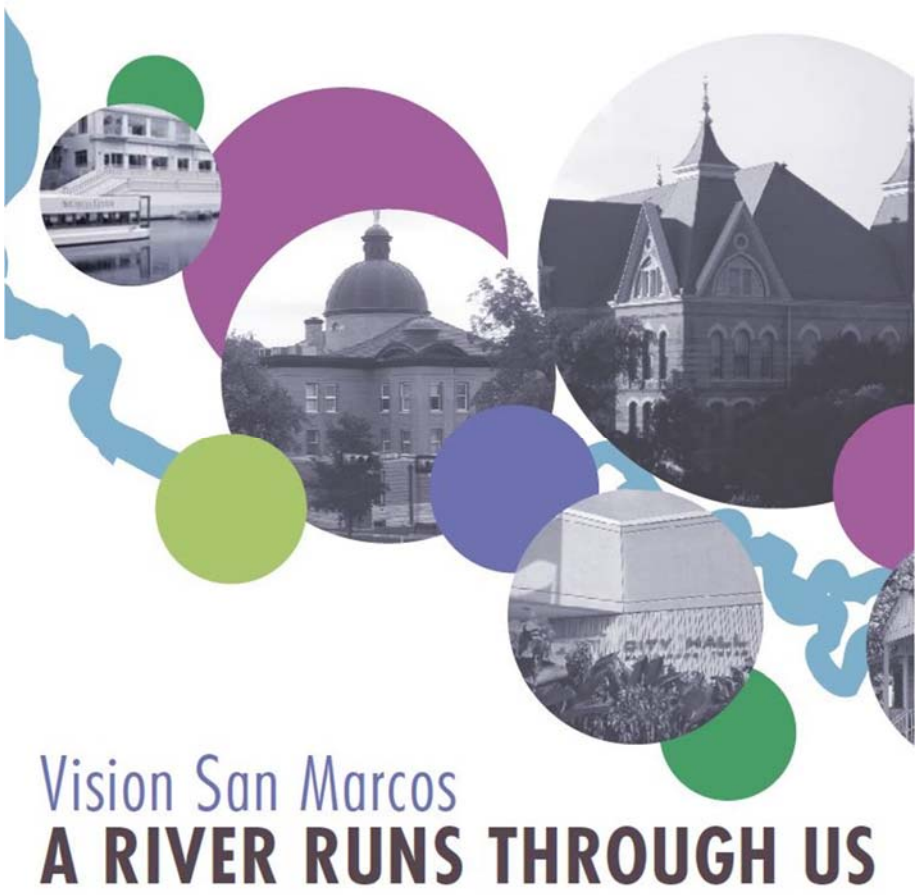
THE VISION

In April of 2013 the City officially adopted "*Vision San Marcos: A River Runs Through Us*" as the comprehensive plan of San Marcos to guide the growth and development. The stated goals and objectives are the community direction for implementing the plan and achieving the preferred future development scenario. This Stormwater Master Plan aligns with the City's goals for **Environment and Resource Protection** which include:

- ✓ Incorporation of low impact development (LID) practices;
- ✓ Adoption of watershed specific regulations;
- ✓ Development of regional detention and water quality strategies;
- ✓ Adoption of comprehensive floodplain development regulations; and
- ✓ Preparedness for, and resilience to, disasters.

This timely consensus driven initiative served as an important event that would lay the ground work to allow city officials to move forward quickly and capitalize on other events to derive this integrated stormwater plan. Key events such as:

- Revisions to the land development code (LDC) to better manage significant projected **population growth** and serve future development;
- Partner on initiates by the Edwards Aquifer Authority and the Meadows Center to address **water quality** challenges;
- Partner on a significant effort by the GBRA, USACE and the TWDB to address **flooding**; and
- Aggressively and effectively respond to **flood disasters in 2013 and 2015**.

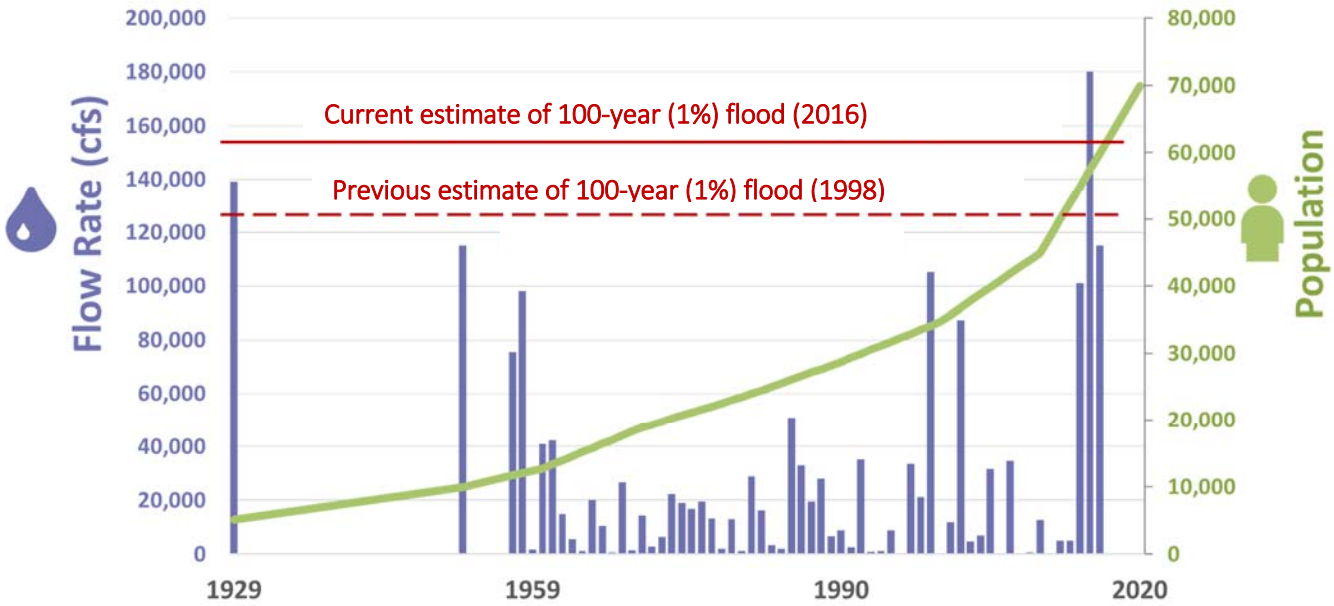


CATALYSTS

There are two (2) primary catalysts when it comes to effectively dealing with stormwater issues in San Marcos: **quality and quantity**. Understanding and addressing these aspects are essential for environmental and resource protection, preserving the quality of life in San Marcos, tourism and socio-economic development.

Significant population growth in the last 10 years coupled with increased frequency of flooding dramatizes the need for more sustainable regional solutions to keep pace with growth projections. While local efforts are essential, larger scale initiatives are important to completely address major challenges when they extend outside of the City's jurisdiction. With the participation of the City of San Marcos, crucial regional initiatives that compliment this Watershed Master Plan were led by:

- The Edwards Aquifer Authority (EAA) to address water quality; and
- The Guadalupe Blanco River Authority (GBRA) to address major flooding (quantity).



Historical flood events and estimates of the 100-year (1%) flood on the Blanco River compared to population

CATALYST: Quality

The degradation of stormwater runoff quality can directly impact:

- Drinking water supplies;
- Threatened and endangered species;
- Compliance with state and federal regulations;
- Quality of life; and
- The natural environment.

In addition to efforts at the local and state level, the **Edwards Aquifer Recovery Implementation Program (EARIP)** has been the most significant, and comprehensive, initiative in recent years intended to protect water quality. Driven by a need to secure their future water supply through pumping from the aquifer, stakeholders (including San Marcos) joined together to develop provisions to protect threatened and endangered species that rely on base flow from the springs.

Through the EARIP initiated in 2006, the Edwards Aquifer Authority (EAA), the San Antonio Water System (SAWS), City of San Marcos, City of New Braunfels, and Texas State University applied for, and received, an Incidental Take Permit (ITP) under Section 10(a)(1)(B) of the Endangered Species Act (ESA). Finally issued in 2013, the ITP included a Habitat Conservation Plan which allows the "incidental take" of threatened or endangered species resulting from the otherwise lawful activities involving regulating and pumping of groundwater from the Edwards Aquifer (Aquifer) for irrigation, industrial use, municipal and domestic and livestock uses, and the use of the Comal and San Marcos spring and river systems for recreation and other activities. Targeted species in San Marcos include: **Texas wild rice, fountain darter, the San Marcos salamander, the San Marcos gambusia, the Texas blind salamander and the Comal Springs riffle beetle.**

This directive defines the basic measures and approach to water quality specific to San Marcos that serves as the basis for water quality protection outlined in this Stormwater Master Plan.

San Marcos River – David Barer, Reporting Texas

HABITAT CONSERVATION PLAN EDWARDS AQUIFER

Texas Blind Salamander – National Wildlife Federation

CATALYST: Quantity

San Marcos has significant challenges when it comes to managing the quantity of stormwater runoff. **Urban** flooding (local drainage) as well as **creek and riverine** flooding can threaten lives and property with very little notice in central Texas. Unique topographic relief and meteorological conditions sometimes collide along an area referred to as 'flash flood alley' that extends from central north Texas through the Austin-San Antonio corridor to near Del Rio. San Marcos has had its share of disasters including three (3) major events in the last five (5) years including the most significant flood of record. The 2015 flood dropped more than 12 inches of rainfall in 6 hours and resulted in 12 fatalities in Hays County.

October 30, 2015

The GBRA, in partnership with the US Army Corps of Engineers (USACE), the Texas Water Development Board (TWDB), and multiple local communities, initiated a **basin-wide flood study of the Guadalupe River** in 2011. Significant efforts continue to be made by these agencies to identify solutions to riverine flooding with a particular attention to the Blanco River at San Marcos. The information developed as part of the study is used by local officials to regulate and guide development and by the Federal Emergency Management Agency (FEMA) to update flood insurance rate maps.

This collaborative study includes the use of state-of-the-art technologies and information for a comprehensive look at damage centers and flood risk for regulating floodplains and developing solutions. This study is then subsequently expanded and employed at the local level as reflected in this Stormwater Master Plan with respect to managing the quantity of runoff.

900 Block of State Highway 80 (May 24, 2015) - William Luther, Staff / San Antonio Express-News

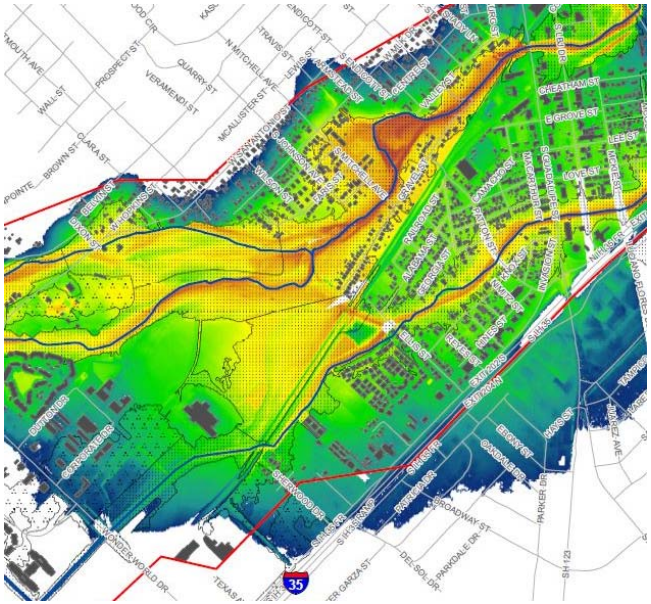
ACTION

Many distinct and somewhat separate actions were taken both locally and regionally by numerous public agencies that contributed to the development of the City's comprehensive Stormwater Master Plan. Significant efforts and contributions were made by:

- Edwards Aquifer Authority (EAA)
- Federal Emergency Management Agency (FEMA)
- Guadalupe Blanco River Authority (GBRA)
- Hays County
- National Weather Service (NWS)
- Texas Department of Emergency Management (TDEM)
- Texas State University and The Meadows Center for Water and the Environment
- Texas Water Development Board (TWDB)
- Upper San Marcos Watershed District
- US Army Corps of Engineers (USACE)
- USDA Natural Resources Conservation Service (NRCS)
- US Department of Housing and Urban Development (HUD)

This Stormwater Master Plan captures the efforts of these agencies and the City's efforts to address the challenges associated to the quality and quantity of stormwater runoff. The actions in response to these catalysts can be catalogued in five key areas:

- Creek and riverine flooding;
- Urban flooding (local drainage);
- Water quality;
- Disaster recovery; and
- Regulatory improvements.

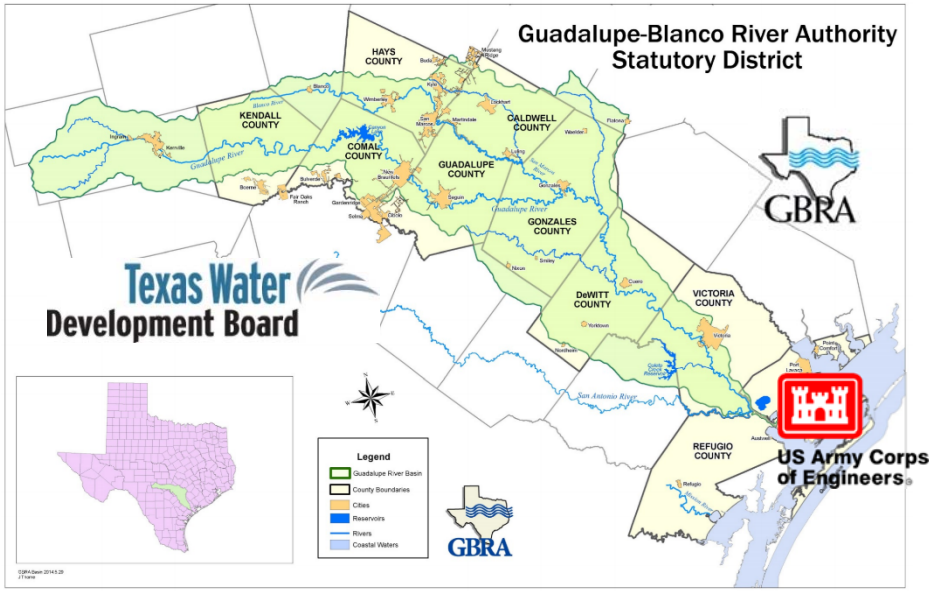


2-dimensional model mesh, Purgatory Creek

CREEK AND RIVERINE FLOODING

Through a contract with the US Army Corps of Engineers (USACE) and the Texas Water Development Board (TWDB), the GBRA sponsored detailed flood studies of the Guadalupe, Blanco and San Marcos Rivers. Fourteen of its river communities (including San Marcos) participated in the project to leverage funds and expand the scope to include additional detail within their jurisdictions.

The results of this study includes better delineation of floodplain and identification of flood prone areas and damage centers and the analysis of flood reduction alternatives. This project began in 2011 is scheduled for completion in 2018.



San Marcos streams include:

- Blanco River/San Marcos River Overflow*
- Purgatory Creek* and tributaries
- Sink Creek including Schulle Canyon Creek
- Sessom Creek
- Willow Springs Creek* and tributaries
- Cottonwood Creek and tributaries*

* The City has, and is, conducting additional 2D modeling studies on these creeks and rivers.

Using the information from that study, an official revision to the floodplains was initiated by FEMA in response to the devastating floods in 2015 with support from the USGS and the Nation Weather Service. Preliminary flood insurance rate maps (FIRM) were released in April of 2017. The maps should be finalized by the end of 2018; however, the City began utilizing the maps immediately for regulatory purposes.

URBAN FLOODING (Local Drainage)

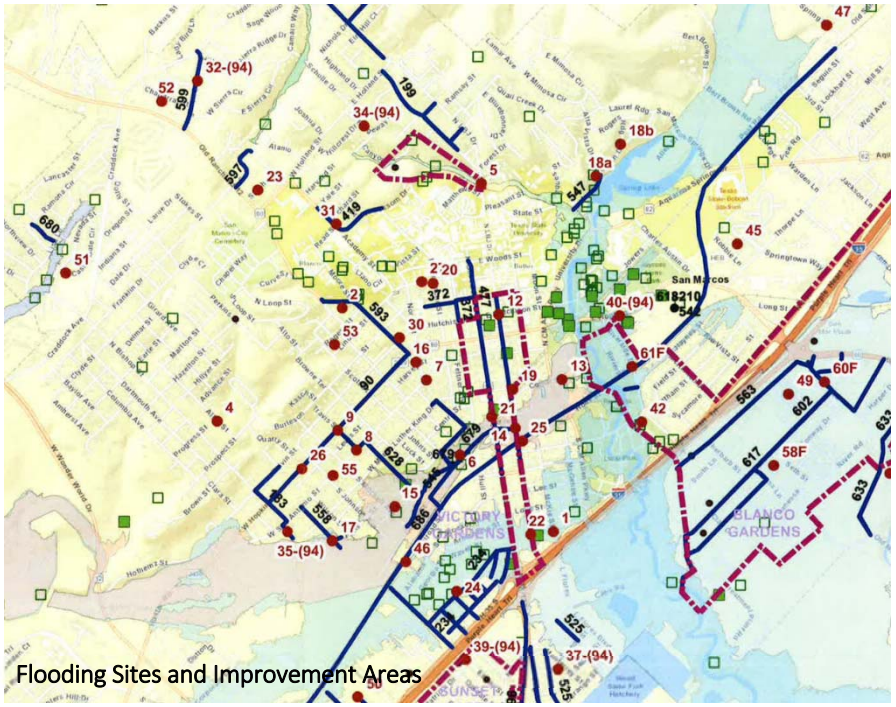
Flooding in urban areas can be caused by flash floods, or coastal floods, or river floods, but there is also a specific flood type referred to as urban flooding. Urban flooding is specific in the fact that the cause is primarily due to a lack of drainage infrastructure. High intensity rainfall can cause flooding when the city's drainage infrastructure does not have the necessary capacity to convey the amounts of rain that is falling.

Urban Flooding (typical)

Urban floods can be a great disturbance of daily life in the city. Roads may be blocked and economic damages may be high; however, unlike riverine flooding, the number of casualties may be low due to the nature of the flood.

Urban flooding issues are primarily the responsibility of the local government and do not typically include the direct support of state and federal agencies. In the case of San Marcos, some areas include both **"urban" flooding and creek/riverine flooding** and it can be difficult to discern the actual source. Detailed analyses identify flooding sources so solutions can be developed and funding can be leveraged with the efforts by state and federal agencies.

A total of **62 urban flooding sites** were identified by City staff through general observation and/or citizen complaints. Detailed hydraulic studies were conducted at each site as part of this master plan. Flooding issues were assessed and proposed measures were developed. Each area was overlaid and integrated with the City's other capital improvement projects and water quality project sites identified in the Water Quality Protection Plan.



Flooding Sites and Improvement Areas

Future complaints or issues will be identified, documented and addressed as received. A GIS database has been provided to facilitiate this effort for use by City departments.

DISASTER RECOVERY

U.S. Housing and Urban Development (HUD) announced in February 2016 that $25 million was to be awarded to the City of San Marcos through the HUD **Community Development Block Grant - Disaster Recovery Program (CDBG-DR)** following significant flooding in May and October 2015. The funds are intended to address unmet housing, economic development, and infrastructure needs resulting from more than 1,000 homes and small businesses being damaged or destroyed. San Marcos completed an Action Plan that outlines how the CDBG-DR funds will be used to help the community recover from the 2015 floods. Fifty percent of the total funds was allocated for infrastructure improvements.

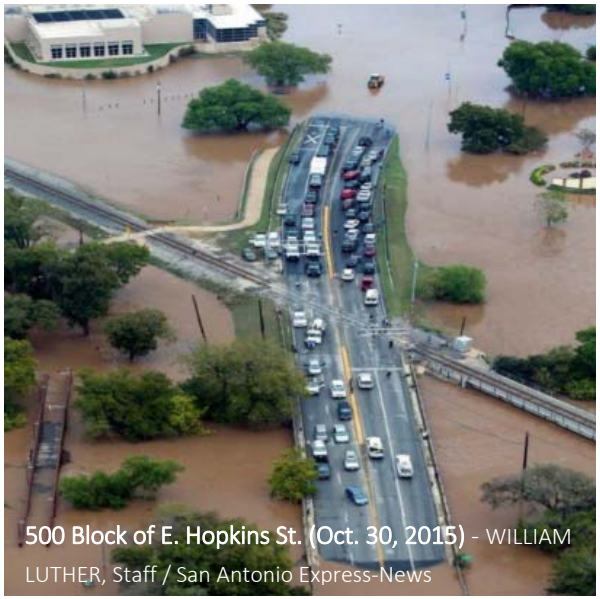
Action Plan Budget

City of San Marcos		
Housing	$7,524,000	30%
SF Owner Occupied Rehabilitation, Reconstruction, or Buyoutl	$5,000,000	
SF 1-4 Unit Rental Rehabilitation, Reconstruction, or Buyout	$2,524,000	
Infrastructure	$12,540,000	50%
Planning	$3,762,000	15%
Admin	$1,254,000	5%
Total Allocation	**$25,080,000**	**100%**

One of the first tasks in the Action Plan was the development of an Infastructure Feasiblity Study to evaluate drainage improvement projects and their effectiveness. Drainage infrastructure projects identified and approved include:

Project Name	Cost	Start	Completion
Midtown	$850,000	Dec 2017	2020
Blanco Gardens	$5,000,000	Nov 2017	2021
Clarewood / Barbara	$2,500,000	Dec 2017	2021
Uhland Road	$4,190,000	Sept 2017	2021

In 2017, an additional $11.5 million was awarded to the City. Of that, over $6 million was approved to control the overflow of flood waters at the Blanco Gardens subdivision area by constructing bank improvements along the Blanco River from Highway 80 to Old Martindale Road.



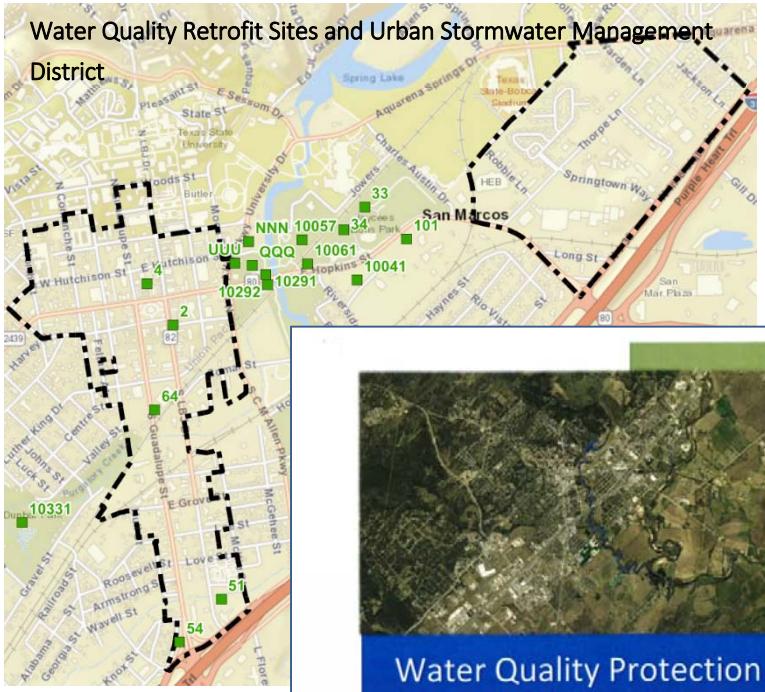
500 Block of E. Hopkins St. (Oct. 30, 2015) - WILLIAM LUTHER, Staff / San Antonio Express-News

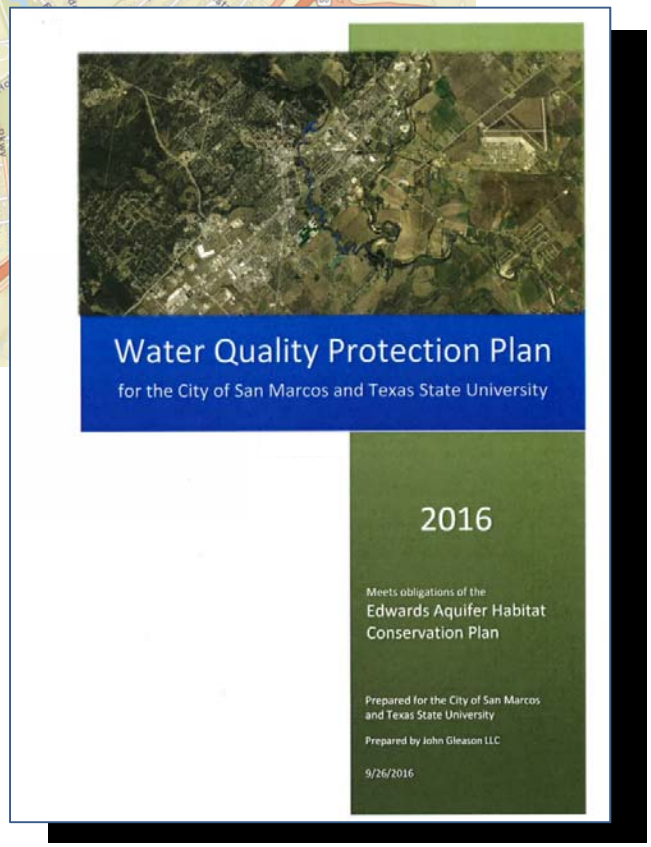
WATER QUALITY

The Edwards Aquifer Recovery Implementation Program's (EARIP) **Habitat Conservation Plan (HCP)** dated November 2012 supports the permit issued in 2013 by the US Fish and Wildlife Service under Section 10(a) of the Endangered Species Act. This permit allows for the "incidental take" of threatened or endangered species resulting from regulating and pumping of groundwater from the Edwards Aquifer (Aquifer) and the recreational uses of the Comal and San Marcos spring and river systems. The measures included in the HCP are designed to ensure that incidental take will be minimized and mitigated and will not reduce the likelihood of the survival and recovery of the critical species associated with these ecosystems.

Consistent with Section 5.7.6 of the HCP, the City of San Marcos, in association with Texas State University, developed a **Water Quality Protection Plan (WQPP)** to protect water quality and reduce the impacts of impervious cover. Based on scientific methods, this Watershed Master Plan incorporates:

- recommended areas of protection;
- 19 strategic retrofit solutions;
- additional water quality sites to be integrated with capital; improvement projects; and
- other measures and strategies to protect water quality to be included in the City's update to the Land Development Code (LDC).





REGULATORY IMPROVEMENTS

Clean Water Act – MS4

Through the requirements of the Clean Water Act (CWA), the U.S. Environmental Protection Agency (EPA) established the program known as the National Pollutant Discharge Elimination System (NPDES) to identify water pollution sources and has delegated responsibility for the program in Texas to the Texas Commission on Environmental Quality (TCEQ). In addition to issuing discharge permits to traditional point sources, such as wastewater treatment plants, the responsibility also includes the minimization of pollution from non-point sources, such as stormwater runoff from construction sites, industrial facilities and municipal separate storm sewer systems (MS4). Based on the population reported in the 2010 census, San Marcos is required to develop a program to protect stormwater quality for their storm sewer systems for compliance.

San Marcos has developed a response that includes the following Best Management Practices (BMP's):

1. Public Education, Outreach, and Involvement.
2. Illicit Discharge Detection and Elimination (IDDE).
3. Construction Site Stormwater Runoff Control.
4. Post-Construction Stormwater Management in New Development and Redevelopment.
5. Pollution Prevention and Good Housekeeping for Municipal Operations

Measurable goals and an implementation schedule were developed for each of these practices based upon effectiveness, applicability in the San Marcos environment, costs associated with implementation of the BMP's, and consistency with on-going water quality initiatives, such as the Habitat Conservation Plan (HCP). Implementation also includes inspection of public and private facilities to monitor performance. Effectiveness and success of BMPs is reviewed annually.

Code SMTX

Code SMTX has been adopted to update the City's Land Development Code (LDC). The Code contains the City's rules for development and regulates the use of land. It was revised so that new development fits the community's Vision for the future. The updates associated with stormwater management address:

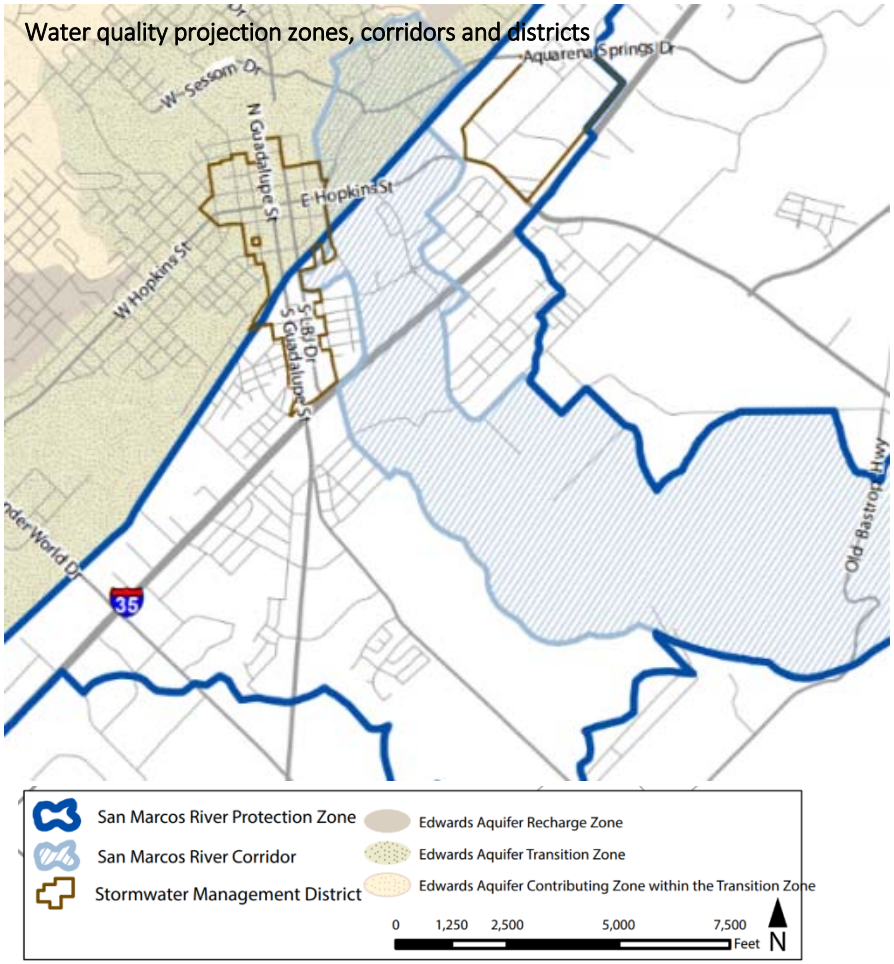
- Land use planning/suitability;
- Fee in lieu of water quality;
- Fee in lieu of detention;
- Stream buffers;
- Water quality protection zones; and
- Stream protection volume.

These initiatives directly address many goals called for under "Environment and Water Resource Protection" stated within the Comprehensive Plan. Highlights include the:

- Watershed specific water quality regulations;
- Regional detention and water quality strategies; and
- Comprehensive floodplain regulations.

"Fee in lieu of detention" is based on square foot of impervious cover and ranges from $1.00/square foot to $7.35/square foot.

The "fee in lieu of water quality controls" is available for development within the Urban Stormwater Management District. The fee in lieu ($14,629 / acre, effective March 1, 2018) is based on the estimated cost of regional water quality controls per total area within the District.



Floodplain Damage Prevention Ordinance

On November 15, 2016, the City of San Marcos adopted a new floodplain damage prevention ordinance that:

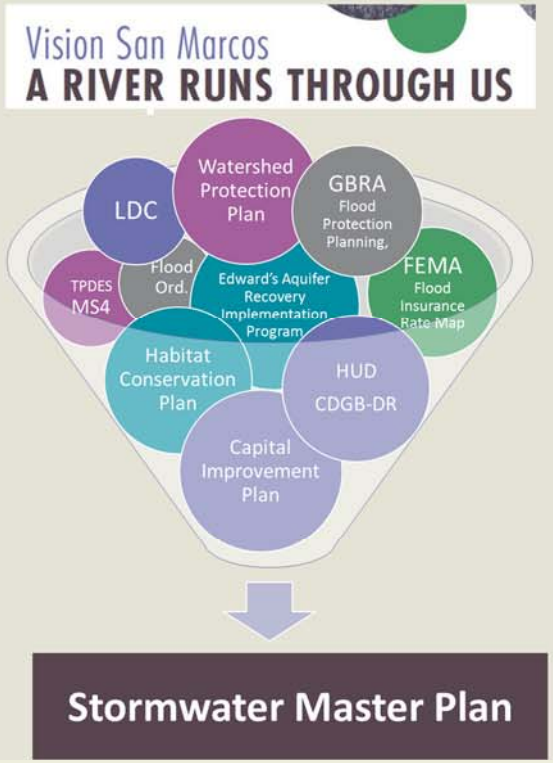
- Exceeds FEMA's minimum standards;
- Incorporates a "no-rise" floodplain policy:
- Adds freeboard and buffers for new development;
- Accepts new flood models to establish base flood elevations; and
- Requires construction staging within the floodplain.

The "no-rise" policy does not allow any increase in water surface elevation resulting from development, accounts for losses of flood storage capacity and includes new standards for fill placement in special flood hazard areas. The freeboard standard for new development requires finish floors to be placed two (2) feet above base flood elevations and new buffer zones are required to extend beyond the floodplain (BFE + 2 feet).

RESULTS

The results of these actions are being leveraged and utilized to:

- Plan and construct capital drainage improvements;
- Conduct additional studies;
- Regulate development;
- Identify opportunities to partner with agencies; and
- Disaster preparedness and recovery.

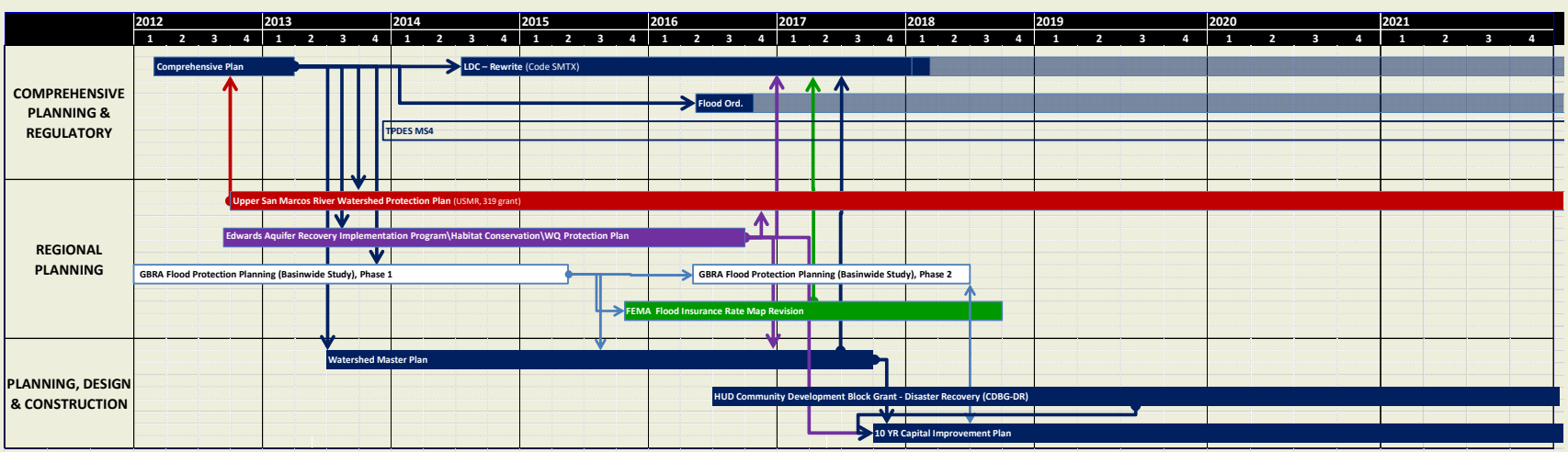


The Capital Improvements Program (CIP) adopted by council in September 2017 captures the efforts required in the next ten years that includes $89 million of storm drain improvements (an increase of $47 million from the previous CIP), $24 million in CDGB-DR projects, $0.5 million in water quality improvements and $3.5 million in additional studies and land purchases. The CIP will be updated annually and focuses primarily on infrastructure and facility needs. Additional revenue will be required to fund the projects identified. The City will continue to seek out grants, utilize "fees in lieu of" and consider possible adjustments to drainage utility rates to close the gap.

MOVING AHEAD

This stormwater master plan is intended to summarize all of the activities and efforts that have been completed, and have yet to be completed, in order to address the many issues associated with stormwater runoff. Many additional efforts are on-going and still required for success such as:

- Adoption of this Master Plan by city council;
- Securing of additional funds to finance the CIP;
- Update of the City's stormwater utility fee structure;
- Additional 2-dimentional watershed modeling to better define issues and optimize solutions;
- Continued support of the efforts of the Meadows Center's Watershed Protection Plan;
- Additional land acquisition and conservation;
- Adoption of Code SMTX and associated fees;
- Consideration for long term sustainability; and
- Development of stormwater technical manuals to support the City's new land development code.



Schedule of key and major initiatives

APPENDIX AND LIST OF REFERENCES

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John Gleason LLC, Water Quality Protection Plan for the City of San Marcos and Texas State University, September 26, 2016

Halff, Cottonwood Overflow 2D Modeling, December 22, 2016 and addendum dated March 10, 2017

FEMA, Hays County Flood Insurance Study, April 2017 (preliminary)

LAN, Detention Volume Estimates (Fee in Lieu of Detention), August 18, 2017

San Marcos, 2018-2027 Recommended Capital Improvements Program, September 28, 2017

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RPS, Purgatory Creek 2D Study and Conceptual Improvements, 2018