AT A GLANCE

137.8 ACRES
OF HABITAT FOR ENDANGERED SPECIES

4 SPECIES
ON THE ENDANGERED SPECIES LIST

~2 MILLION CENTRAL TEXANS
RECEIVE DRINKING WATER FROM THE ARTESIAN EDWARDS AQUIFER*

25' CREST HEIGHT
ON COMAL AND GUADALUPE RIVERS DURING 10/2015 FLOODS

~13% INCREASE
IN IMPERVIOUS COVERAGE FROM 2000-2020*

Sources: https://www.nature.org and Texas Water Development Board **

NATURAL RESOURCES AND INFRASTRUCTURE

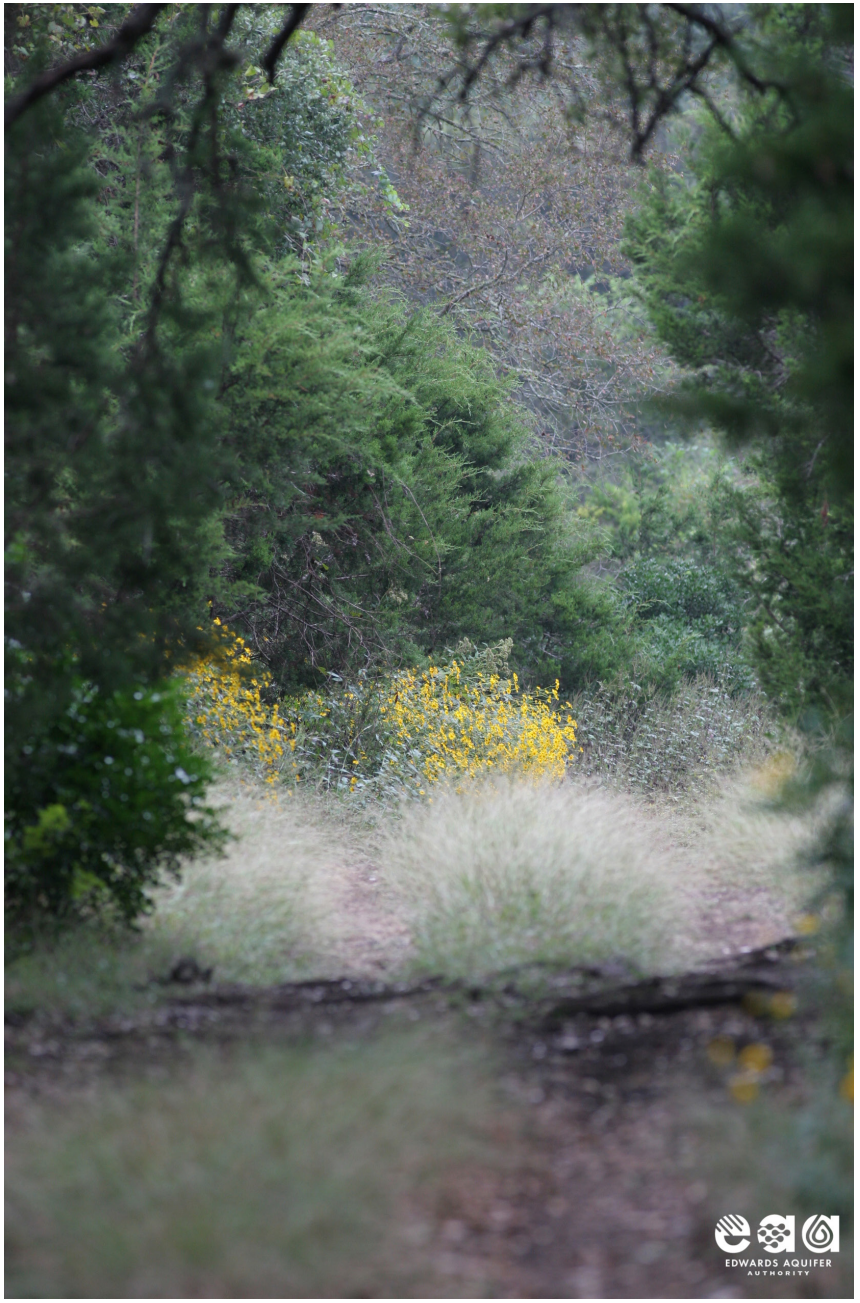
EXISTING CONDITIONS

The Natural Resources and Infrastructure Plan Element focuses on addressing land use compatibility with environmentally sensitive areas and features, conservation of natural resources, stormwater conveyance including Low Impact Development (LID), and utility infrastructure.

Natural resources lie at the heart of the New Braunfels story. Situated at the intersection of two rivers and boasting some of the most breathtaking scenery in the Texas Hill Country, the community's environmental assets have been an integral part of its identity since Native Americans settled along the springs. Today, those same resources serve as the foundation for a robust parks and recreation profile, and, by fueling tourism, help stoke the local economy.

As New Braunfels and the rest of the region become increasingly developed, the imperative need to preserve the community's environmental assets will grow. In addition to maintaining the economic and cultural benefits of fresh water, tree canopy and a diverse ecosystem, the landscape's natural capacity to handle stormwater and run-off from upstream communities will assist local utilities and infrastructure in keeping New Braunfels and its residents safe.

What follows details the existing conditions for some of New Braunfels most significant natural resources and infrastructure issues. These topics will serve as the parameters for future growth in the city, and indicate potential opportunities to leverage in the next 20 years.



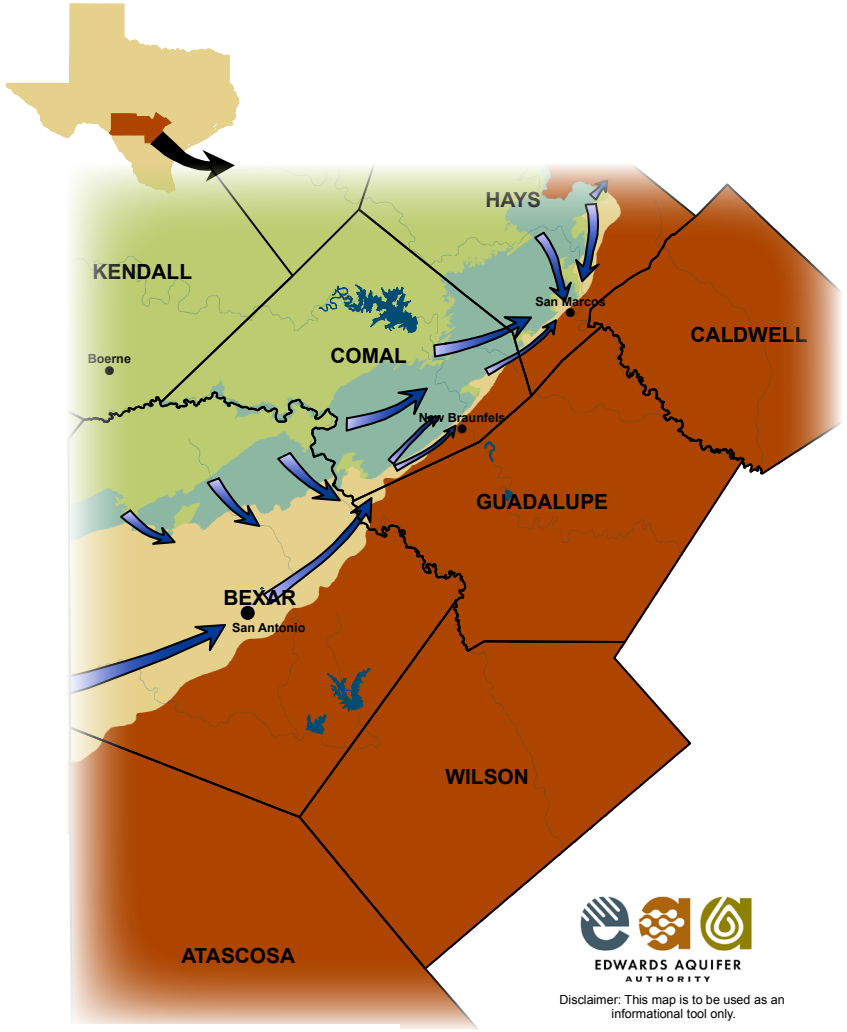
HYDROLOGY

Due to New Braunfels' location at the confluence of the Guadalupe and Comal Rivers, hydrology is central to many facets of community life. While the rivers provide New Braunfels with significant economic opportunity and constitute a large part of civic identity, they can also be destructive. Over 18 percent of the city limits (5,409 acres), including parts of downtown, occupy the 100-year flood zone, while more than an additional 12 percent is within the 500-year flood zone. This includes the bulk of downtown.

The City has a series of dams for flood control within the watershed, including the Guadalupe Canyon Dam, which is managed by the US Army Corps of Engineers. Managed by the Comal County Engineers Office, the Dry Comal Creek has five flood control dams, recently constructed in 2013. It is designed to detain a 100-year flood event and prevent runoff that frequently floods the Comal River downstream.

New Braunfels is a member of FEMA's Community Rating System (CRS) which recognizes and encourages community floodplain management activities that exceed the minimum National Flood Insurance Programs's standards. The City became a member after the devastating 2010 floods and continues to work towards a high CRS rating in an effort to keep flood insurance rates low for residents.

Additionally, New Braunfels occupies a unique position in regional groundwater hydrology. The City's western portion sits on the eastern edge of the Edwards Aquifer, one of the world's highest capacity artesian aquifers. Nearly two million people in south Central Texas depend on the aquifer for agricultural, industrial, recreational and domestic purposes. Within the New Braunfels extraterritorial jurisdiction are segments of the aquifer's recharge zone (the area where surface water enters the aquifer) and the artesian zone (the area where groundwater is passively pumped above the ground), the latter of which is where Comal Springs is located.



CRITICAL HABITATS

New Braunfels' environment provides a rich habitat for a wide array of birds, amphibians and mammals, including several endangered species. The Fountain Darter, Comal Springs Riffle Beetle, Comal Springs Dryopid Beetle, and Peck's Cave Amphipod are listed as endangered by the U.S. Fish and Wildlife Service. The Golden-cheeked Warbler, a migratory bird whose summer, spring and fall breeding and nesting grounds include parts of New Braunfels, is also endangered. New Braunfels is also home to the Comal Springs Salamander, another threatened species.

SOILS

New Braunfels features a range of soil types and conditions, which is suitable for a variety of uses and development types. 39 percent (11,349 acres) are rated "Not Prime Farmland" by the National Resources Conservation Service, with 60 percent considered "Prime Farmland." Less than 1 percent are "Prime Farmland if Irrigated." Other soils include 34 percent (9,924 acres) are either "Highly Erodible" or "Potentially Highly Erodible" by water. Three percent (1,002 acres) of soils are "Highly Erodible" by wind. Highly erodible soils are a significant factor to consider when concerning new development. These soils are typically associated with the Blackland Prairie ecoregion along the southern side of the City. Their tendency to shift often causes house foundations to crack and roadways to buckle.

Guadalupe River

Species	Habitat Requirements	Location	Intended LID Effects
Fountain Darter *(Etheostoma Fonticola)*	Unpolluted, constantly flowing, cool water	Upper Comal River and Landa Lake	Reduce water uptake & pollution
Comal Springs Riffle Beetle *(Heterelmis Comalensis)*	Deep waters	Deep parts of Landa Lake	Reduce water uptake and pollution
Comal Springs Dryopid Beetle *(Strygoparhus Comalensis)*	Unpolluted water	Upper springs	Reduce water uptake and pollution
Peck's Cave Amphipod *(Stygobromus Pecki)*	Unpolluted, cool water	Crevices of rocks near spring flows	Reduce water uptake and pollution

Protected Species

ENVIRONMENTAL QUALITY EFFORTS IN NEW BRAUNFELS

EDWARDS AQUIFER HABITAT CONSERVATION PLAN

The City of New Braunfels has taken significant strides towards habitat conservation. The City participates as a partner on the Edwards Aquifer Habitat Conservation Plan (EAHCP). The mission of the plan is protect endangered species from harm during the most severe drought to the extent required by state and federal law. The plan covers eight endangered species that live within the Edwards Aquifer, the San Marcos Springs, and the Comal Springs aquatic ecosystems:

- Comal Spring Riffle Beetle
- Fountain Darter
- Peck's Cave Amphipod
- San Marcos Salamander
- Texas Blind Salamander
- Texas Wild Rice
- Edwards Aquifer Diving Beetle
- Comal Spring Salamander
- Texas Troglobitic Water Slater
- Comal Spring Dryopid Beetle
- San Marcos Gambusia

San Marcos Salamander

Golden-cheeked warbler.

The City of New Braunfels sits within the Comal Springs ecosystem. Comal Springs is the largest spring system in Texas as well as the southwestern United States. Development and channel modification have contributed to noticeable biological impacts. The City of New Braunfels committed to fourteen habitat protection measures within the Comal Springs ecosystem that begin to mitigate this impact:

1. Old Channel Restoration
2. Flow Split Management
3. Aquatic Vegetation Restoration
4. Non-Native Animal Species Control
5. Decaying Vegetation Removal
6. Restoration of Riparian Zones & Rifle Beetle Riparian Improvement
7. Gill Parasite Control
8. Household Hazardous Waste Program
9. Litter Control and Floating Vegetation Management
10. Golf Course Management Plan
11. Native Riparian Habitat Restoration
12. Impervious Cover/Water Quality Protection
13. Prohibition of Hazardous Material Transport Routes
14. Management of Public Recreation

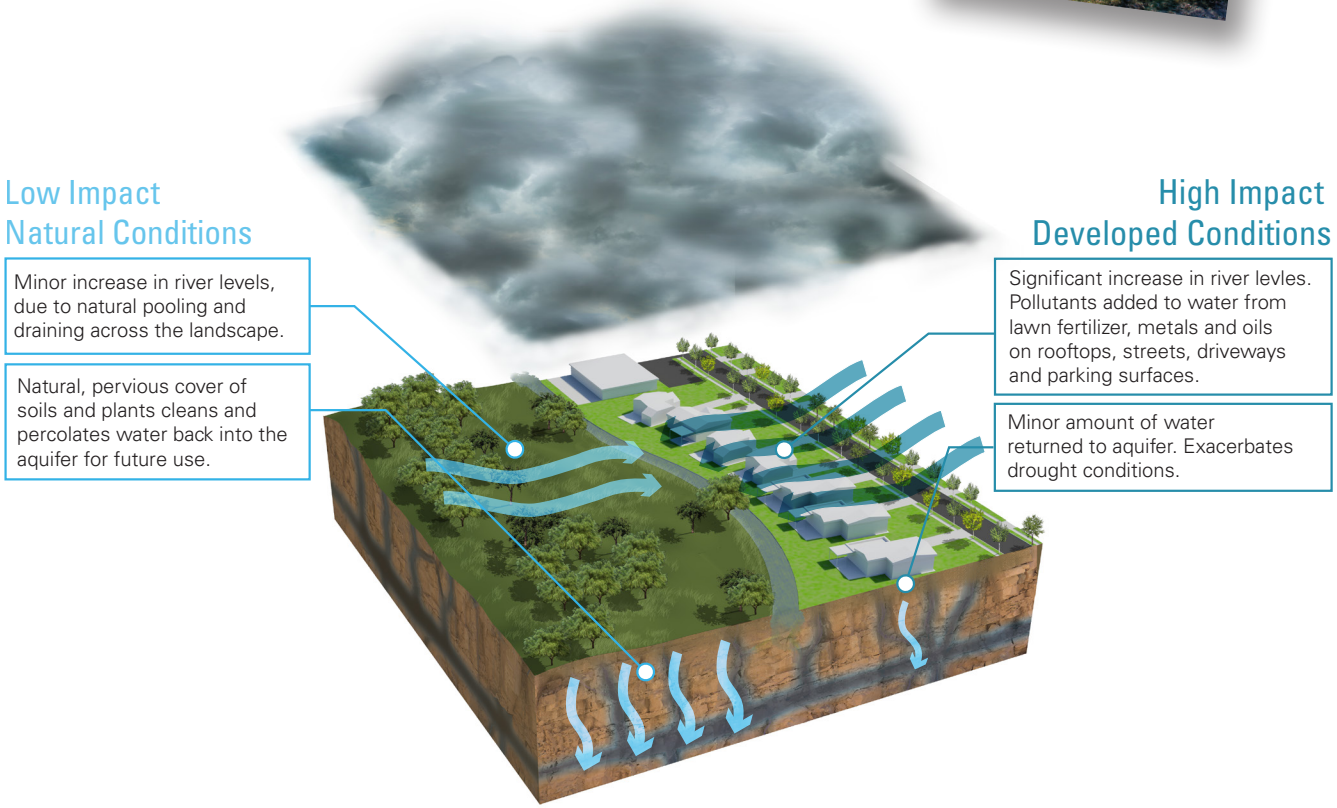
In addition, the Conservation Plan provides flow protection measures and supporting measures that provide overall benefits to habitat and species.

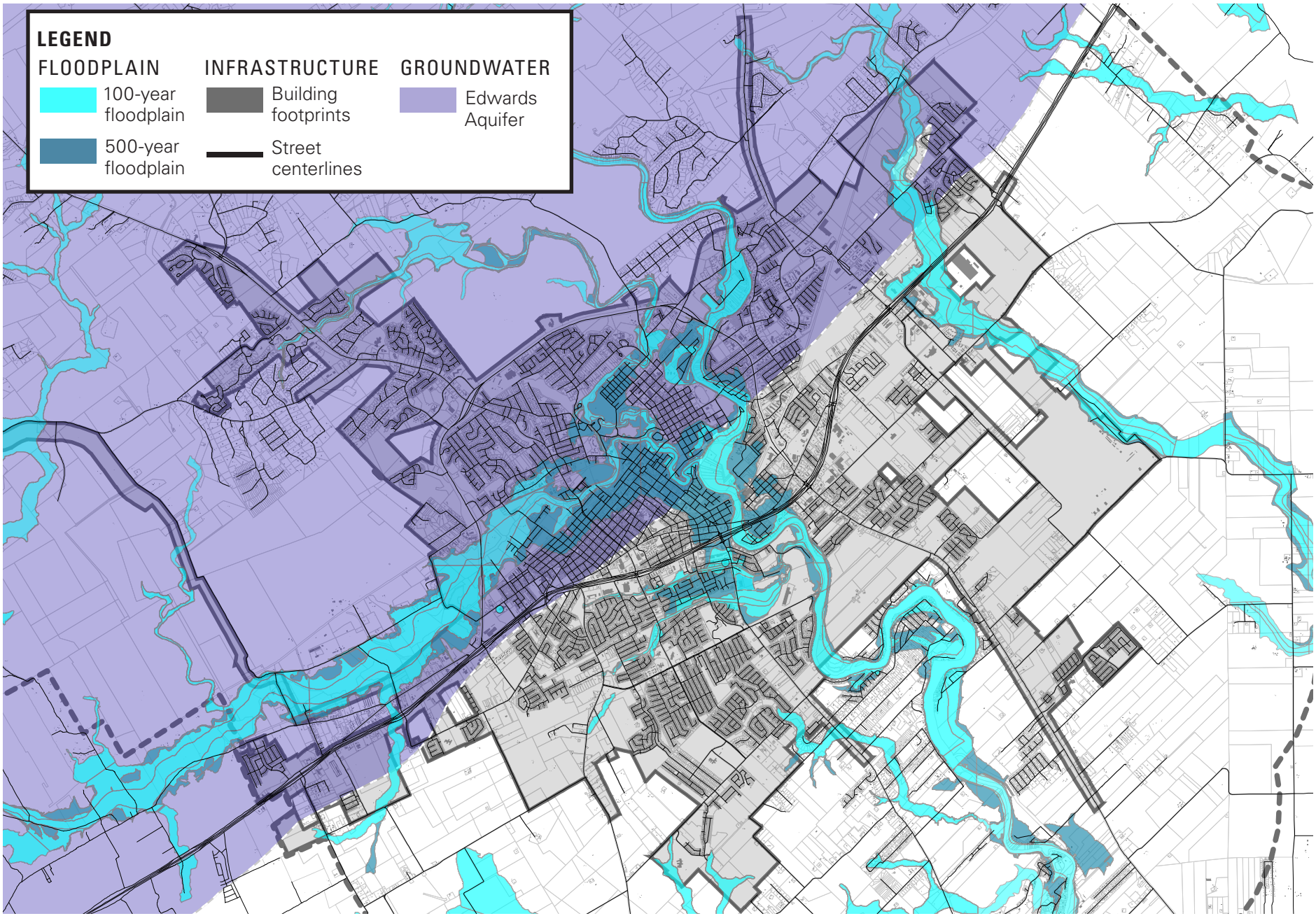
For more information on the specifics of each measure visit the Edwards Aquifer Habitat Conservation Plan Website.

LOW IMPACT DEVELOPMENT PROGRAM

The Low Impact Development Program was developed in a response to the Edwards Aquifer Habitat Conservation Plan. The report provides a guide to implementing Low Impact Development (LID) Best Management Practices (BMPs) to protect and preserve the habitat of four endangered species identified within the Comal River and Blieders Creek as they overlap within New Braunfels city limits. LID BMP's improve the overall quality of water traveling to the Edwards Aquifer, reduce groundwater depletion rates, and increase spring flows. Strategies outlined in the report include:

- Rain Barrels and Cisterns
- Green Roofs
- Porous Pavements
- Native Landscaping
- Rain Gardens
- Biofilters
- Cascading Pools/Runoff Control
- Devices
- Improve Soil Porosity
- Detention Pond
- Dry Wells
- Surface and Subsurface Sand Filters
- Limit Well Uptake
- Non-Toxic Fertilizer Rebates
- Adopt-a-Street
- Community Cleanup Days and
- Streambank Restoration
- Environmental Education Programs




LEGEND
FLOODPLAIN
100-year floodplain
500-year floodplain
INFRASTRUCTURE
Building footprints
Street centerlines
GROUNDWATER
Edwards Aquifer
0'
8000'

HEADWATERS AT THE COMAL RESTORATION

The Headwaterts at the Comal is a habitat restoration project that will restore 16 acres of the New Braunfels Utility Klingemann Warehouse property at the headwaters of the Comal Springs to its natural environment.

The ecological restoration will include removing 85 percent of the impervious cover currently on the property; upcapping and restoring the spring; restoring the natural riparian habitats for numerous endangered and threatened species; and restoring native plant communities.

Public amenities will include a central courtyard, event lawn, display gardens, walking trails, outdoor classrooms, natural spring overlooks, wastewater treatment wetlands, composting facilities and more.

FISCHER PARK BLACKLAND PRAIRIE RESTORATION

New Braunfels Parks and Recreation's Fischer Park features a Bayer "Feed a Bee Program" to plant forage for pollinators in New Braunfels. Fischer Park's Blackland Prairie Restoration project is part of the Bayer Feed a Bee program's $500,000 initiative to plant forage areas in all 50 states by the end of 2018.

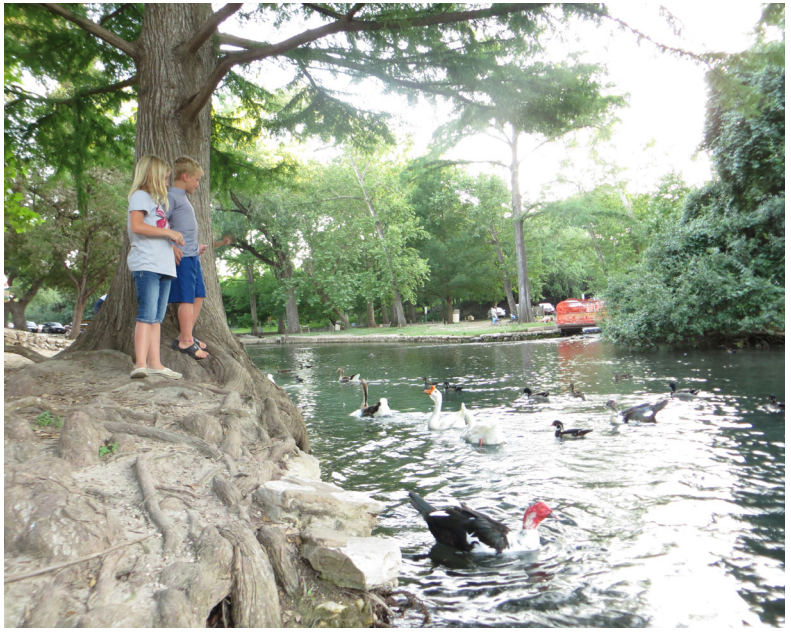
The Blackland Prairie habitat offers increased habitat and nutrition sources for local pollinators. As one of the initial recipients of grants awarded during this two-year initiative, New Braunfels Parks and Recreation's Fischer Park received funding to implement planting projects across 30 acres, which, together with the 57 additional projects recently honored, help provide a tangible, sustainable solution to the lack of forage for bees and other pollinators.

The Fischer Park Nature Education Center provides programs that teach the importance of pollinators to our food supply and how we can all play a role in keeping them healthy and well-fed by planting bee-attractant flowers. Through the newly planted pollinator habitat, these program participants will have the opportunity to see firsthand how bees buzz from plant to plant. Fischer Park staff will work with volunteers to continue to plant more blooms that support their health.

LANDA PARK RESTORATION

The river front of Landa Park has been restored. The project includes the replacement of 5,280 linear feet of stone retaining walls along the Comal River in Landa Park. Overtime, periodic flooding beyond the existing channel bank walls has caused moderate to severe soil erosion resulting in damaged and failed channel bank walls. As of December, 3,850 linear feet of 5,280 linear feet of stone retaining walls have been set. Additional efforts included the following.

- Riparian landscape restoration.
- Phased replacement of riverfront walls.
- Wading pool pedestrian bridge improvements.
- Custom "Cedar" handrails have been installed.
- Gazebo restoration and new foundation.
- Landa Lake dam reinforced.
- Old Comal River Chanel spillway reconstruction.
- Capstone and sidewalk improvements.



PLAN ELEMENT ADVISORY GROUP RECAP

STRENGTHS

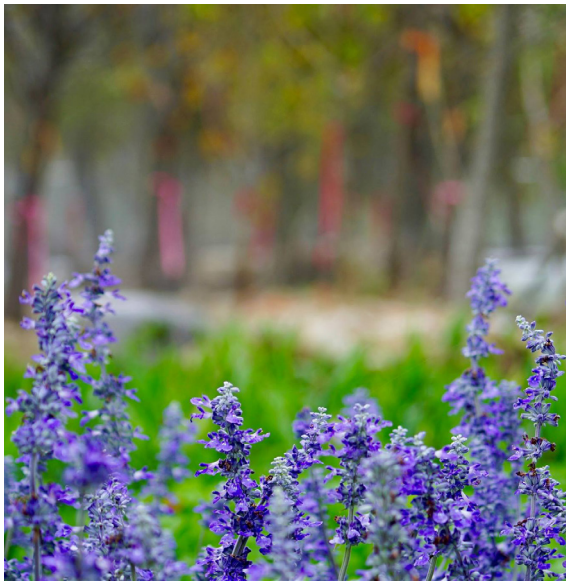
- A shared community passion for natural resources helps breed a sense of environmental stewardship.

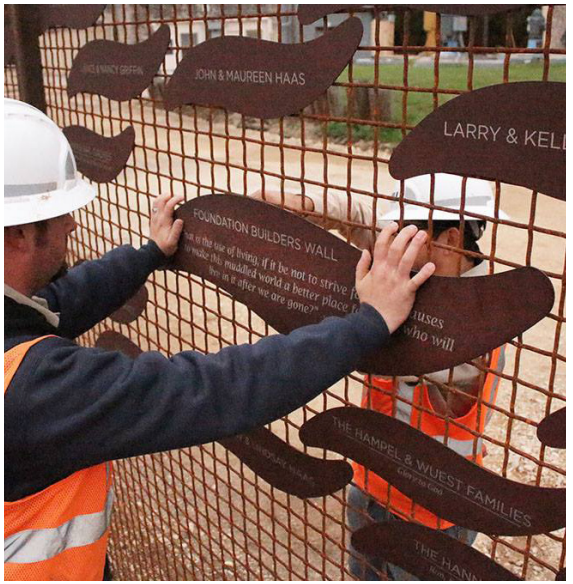
OPPORTUNITIES

- Replacing aging and obsolete infrastructure could help preserve existing natural resources.
- Incorporating low-impact development strategies into future built projects will help offset their impact on New Braunfels' natural resources.
- Improved regulatory action, including code enforcement and inter-department coordination, could lead to better conservation outcomes.

PRIOR GOALS (2016)

The Plan Element Advisory Group conducted an inventory of the 2006 Comprehensive plan goals and determined which ones were and were not achieved and identified the gaps that Envision New Braunfels could work to complete. Refer to the Technical Report Appendix for a matrix of the reviewed goals.





NATURAL RESOURCES AND INFRASTRUCTURE GOALS

1. Protect natural riparian areas and tree canopies that provide resiliency against flooding or other risks.

1 2 3 **4** **5** **6** 7 **8**

2. Implement stormwater best management practices to improve water quality and reduce the demands on engineered stormwater systems.

1 2 3 **4** **5** **6** 7 **8**

3. Reduce solid waste through material recycling and reuse.

1 2 3 4 **5** **6** 7 **8**

4. Emphasize energy efficiency and innovation in homes, businesses and equipment.

1 **2** 3 4 5 6 7 **8**

5. Collaborate with surrounding water providers to preserve, conserve and continue to diversify our water supply.

1 2 3 **4** **5** 6 7 **8**

6. Reduce and control air pollution.

1 2 3 **4** **5** 6 **7** **8**

● *INDICATES A STRATEGY THAT SUPPORTS THE PLAN ELEMENT GOAL*

APPLICABLE STRATEGIES
REFER TO PAGE 178

1 SUPPORT VIBRANT CENTERS

2 ACTIVATE NEIGHBORHOODS

3 BALANCE JOBS AND HOUSING CHOICES

4 INNOVATE IN PARKS AND PUBLIC SPACES

5 BOLSTER RESILIENT INFRASTRUCTURE

6 COORDINATE CITY INVESTMENTS

7 CONNECT ALL

8 CULTIVATE LOCAL AND REGIONAL PARTNERSHIPS