

Sustainability

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a alguien to let sb off sthg; **perdonarle la vida a alguien** to spare sb their life - **3.** [desperdiciar]: **no perdonar algo** not to miss sthg. ◇ **vi:** **perdone, ¿cómo ha dicho?** excuse me, what did you say?

perdonavidas *smf inv fam* bully.

perdurar *vi* - **1.** [durar mucho] to endure, to last - **2.** [persistir] to persist.

perecedero, ra *adj* - **1.** [productos] perishable - **2.** [naturaleza] transitory.

perecer [30] *vi* to perish, to die.

peregrina ▷ **peregrino.**

peregrinación *sf* RELIG pilgrimage.

peregrinaje *sm* RELIG pilgrimage.

peregrinar *vi* RELIG to make a pilgrimage.

peregrino, na ◇ *adj* - **1.** [ave] migratory - **2.** *fig* [extraño] strange. ◇ *sm, f* [persona] pilgrim.

perejil *sm* parsley.

perenne *adj* BOT perennial.

perentorio, ria *adj* urgent, pressing; [gesto,



EXISTING CONDITIONS

Sustainability is a broad concept that can be included in nearly all aspects of daily life. Its subjects include specific instances, examples, and solutions that involve a wholistic understanding of our surroundings. The built environment plays a significant role in how our communities impact the local ecosystem.

For example, a 2004 study by the United States Green Building Council (USGBC) revealed that transportation is responsible for approximately 33% carbon emissions while buildings are responsible for approximately 39%. According to information released by the U.S. Energy Information Administration, transportation accounted for 28.1% of energy consumption and buildings accounted for 47.6% in the U.S. in 2012.

These statistics make it clear that an overwhelming amount of emissions and energy can be attributed to our built environment. Methods to reduce the strain on the ecosystem as well as our infrastructure can be addressed in how we plan and build our cities and buildings, as well as our stewardship of the natural environment.

Green Space

The National Recreation Association Park Standards (NRAPS) recommends at least 10 acres of park and recreational space be set aside for every 1,000 citizens. A 2015 study by the Trust for Public Land revealed that Laredo has 5.7 acres set aside for every 1,000 citizens. While the current code for Laredo encourages the formation of public space, the desired level established identifies 11 acres per 1,000 citizens. Additionally, This space requirement can be offset by paying a fee to the city. A lower amount of green space also places a higher burden on infrastructure by channelling water runoff into city sewers and into the water treatment facilities. Currently, a plan for park locations and connections has not been established.

Natural Habitat and Biodiversity

The existing network of natural and wild places are distinct, permanent and irreplaceable. The Rio Grande and the rich, native habitat that surrounds it generates locally unique biodiversity and animal habitat. These places offer benefits to both humans and the environment. In developing new land or retrofitting existing neighborhoods, Laredoans will need to consider that these special places take generations and centuries to form, and their impacts are lasting. A key strategy for development will include maintaining the diverse habitat and utilizing it as a community asset.

Water

The quality of water in the Rio Grande is a continuing concern for residents, ecologists, and a variety of other public service agencies. Great strides have been made by the City of Laredo since the construction of water treatment plants to deliver clean water to residents. As Laredo continues to grow, strain will be placed on the existing infrastructure as well as the river itself. In order to help ease the strain on the system, passive and active conservation techniques should be considered.

Transportation

A large portion of central Laredo, including the downtown, is a gridded street network that is well connected and is already in good condition to encourage multi-modal transportation. Unfortunately, a vast majority of Laredoans do not walk, bike or use transit as a means of accessing Laredo. This is a result of a planning history of separating uses which translates into longer car trips in order to do even daily errands. This increases the amount of energy consumed for travel as well as the emissions released into the atmosphere. It also puts a strain on the street network that might otherwise be alleviated if other options were available. While positive steps have been taken to address this issue, more can be done to increase the possibility of a mere multi-modal Laredo.

COMMUNITY CONCERNS

While discussing environmental concerns, Laredoans frame the topics in terms of quality of life and local challenges. These concerns are important because, through success in tackling local challenges, Laredo will also help address environmental concerns that are global in scale.

A Walkable and Accessible City

Many residents expressed their desire to move around Laredo using alternative modes of transportation, with a clear need to spend less time driving or sitting in traffic. This concern is particularly relevant to children and the elderly, but is also increasingly important to younger generations that are interested in vibrant, walkable neighborhoods. Less time driving will both reduce pollution and greenhouse gas emissions, while also improving the health of the community. Residents requested that the city prioritize fixing and intensifying the infrastructure and policy that make Laredo more walkable and accessible.

Preservation

The historic buildings and plazas in Laredo are more than just a reminder of the history of the city; they represent a significant amount of embodied energy, materials, time and labor that were a part of their creation. It would be more economical and more sustainable to preserve these historic assets than to replace them with buildings of a similar quality. Adaptive re-use of these structures is an inherently sustainable enterprise for both the environment as well as the for the character and life of the city. Beyond green benefits, historic buildings help inform today's developers and architects in creating street-friendly, climate-responsive structures of enduring quality. Cities have realized that historic districts with coherent architecture also attract tourists while generating positive economic impacts.

Expanded Network of Parks & Open Spaces

Currently, within the City of Laredo, there are about 100 locations dedicated to its Parks and Recreation system. Via the design of hiking and biking trails, many of these locations have recently become interconnected. This could potentially play a major role in increasing walkability and available open space for active recreation in Laredo.

Many residents expressed the need to update existing parks and open spaces—such as improving the existing trails or activating parks and plazas with new facilities and programs. In addition, thoughtfully considering the placement of development, including shopping destinations, fitness facilities, educational facilities, and restaurants within close proximity of parks could create a potential symbiotic relationship between the land uses and encourage more daily activity.

Habitat & Biodiversity

A common theme within the community involves the restoration and preservation of the dynamic habitats in the city, as well as a desire to encourage people to use the beautiful spaces and experience the panoramic views. Between the Rio Grande, Lake Casa Blanca, and the plains and fields, Laredo has distinct habitats and ecosystems.



Existing and shaded shared use path in Laredo.



Energy and Industry

The green economy does not resemble the previous generations' vision of industry. As city leaders seek to attract new business, they will be doing so with energy-saving and energy generating building and business models.

Many existing businesses and households want to retrofit their properties to be more efficient and more economical. While such innovation is occurring at the scale of the building, the city and county should coordinate and collaborate with private land owners to set aside open spaces for renewable energy generation such as solar and wind farms on the plains outside the city. As manufacturing and other enterprises return to this hemisphere, Mexico, the United States, Texas and Laredo will likely find that energy and resource-efficient modes of industry and logistics will help them remain competitive.



Existing wetlands and bike path.

Water¹

Atmosphere and climate change affect the quantity and quality of water available to metropolitan area. Because water and its natural conveyance features are the very basis for survival in the region, Laredoans have become more interested in protecting and effectively managing these features.

There are different interests competing for water in Laredo. These include Rio Grande advocates, industry and businesses, government, and households. Natural habitats and ecosystems have needs that are indifferent to the other interests vying for water. This implies a series of important questions that must be revisited by each generation of Laredoans:

1. How should the city and its citizens determine the proper and equitable distribution of water?
2. How can Laredo sustainably diversify and expand the current contributors to its water budget - the river, water harvesting, and water reclamation technologies?
3. Are there ways that Laredo can reduce water consumption given its current population and prognosis for population growth?
4. How can the cost of infrastructure and water delivery be used to prevent suburban sprawl and encourage metropolitan compactness?
5. How can natural groundwater recharge and conveyance features be conserved, restored, and inform the design of new infrastructure, or retrofits?

¹ Gilpin Engineering Environmental Consulting Technical Memorandum 12/02/2016

STRATEGIES

Limit Sprawl & Reduce Emissions

The strategies to reduce pollution and greenhouse gas emissions span many aspects of the daily life of the city. Consequently, the strategies needed to accomplish this task are not only found in the Sustainability Chapter but in many other chapters.

Vehicle Miles Traveled

Vehicle Miles Traveled (VMT) reduction is the pillar of the sprawl and emission reduction strategy. Laredo needs to make multiple modes of mobility just as convenient as automobile usage. These include walking, cycling, buses, electric rail, and other forms of travel. Moving towards better transit options should be complemented by walkable, compact urban fabric, especially around major transit nodes.

Sprawling development segregated by use lacks overall connectivity, and forces most inhabitants to travel from home to work, school, entertainment or recreation by car only. In order to repair sprawl, neighborhoods need to be walkable, bikable and well connected. Walkable places aim to reduce VMT and subsequently reduce green house gas emissions. Plans for new neighborhoods, as well as revitalized neighborhoods in Laredo revolve around the notion of reducing auto only travel, and instead are designed for bike and pedestrian comfort, with transit access nearby.

Additionally, sidewalks, street trees, shading devices and dedicated bike infrastructure can make walking and biking easier and more comfortable. In addition, there are parts of the city that are already “transit-ready”, meaning they already have many of the needed features for improved accessibility (e.g. interconnected network of streets, buildings that line the street with interesting facades, providing a sense of enclosure, etc.).



Illustration of a proposed neighborhood with new, compact development that is surrounding public open space, limiting sprawl, reducing car dependency, and allowing walkability.

Zero Emission Incentives

In order to help promote the use of low carbon vehicles such as hybrids and electric vehicles, the city should consider providing priority parking locations with free charging stations at public parking facilities. The city should also consider requiring bicycle facilities as part of commercial and multi-family development. Transit systems could also be run with cleaner running engines or by utilizing electric lines to power buses or trolleys.

Greener Buildings

There are many reasons to incorporate sustainable construction practices into new construction, especially when many of these are no more costly than unsustainable designs, and others generally pay for themselves in a short time frame. Some low-tech, common sense ways to construct more sustainably include using locally produced construction materials, using renewable or very durable materials, and designing buildings to be climate-responsive. Laredo's historic and vernacular building traditions offer many pointers on how to accomplish these things.

Some typical climate-responsive design techniques include cross-ventilation, high ceilings, use of daylight, and acknowledging solar orientation. Of course, the location and siting of buildings is also crucial. A designer or building owner should strive to build mostly in walkable or transit-served contexts. Unbuilt portions of the site can have roles in recharging groundwater and providing for habitat.

For those that can afford to build or retrofit using high-tech solutions, these may include on-site energy generation, integrated plumbing systems that recycle and differentiate water based upon intended use. The ability to increase the use of timers and sensors for lighting, air-conditioning, and other building systems, which can greatly reduce consumption and demand, already exists.

Weatherization

"Weatherization" should be considered low hanging fruit in the process of making buildings greener. Without even upgrading building systems, large savings can be gained from easy and inexpensive improvements to insulation and by sealing cracks in windows and doors. Regular maintenance of air conditioning and heating systems, such as coil and duct cleaning and filter replacement, are important practices when trying to reduce citywide electricity loads. Installing shade devices such as awnings and shutters, planting deciduous trees in appropriate sites, using high-albedo (reflective) roof surfaces also contribute. The latter two practices also mitigate the urban heat island effect.

Reduce Heat Island Effect

The heat island effect is where an area is significantly warmer than the surrounding areas due to manmade interventions such as large surfaces that reflect heat instead of absorbing heat such as large parking areas or roof surfaces.

There are both building roof and non-roof strategies that can be used to mitigate the urban heat island effect.

Roof Strategies

Create shade for roofs by using vegetated roofs, high albedo materials, trees to shade roofs, and pergolas, solar panels, and other devices to shade parking garages and/or flat sloped roofs.

Non-Roof Strategies

Create shade for the ground by installing vegetative ground cover and trees in planting strips, swales, and verges instead of pavement, using high albedo materials for paved surfaces, minimizing surface parking lots and the size of expanses of asphalt, installing trees and ground cover in parking lots.

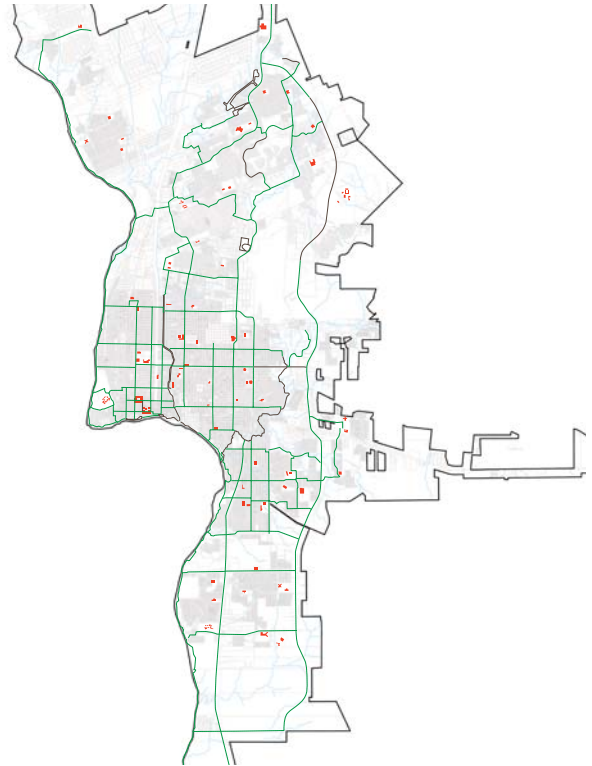
Increase & Strengthen the Green Network

Creating a Green Network

Laredo's green network is much more than just its existing parks. A seamless system should also include trails, wild areas, tree-lined streets, and hardscaped plazas. All of these open space types can provide benefits such as increasing and preserving habitat, recreation and relaxation, public health and fitness, and providing psychological counterpoint to the intense urbanity of the city.

A more complete green network would also provide ecological services such as carbon sequestration, polishing the air of gaseous and particulate pollutants, aiding in groundwater recharge, and mitigating the urban heat island effect. VMT reduction due to trail users choosing to bike or walk instead of driving is also an important benefit of the green network. Economic considerations include higher real estate values and higher tax revenue for the city.

Laredo has the opportunity to set aside land for parks and trails on its expanding periphery before it is developed. The city should also strategically insert or improve such places in the already-built portions of the city.



The Bike Master Plan outlines path and trail connections as well as bike infrastructure. Refer to the Mobility section of the plan for more detail.



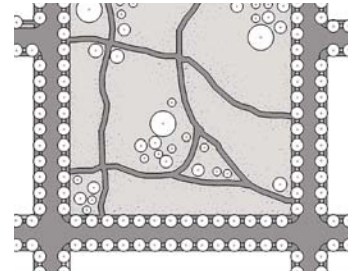
Section of Chacon Creek Hike / Bike Trail (Rails to Trails Conservancy, 2016)

Introducing More Variety into the Public Space Options in Laredo

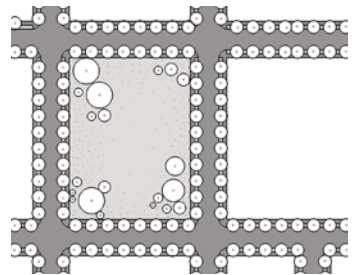
High-quality civic spaces should be thoroughly integrated into new development and introduced during redevelopment. Plazas and squares are the most urban types of space; they are enclosed by surrounding buildings that form an outdoor room.

Parks and greens are more open, bounded on at least one side by buildings, and framed by plantings. Other types of civic spaces, including community gardens and playfields, are more open and only occasionally shaped by buildings or formal plantings.

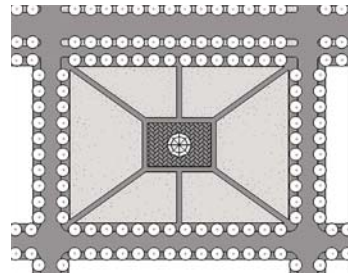
A **park** is a natural preserve that serves environmental goals such as the preservation of habitat or filtration of water. It may also be available for active recreation. The shape of the park may follow the boundaries of natural features like the waterways running through the city. Parks may contain trails, rock escarpments, water bodies, woodlands, and meadows. A park may also contain orchards or food gardens. Adjacent buildings should face the park.



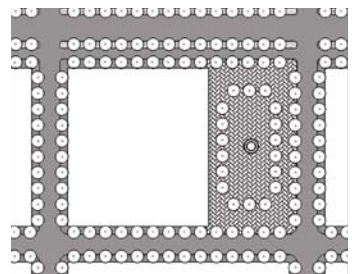
A **green** is available for structured or unstructured recreation. A green may be spatially defined by landscaping rather than by buildings. Trees can be formally or naturalistically planted. A green contains lawns, trees, pavilions, memorials, benches, and playground equipment. A green may also contain orchards or plots for cultivation of community gardens.

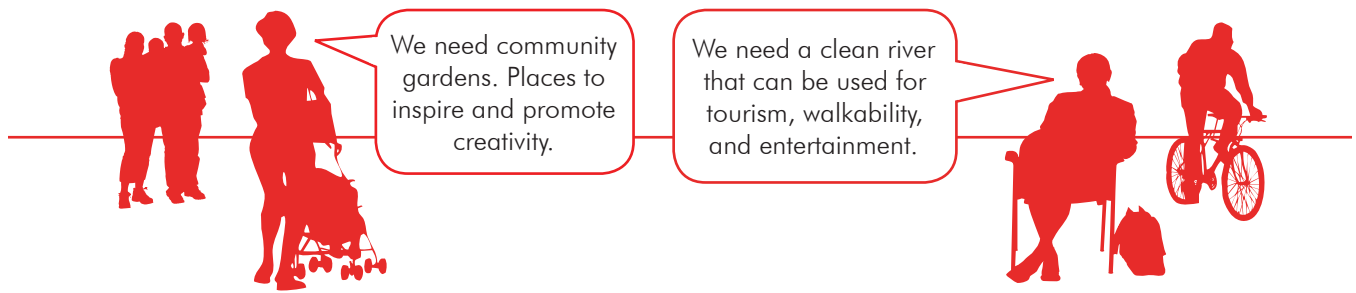


A **square** is available for structured or unstructured recreation and civic purposes. A square is clearly defined by building frontages. A square can provide a public open space that provides a setting for civic buildings. Squares are located at the intersection of important thoroughfares. Squares may contain lawns, trees, and pavilions that are formally disposed.



A **plaza** is designed for civic, commercial, or residential activities. A plaza is clearly defined by building frontages. Its surface is typically covered with pavers or compact earth. Trees are optional and plazas are located at the most central intersections or as quiet neighborhood centers.





Design Around Civic Spaces

Neighborhood civic features can be a prime selling points for a community and should be designed accordingly. Greens should not be treated as leftover space. Integrating these spaces into neighborhoods should be an important priority; locating them prominently in conjunction with churches and schools is often beneficial.

To improve the usability and attractiveness of neighborhood parks created while land is being subdivided, the city should consider allowing multiple smaller neighborhood greens or parks that can be reached by more people on foot or by bicycle. Amenities such as playgrounds or gazebos are highly encouraged.

The edges of greens and small parks are critical to their success. The top illustration shows a typical neighborhood green that faces the backs of houses, which limits interaction with surrounding properties and reduces natural surveillance.

The civic space could instead be designed with a new layer of development with the fronts of buildings facing the green would activate this space, as shown in the middle illustration. One or more walkable tree-lined streets would provide an active edge to what will now function as a true neighborhood green or park. Shade trees would also be added to adjacent streets, helping to define the edges.

In compact settings, residents can enjoy neighborhood squares and engage more fully in civic life outside their homes. Additional uses are made possible by virtue of adding more people, and attached units around the parks periphery. The image shows five types of units: attached, detached, accessory, and apartments above shops and offices. This kind of diversity in housing type would likely lead to a neighborhood of varied ages and incomes.



A potentially lifeless neighborhood green with housing facing away from the park.



A lively neighborhood green fronted with detached homes.



A lively neighborhood green made more lively by adding a corner store and small offices.

Environmental Benefits of Parks²

Stormwater runoff created through new development can be offset by channeling this water to the increased greenspace of linear parks. The reduced volume and peak flows of stormwater will reduce the size and cost of necessary stormwater management infrastructure.

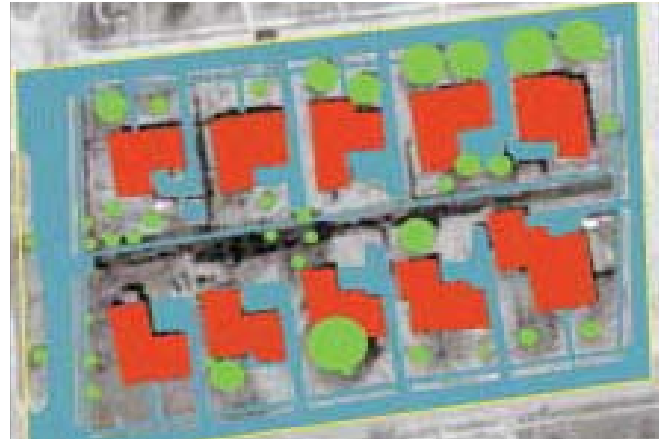
A case study done by the Davey Tree Expert Company and American Forests looks at a 3.8 acre residential site in Garland, Texas; this study provides insight into the potential stormwater volume reduction trees alone could provide (i.e. tree canopy coverage).

A notable reality that is worth considering from this example: if the City of Garland were to remove all of its existing tree canopy coverage, an estimated \$2.8 million (annually) would be needed to build and maintain stormwater management infrastructure, such as retention facilities, to handle the additional runoff volume. What would the equivalent for Laredo be?

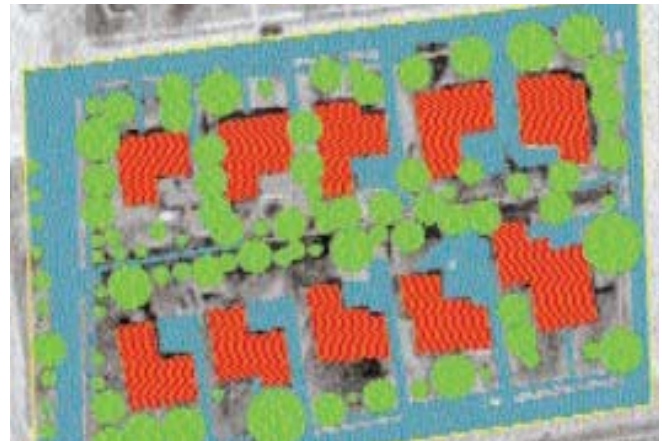
The proposal to use a connected linear park system in order to create a niche in each watershed in Laredo is a step forward towards modern urbanism and efficient infrastructure management. In Laredo, much of the needed infrastructure is already present on developed watersheds, making it possible for most of Laredo to ultimately benefit from this approach.

In addition to improving natural infrastructure, an urban network of linear open spaces would result in new parks that seek to connect to the larger system. The system of parks can continue to fill-in missing components in the overall trail system, which can ultimately connect to the larger bike and pedestrian network throughout the city. This green network has multiple functions, meeting both stormwater needs and the communities desire for parks and trails that are better connected to one another.

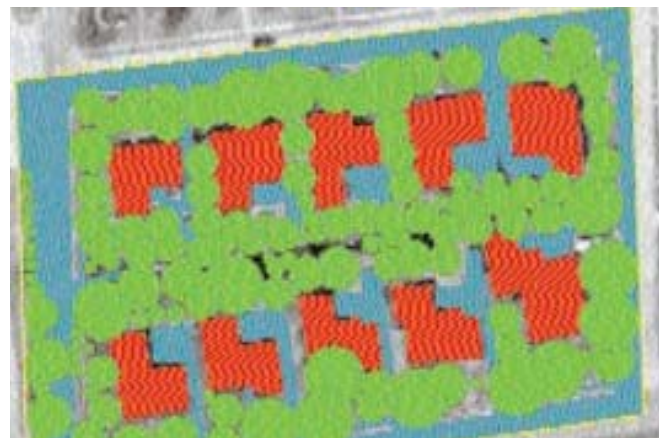
² Gilpin Engineering Environmental Consulting Technical Memorandum 12/02/2016



8% Tree Canopy Coverage = 34 ft³/acre reduction in stormwater runoff



25% Tree Canopy Coverage = 4,200 ft³/acre reduction in stormwater runoff



45% Tree Canopy Coverage = 76,200 ft³/acre reduction in stormwater runoff

Protect & Restore Nature

In response to the overwhelming community desire to retain the natural habitat and biodiversity that make Laredo and the wider region adjacent to the Rio Grande distinct, efforts to protect and restore natural features as the city grows will be central to realizing this vision. Natural areas serve multiple functions, acting as both infrastructure and open space.

Existing Habitats

Consider the network of natural and wild places, where they exist, as permanent and irreplaceable. Defend the interconnectivity of habitats with the same fervor with which the interconnected network of streets is defended. When developing land, consider that natural places are eons in the making. Such places offer multiple benefits to humans and the environment. The ecology of Laredo will be healthier as a result of their protection; biodiversity is maintained or increased. Additionally, wild areas provide the benefits of water recharge and needed contrast to the realities of the built world and its stresses.

Restoration

The restoration of natural habitats can occur at all levels—including households, developers and the local government. Together, each resident, property owner, or governmental department can contribute, parcel-by-parcel and neighborhood-by-neighborhood, protecting existing species and working to restore those that are endangered.

Every yard, median or planting strip can become a part of citywide restoration. The result will be a city that has lower heating and cooling loads, enhanced water conservation, contact with plants and animals and the pride that comes with protecting the elements of the ecosystem that make Laredo unique.

Due to the location and the geographic features in the city, many of Laredo's existing parks have room for either the expansion or the creation of wetlands. Such efforts would be considered Low Impact Development (LID) and include stormwater management. Wetland



Protecting and restoring natural features is beneficial for both residents and visitors.

creation and expansion can help to manage the flow and storage of stormwater while also prioritizing green infrastructure. Compact neighborhood development reduces the tendency to encroach on wetlands by increasing the yield of land for developers in terms of units per acre.

Tourism

Tourism is partially dependent upon travelers seeking out what is unique to the region. Travelers often spend more time and money in a place that they perceive to be authentic, which has an identifiable character, and which offers them tastes, sounds, and sites that cannot be experienced elsewhere. The built environment contributes to some of this unique “Laredo” character, but the natural environment is the complement.

Creation and Expansion of Wetlands³

As part of the National Recreation Association Park Standards, green belt and natural state areas are recommended for park design. Wetlands provide many important services to the environment and to the public. They offer critical habitat for birds, fish, and other wildlife. They purify polluted waters, and they help lessen the damage caused by floods and storms. Wetlands also provide a wide variety of recreational opportunities such as fishing, photography, and wildlife observation.

In Laredo, there is ample space in existing parks and open lands for the expansion and the creation of new wetlands. New wetlands would contribute to LID, making stormwater infrastructure more sustainable.

An example worth considering involves the City of La Feria along with the Rio Grande Valley Storm Water Management team. Together, they designed and built a wetland at the La Feria Nature Complex as part of the Arroyo Colorado Watershed Protection Plan. Some of their 24 million gallons of effluent per year is used to sustain the wetland, while the rest is used for irrigation purposes. The City of Uvalde has developed a similar project; these wetlands now enjoy being a national destination for Audubon Society enthusiasts and photographers.

In Laredo, a similar approach, using bypass piping systems from the effluent collection system supplying Lake Casa Blanca, could ultimately be directed toward connected parks and creeks throughout the city in order to revitalize and add wetlands. These wetlands could be sustained year-round. Future areas could be added to the effluent distribution system as they are developed in conjunction with linear parks along their watersheds.

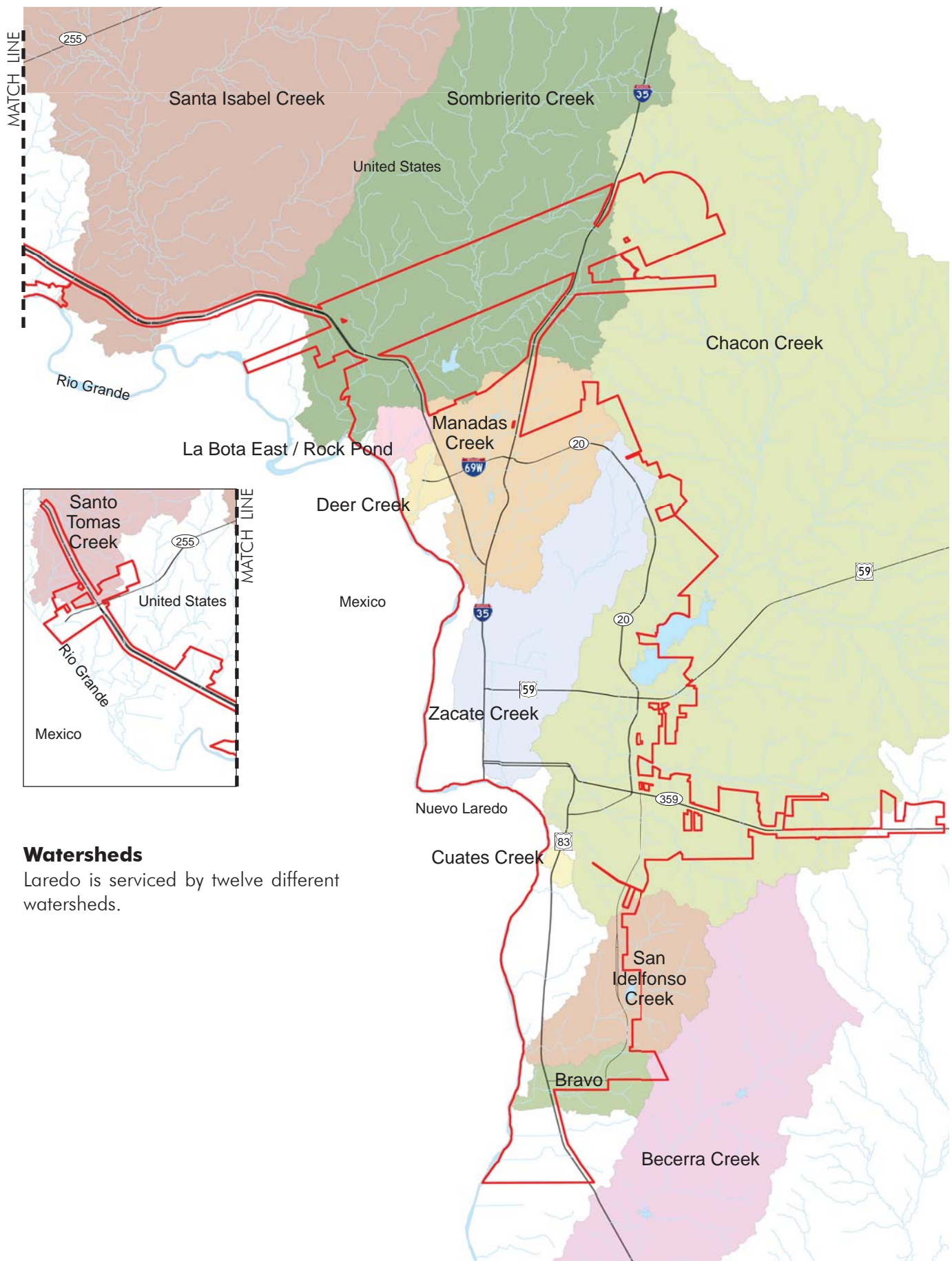


Natural, existing infrastructure in Laredo



La Feria (Arroyo Colorado Watershed Partnership, 2016)

³ Gilpin Engineering Environmental Consulting Technical Memorandum 12/02/2016



Watersheds

Laredo is serviced by twelve different watersheds.

I love the fact that here in Laredo they placed a ban on plastic bags, but I would like to see a recycling program for plastic bottles.

I believe more clean energy needs to be produced in Laredo.

Pursue Renewable Energy & Upgrade the Grid

The question of sustainable energy needs to encompass the technology by which energy is generated, where the energy is produced, the storing of that energy, and optimizing its distribution.

The city should commit to expanding energy derived from renewable sources such as sun, wind, and geothermal/geoexchange. The modes of energy generation that should be discouraged are coal and petroleum-burning.

Wherever possible, district heating and cooling can reduce distribution inefficiencies by shortening the trip from generating plant to consumer or by generating heat as a community rather than each individual household converting electricity into heat. Though district heating can be accomplished by burning fossil fuels, it can have a lower carbon footprint by using biomass and renewable energies. By creating on-site renewable generation, such as with roof-mounted photovoltaic panels, the distance between the point of consumption and the point of generation is shortened, thereby increasing efficiency and decreasing pollution.

The city should consider implementing a smart grid, or at least aspects of a smart grid. Meters could take into account peak loads, mode of energy generation, and reduce distribution inefficiencies associated with the aging, conventional grid. Off-peak usage and non-polluting modes would be rewarded monetarily.

A smart grid would also ideally include capacity upgrades in order to accommodate a larger city fleet of electric or hybrid vehicles, which would increase loads during nighttime charging. Net metering would allow consumers to produce renewable energy and sell the excess power back to the grid and to the utilities, thereby rolling back meters and their electric bills.



Harnessing renewable, low-carbon energy such as wind, solar, and geothermal power can make the region less vulnerable to a fluctuating oil market while reducing atmospheric pollutants.



I would like to see glass recycled and yard waste disposed of in recyclable paper bags. Apartment complexes should also provide separate bins for recycling.

Diversifying the Energy Portfolio

A long-term sustainability goal for the city and the region depends upon its ability to diversify its energy portfolio, especially with renewable energy. The following are considerations for each of the current and proposed methods of generating energy that could enrich or diversify the city's energy portfolio.

Fossil Fuel: Petroleum

Petroleum, its by-products and related hydrocarbons are often used to fuel electric plants, cars, trucks, lawn mowers, and generators. Such liquid fossil fuels may come from domestic sources in Texas and neighboring states. However, they also may be extracted from Canadian tar sands at great environmental cost due to deforestation and pollution or from politically unstable countries that are openly hostile to America's interests.

Fossil Fuel: Natural Gas

Of the fossil fuels, the burning of natural gas may have the lowest carbon footprint. Natural gas has come under national scrutiny due to the common practice of "fracking." This practice is extremely water intensive and involves forcing high pressure water and chemical mixtures into rock strata in order to free gas deposits. Some studies indicate fracking can result in the pollution of groundwater.⁴ Careful public consideration should be given to balancing the economic and the environmental impacts.

Fossil Fuel: Coal

Coal is one of the most abundant American fossil fuels. One of coal's advantages is its ease of transport and its potential to help the country achieve short-term energy independence. Its disadvantages are that it is intensely polluting, producing more greenhouse gases than other modes of electricity generation.

⁴ EPA's Study of Hydraulic Fracturing for Oil and Gas: Impacts from Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States, December 2016

Solar

The box entitled "The Solar Transect" provides guidance on the implementation of solar energy in Laredo. Another document that could be considered a handbook for the city is *The Solar Task Force Report* published by Senator Eliot Shapleigh in November 2010.

Wind

Wind farms have been installed within Webb County. Wind farms rely upon transmission lines to deliver power to cities and should be erected where the wind is steady enough to justify their cost.

Geothermal

The Texas Renewable Energy Resource Assessment has identified Geothermal as a promising energy horizon for the state. Geothermal comprises three different technologies: geothermal HVAC systems, direct use of heated water, and electrical power production. In addition to these technologies, geoechange or thermal exchange technologies take advantage of temperature gradients between the building and underlying geology in order to heat or cool buildings.

Landfill Gas

Landfills release methane as the disposed trash decays. As methane is a potent and malodorous regulated greenhouse gas, it is often harvested to create electricity or provide power for industrial processes.

Biomass and Biofuel

Biomass refers to the incineration of plants and organic material to generate power. Concerns for air quality should be considered and mitigated if energy generation from burning is considered.

The Solar Transect

There is a considerable range of solar responses that can reduce demand for electricity or conventionally produced electricity as shown on the spectrum below. Low-tech solutions can be undertaken by individuals, households, business owners, and any other building owner, including government. High-tech solutions, due to their complexity and space requirements, may require partnership with other entities such as the County.

Passive Solar Design

Passive solar design strategies include designing façades with the exposure patterns of the sun in mind; designing deep porches to shade doors and windows; high albedo façades and roofs to reflect sunlight; high ceilings so that hotter air rises; abundant windows to provide cross-ventilation; deep overhangs or projecting cornices; adobe construction; courtyards with fountains; and thick masonry walls that insulate in the winter but which are slow to heat up in the summer. Contemporary architecture may also include light shelves and adjustable exterior louvers. Additionally, skylights and solar tubes can direct natural sunlight into interior spaces that lack windows, thereby reducing demand for electric lighting.



Solar Water Heaters

Unlike photovoltaic panels, which convert sunlight into electricity, solar water heaters convert sunlight directly into heat, which in turn heats water. Solar water heaters are relatively inexpensive compared with higher-tech solutions, and can be installed on most rooftops with ease. Such devices can pay for themselves very quickly due to their cost and their potential to reduce electricity loads for hot showers, dishwashers, clothes washing machines, and sinks.



Low-Tech

Roof-Mounted Photovoltaics

Photovoltaic panels can be added to most building roofs. These not only convert sunlight to electricity, but also may provide shading of roof surfaces, thereby reducing loads on air conditioning systems. Photovoltaic panels may be fixed or may incorporate sun tracking technology. Advances in photovoltaic technology are making solar generated electricity inexpensive enough to compete with conventionally generated energy. There are grants and tax incentives at the state and federal levels that encourage the installation of photovoltaics and other means of harnessing solar energy. Many energy companies now also have the option of earning electricity bill credits for selling back solar electricity that you generate but don't use.



Solar Arrays

A solar array requires more land than the other technologies listed. Also, as is the case with conventional generation plants, solar arrays require transmission lines in order to connect consumers of electricity with its source. Solar arrays may employ different technologies. Photovoltaic panels, similar to those that are mounted on buildings, convert sunlight into electricity. Other arrays employ reflectors, or mirrors, which direct and concentrate sunlight to a central water tank, converting heat energy into steam, which then generates electricity. The performance of solar arrays is optimized by sun tracking technology, in which computers and motors keep mirrors or photovoltaics oriented toward the sun as the surface of the earth changes its relative angle to the sun throughout the day.



Project done by Texas Solar Power Company, Austin, TX

High-Tech

Better Utilize Available Water⁴

Because of its constrained water budget, Laredo must protect and enhance natural sources as it begins to incorporate water harvesting strategies that can be adopted by all Laredoans.

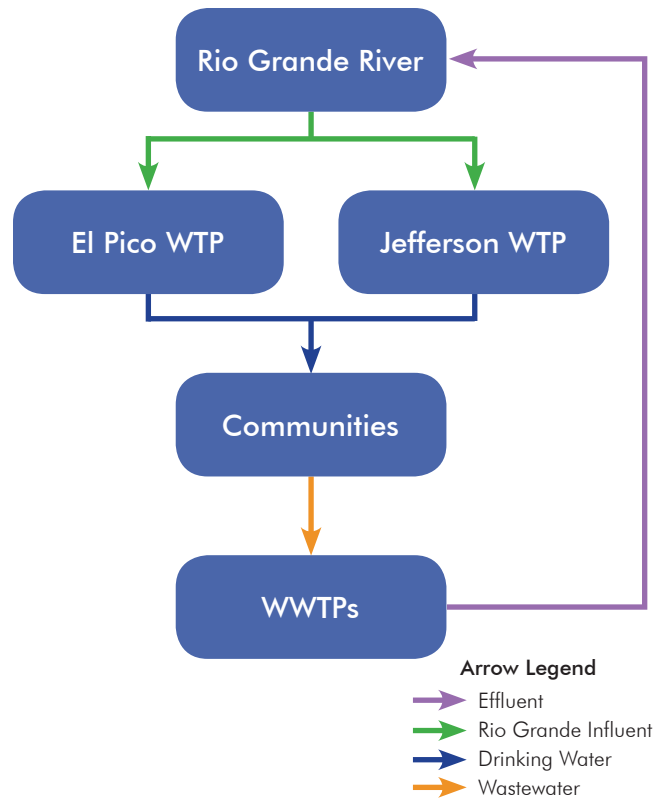
At the Building

Starting at the scale of the individual and household, the first step is changing behavior. Low-flow faucets and fixtures, efficient or composting toilets, shorter showers, and efficient dishwashers and washing machines can help the city to live. Gutters, rain barrels, and cisterns can keep precious rainwater for on-site use and also reduce stormwater runoff. Homeowners and land developers should be aware that minimizing impervious surfaces can reduce flash flooding and increase the recharge of groundwater resources. Native and drought tolerant plants should be the norm in most landscape plans. Landscapes that are less thirsty help consumers use less water and lower energy costs.

Reclaiming Treated Water

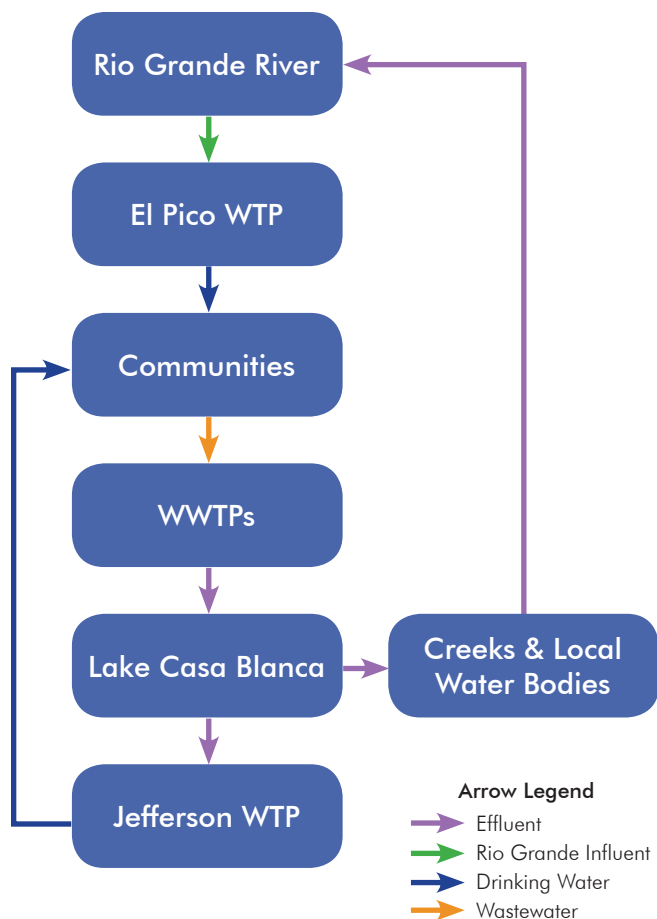
Currently, Laredo's water cycle begins with water pumped from its sole water source, the Rio Grande, to two city-owned Water Treatment Plants (WTP), El Pico WTP and Jefferson WTP, to produce a combined average of 40 million gallons per day (MGDs) of drinking water on peak days.

In the cycle, river water is pumped into the WTPs, cleaned, and then distributed throughout the city. The resulting wastewater is transmitted through collection systems leading to one of six wastewater treatment plants (WWTPs), and converted to approximately 30 MGD, on peak days of treated water, or effluent. The effluent produced is cleaner than the water in the Rio Grande where it was first sourced. While a small portion of this cleaned effluent is reused, there is ample opportunity for water re-use and reduction within the existing water cycle in Laredo.



Laredo's Current Water Cycle

⁴ Gilpin Engineering Environmental Consulting Technical Memorandum 12/02/2016



Proposed Water Cycle for Laredo



Lake Casa Blanca

Currently, approximately one MGD, on peak days, of effluent is discharged to reservoirs used to irrigate the Casa Blanca Golf Course and the Laredo Country Club Golf Course. The remaining water is either directly discharged into the Rio Grande or discharged into creeks that lead to the river.

The treated effluent could, instead, play a greater role and serve as a stepping stone to bigger scale water and natural habitat conservation efforts. Fluctuating water levels have been a persistent problem for Lake Casa Blanca, one of the main attractions of Laredo's only national park.

Redirecting effluent into Lake Casa Blanca would improve Laredo's quality of life by keeping the lake full and at a constant water level. This would allow any overflow to keep the Chacon Creek, located below the lake outfall, flowing continuously. Like other cities in Texas, the City of La Feria re-uses its effluent in a similar way to feed a wetland.

Furthermore, at that point in time, some water could also be sent gravitationally from Lake Casa Blanca to be treated and converted back to drinking water by the Jefferson WTP. As a result, El Pico WTP could ultimately lower its pumping quantity, unburdening the Rio Grande and reducing pumping costs by over 35% that are associated with energy consumption and maintenance.

This proposed change to the use of Laredo's effluent would call for a new water cycle. The city should consider studying the local ecology to better understand what amount of effluent should be returned back to the land to support the ecosystem and how much reclaimed water can be reused within the community.

GOALS & POLICIES

Overall Goal

Ensure that environmental resources are conserved and properly managed in Laredo so that future generations may experience an improving environment that is more resilient than that of the previous generation.

Sustainable Buildings

Goal 6.1: Create new and revitalize existing sustainable architecture throughout the city.

Policy 6.1.1: Implement programs and utilize best practices for efficient energy use in new buildings, such as LEED or other lifecycle costing initiatives.

Policy 6.1.2: Implement programs to use energy more efficiently in existing buildings.

Policy 6.1.3: Enhance energy efficiency measures in local government operations.

Policy 6.1.4: Embrace technological responses to the green building challenge.

Policy 6.1.5: In addition to technology, embrace low-tech response to the green building challenge. Develop standards to encourage buildings to be designed with inexpensive components, including passive solar design, climate responsive architecture and vernacular design that is adapted to Laredo.

Policy 6.1.6: Implement programs that utilize best practices for sustainable site development.

Policy 6.1.7: Promote behavioral changes and consumption patterns that conserve energy including energy efficient building systems, fixtures and appliances.

Policy 6.1.8: Promote weatherization techniques such as adding weather strips on doorways, caulking, sealing and insulating doorways.

Policy 6.1.9: Promote durable materials and architectural designs with a long life.

Policy 6.1.10: City government should lead the way in new construction and remodeling with green building principles.

Policy 6.1.11: Promote education programs, especially in schools, which stress the responsibility of each person to conserve energy resources.

Civic Spaces

Goal 6.2: Provide a wide variety of neighborhood parks and recreational programs that are integrated with neighborhoods and accessible to most residents and visitors to Laredo.

Policy 6.2.1: The city shall strive to create extraordinary parks that express the natural beauty and cultural diversity of Laredo and fund the park system at a level that corresponds to its significant importance to Laredo residents.

Policy 6.2.2: The city will provide a balanced parks system with a variety of park sizes and facilities, including trails, open spaces, and indoor recreation facilities.

Policy 6.2.3: The city will regularly update and manage a park system plan.

Policy 6.2.4: The city will continue to require improved neighborhood greens or parks when land is subdivided, with adequate regulations (a minimum of 10 acres for every 1,000 residents) that ensure they will become important features in the new neighborhood:

- a. The edges of small greens and parks are critical to their success; the fronts and sides of buildings, not the backs, must face the park to provide natural surveillance and a well-maintained edge.
- b. Greens and parks must be separated from private buildings with a street or public path.

- c. Drought-tolerant shade trees should define the edges of parks and greens.

Policy 6.2.5: Create partnerships for the future success of the park system, involving every governmental entity, the school systems, the county, and the state. Recreational facilities at schools should be integrated into Laredo parks system for the mutual benefit of schools and the community. Stormwater detention areas can often be integrated with parks.

Policy 6.2.6: Incorporate stormwater detention facilities in an interconnected network of civic spaces.

Policy 6.2.7: Create trails, greenbelts, and linear parks for their inherent value and to provide connections among other parks, schools, neighborhoods, and natural open spaces.

Policy 6.2.8: Update the current landscaping ordinance to integrate the goals of this plan.

Habitat and Biodiversity

Goal 6.3: Protect and enhance ecologically sensitive areas, plants and wildlife resources.

Policy 6.3.1: Allow high-density land uses and cluster developments that protect ecologically sensitive areas. Encourage “light imprint development” where development cannot be avoided adjacent to or within ecologically sensitive areas.

Policy 6.3.2: Encourage retention of land that is in a natural, undisturbed condition. Plan new parks and open spaces to preserve ecologically sensitive areas.

Policy 6.3.3: Use the existing and future recreational connected park systems along creeks to interconnect potential development sites with complimentary land uses for park goers.

Policy 6.3.4: Incorporate the expansion and creation of wetlands into park systems in order to complement urban design and enhance parks and natural habitat.

Policy 6.3.5: Encourage the establishment and maintenance of wildlife and nature preserves.

Policy 6.3.6: Assure preservation of natural habitats for wildlife and protect threatened/endangered species of plants and animals.

Policy 6.3.7: Enhance and enforce a citywide tree preservation ordinance.

Policy 6.3.8: Establish a tree planting and maintenance campaign throughout the city.


Policy 6.3.9: Encourage the conservation, creation, or restoration of native habitat in urban areas such as public parks and publicly or privately owned lots.

Policy 6.3.10: Require that the majority of plants used on private lots, rights-of-way, and unbuilt portions of developments be native species, appropriate to the ecosystem viable for the particular site. Native shade trees should be prioritized; yet use of some acclimated species might be necessary under certain conditions.

Energy and Atmosphere

Goal 6.4: Develop Laredo in a way that requires less automobile use for access to daily needs, which will help to reduce the prevalence of green house gases. Strive to continue to meet the national ambient air quality standards for all pollutants.

Policy 6.4.1: Promote new development that encourages a sustainable lifestyle such as walking, cycling, the use of public transit, and reducing the dependence on automobiles.



Affordable and safe LED lights in all parks, warehouses, schools, and public places to save us money.

More strict laws for vehicles to pass State inspections and avoid air pollution.

Policy 6.4.2: Consider the energy efficiency of proposed development when land use and development decisions are made. This would include energy consumed by buildings and their users as well as energy used by commuting and vehicle trips generated due to new development.

Policy 6.4.3: Emphasize infill and higher density development located in walkable area and areas served by public transit to reduce dependency on automobiles.

Policy 6.4.4: Promote the concepts in the program for Leadership in Energy and Environmental Design for Neighborhood Development (LEED-ND) as a tool for evaluating development proposals.

Policy 6.4.5: Promote the adoption of on-site, low-carbon footprint (such as natural gas), and renewable energy sources by households, government and businesses.

Policy 6.4.6: Promote the use of renewable energy sources that reduce demand on fossil fuels such as solar, wind, and geothermal.

Policy 6.4.7: Promote citywide car and van pooling systems and implement other forms of transit to connect major destinations, such as downtown or the universities.

Policy 6.4.8: Meet or exceed federal air quality standards for green house gases and other common pollutants.

Policy 6.4.9: Promote research and education that focuses on improving air quality.

Policy 6.4.10: Promote both roof and non-roof strategies to mitigate the urban heat island effect.

Policy 6.4.11: Secure sufficient energy resources to meet present and future community needs without degrading local, regional or global ecology.

Policy 6.4.12: Promote architecture that exhibits sustainable design and technological innovations that conserve or generate energy.

Policy 6.4.13: Consider an increase of local gasoline tax to be earmarked for funding El Metro and improving El Metro's level of service.

Policy 6.4.14: Direct additional and new environmental impact fees to El Metro.

Policy 6.4.15: Plan for adequate and sustainable solid waste management practices such as city-wide composting, landfill gas harvesting, and expanding of recycling capacity.

Water Management

Goal 6.5: Continue to develop policies that promote water reclamation, conservation, stormwater management, and access to a sustainable water supply.

Policy 6.5.1: Develop cost effective processes to re-use and reclaim water; use new technologies to expand capacity.

Policy 6.5.2: Develop policies that promote and incentivize the development of surface water treatment, conveyance, and reclamation.

Policy 6.5.3: Implement the re-use of wastewater treatment plant effluent to initially combat Lake Casa Blanca's fluctuating water levels; this will ultimately decrease Laredo's reliance on the Rio Grande.

Policy 6.5.4: Pursue active and passive water harvesting techniques, including small-scale techniques, such as rain barrels or cisterns.

Policy 6.5.5: Maximize the use of native and drought resistant species in required landscaping policies.

Policy 6.5.6: Maximize the use of permeable surfaces where they can replace impermeable surfaces, such as conventional asphalt or concrete.

Policy 6.5.7: Continue to implement the existing water conservation program.

Policy 6.5.8: Recognize that climate change will affect water supply, stormwater management, and conservation and that the annual flows of the Rio Grande will be affected, resulting in needed adjustments to local ordinances, specifically related to properties that are in flood zones.

Policy 6.5.9: Protect the community from floods and reduce the risk of flood damage.

Policy 6.5.10: Locate development outside of flood plains and instead dedicate these spaces for suitable uses, such as recreational, agricultural, or open spaces.

Policy 6.5.11: Design necessary flood control facilities to blend with and enhance surrounding areas.

Policy 6.5.12: Create a unified drainage ordinance that considers the initiatives outlined in this plan.

Policy 6.5.13: Develop a Future Water Resource Plan.