A.R.S. Section 9-461 E.1. – Conservation Element: *A Conservation Element for the conservation, development and utilization of natural resources, including forests, soils, rivers and other waters, harbors, fisheries, wildlife, minerals and other natural resources.*

A.R.S. Section 9-461 D.3. – Environmental Element: *An environmental planning element that contains analysis, policies and strategies to address anticipated effects, if any, of plan elements on air quality, water quality and natural resources associated with proposed development under the general plan. The policies and strategies to be developed under this element shall be designed to have community-wide applicability and shall not require the production of an additional environ-mental impact statement or similar analysis beyond the requirements of state and federal law.*

7 – CONSERVATION, ENVIRONMENTAL & ENERGY ELEMENT

This Chapter of the General Plan combines three major elements required by Arizona State law: the Conservation, Environmental and Energy Elements. These elements were combined because of the interdependencies among these three planning areas. The natural resources indentified in the Conservation element are those resources that will be impacted by continued economic growth. The development of those resources will impact the Environment in which we live. How the general Environment in which we live is developed will determine the amount of Energy we use. The local economy, our community, and our environment support community success. Making each stronger and integrating solutions among the three will provide a more comprehensive and cohesive document. This chapter is intended to address issues relevant to all three.

The three overarching Goals of this chapter are: Improving the quality of life, Reducing environmental degradation, and Strengthening our community and families. These goals can be achieved by coordination of a more comprehensive range of considerations than the present planning and development efforts considered. The addition of "Sustainability" principles will provide the welding link needed. Yuma's future is dependent upon a sustainable approach to planning that includes Conservation of Land, Air, Water and Energy.

This chapter is structured in the following format: the Background section identifies the existing conditions of the Yuma area including topography, geology, the natural environment and the manmade environment; the Evaluation and Analysis section examines the status of and potential effect of urban development on important quality of life indicators including air, water, energy, noise, wildlife and archeological resources; the Goals, Objectives and Policies section identifies community goals and policies to ensure the environmental health of our community and the protection of our natural resources for the use of future generations; and the Action Plan identifies a list of projects and a general timeline to meet the identified goals.

An overall guide to preserving the historic and natural resources of the Yuma community is the implementation of the Yuma Crossing National Heritage Area Management Plan. An area encompassing twenty-one square miles (including the Lower Colorado River and the Yuma Crossing) has been designated by the National Park Service as a Heritage Area, thereby recognizing its historical importance in the development of our nation. The Yuma Crossing Heritage Area Plan addresses improvements to the Colorado River to restore it to its native habitat and recognizes the important historic and cultural sites in the

community.

BACKGROUND AND EXISTING CONDITIONS

TOPOGRAPHY

The Planning Area is defined by the confluence of the Colorado and Gila Rivers, the mesas of the Yuma Desert and the nearby mountains. The wide river valleys of the Colorado and Gila provide prime soils for agricultural activities. The mesas are the location of a majority of the community's residential, commercial and military developments and activities. Elevations range from 125 feet to 260 feet above sea level. The eastern boundary of the plan area abuts the foothills of the Gila and Laguna Mountain Ranges.

Rivers – The Colorado River is the major source of water for the southwest. The waters meet urban, recreational and agricultural needs for communities all across Arizona and Southern California. Starting in the Rocky Mountains of Colorado, the river flows south to the Pacific Ocean through the Sea of Cortez in Mexico. Construction of dams for water and hydroelectric plants for electricity and the construction of levees for flood control have contained the high water flows of the Colorado. The Colorado was a wild river that typically overflowed into the Gila and Yuma Valleys every season.

These overflows into the alluvial plains deposited soils rich in nutrients. As a result of dam and levee construction, the nature of the Colorado changed. Flows have slowed and soils previously dropped in the plains now build up in the riverbed. Plants and wildlife dependent on fast river flows, periodic flooding and clear water were gradually replaced by non-native vegetation and wildlife species.

The major dams in the Yuma area are: the Laguna Dam, the first dam built for the Yuma Project, the Imperial Dam, which provides a point for agricultural and urban diversions to California and Yuma County, and the Morales Dam, which provides a point for Mexican diversions for agricultural uses. The width of the Colorado River Levees span a distance ranging from 400 feet to over a mile through the General Plan area. The differing ground levels, which typically gradually rise from the river channel to the edge of the levee, provide a variety of habitats and land use activities. River operations are under the management and authority of the US Department of the Interior's Bureau of Reclamation with the Army Corps of Engineering establishing the flood control criteria for river operations. Other agencies involved in river management and adjacent lands are the Bureau of Interior's Fish and Wildlife Service and Bureau of Land Management, the US State Department's International Boundary and Water Commission, the Arizona Department of Water Resources, the Arizona Game and Fish Department, the City of Yuma, Yuma County, the Yuma County Flood Control District, local irrigation districts, the Quechan Indian Tribe, the Cocopah Indian Tribe as well as a number of private landowners.

A.R.S. Section 9-46.05.E.10– Energy Element:
An energy element that includes:
(a) A component that identifies policies that encourage and provide incentives for efficient use of energy.
(b) An assessment that identifies policies and practices that provide for greater uses of renewable energy sources.

The Gila River, crossing through mid-Arizona, collects mountain and agricultural runoff before joining the Colorado River at the confluence. The historic confluence of the Gila and Colorado Rivers was right below the Yuma Territorial Prison State Park, but a re-channeling of the Gila pushed the confluence east to approximately the Avenue 4½E alignment. The distance between the river levees and from the Prison to the confluence is nearly ¾ miles wide and 3 miles long.

Valleys - The result of centuries of alluvial plain flooding from the Colorado and Gila Rivers has created valleys prime for agricultural production. The Yuma Valley stretches from the Colorado River on the north and west, to Mexico on the south and the mesa on the east. The Gila Valley is bordered by the Gila River to the north, the Mesa to the south and west and the Gila Mountains to the east.

Deserts – The Yuma Desert is a sub-area of the Sonoran Desert, which covers vast expanses of southern Arizona, California and northern Mexico. Typified by high summer temperatures and a low elevation, the Sonoran desert contains sandy soils, hard desert pavement and mountain ranges. Vegetation is relatively sparse except in areas along natural rivers and streams. Southeast of the Yuma planning area is the Cabeza Prieta National Wildlife Refuge (CPNWR). First established in 1939, the more than 800,000 acres of the CPNWR contain the natural habitats for many wildlife species. These include: coyotes, badgers, deer, snakes and a number of lizard species. The refuge also provides critical home range for the desert bighorn sheep and the endangered Sonoran pronghorn.

Mountains – The primary mountain ranges in proximity to the General Plan area are the Gila and Laguna Mountains. Sparse in vegetation, the Gilas provide a striking view shed for Yuma residents. The peaks of the Gilas are over 3,000 feet in elevation. The range provides a buffer for the monsoon storms that barrel west from Tucson and Phoenix through Dome Valley. The Laguna Mountains, a smaller range to the north of the Gilas, have peaks that exceed 1,000 feet in elevation. The ranges are separated by the Gila River.

GEOLOGY

The geology of the Yuma area has been determined by the actions of the rivers and historic geologic activity.

Soils – The soils in the Yuma region fall within two soil orders: Aridisols on the mesa and Entisols in the valleys. There are three major soil associations in the Planning Area, which are made up of specific soil series. The first is primarily found in the Yuma Valley. This is the Holtville-Gadsden-Kofa Association. These entisol soils are deep, relatively level, drain well, contain clay and form in flood plains and low terraces. These soils also have low permeability and the clay layers and deposits have the potential to shrink and swell in periods of inundation. In the Gila Valley the primary entisol soil associations are the Indio-Ripley-Lagunita Association. These soils are typically deep and well drained.

They form on flood plains, low terraces, alluvial fans and drainage ways. The Mesa is primarily made up of the Rositas-Superstition Association. The aridisol soils of this association are deep, sandy, nearly level to undulating and somewhat excessively drained. There are areas, found in small depressions, with a surface cover of varnished desert pavement. The Rositas-Superstition Association is typically formed from old terraces, sand dunes and alluvial fans. Also on the Mesa can be found a number of granite outcroppings. Most notable are Black Hill and the Yuma Crossing. Black Hill, at an elevation of approximately 300 feet, has been a historic guide marker for explorers of the southwest and currently hosts the community's emergency communications towers. A private company for sand and gravel operations is currently excavating the south portion of the hill. The Yuma Crossing outcropping, which provides the narrowest point across the Colorado River, has been the historic crossing point for travelers headed west.

Groundwater – With surface water resources available from the Colorado River, the availability of groundwater for urban uses has not been an issue in the development of Yuma. What is a concern are the seasonal high levels of groundwater in the Yuma and Gila Valleys that can impact the operations of septic systems and farming operations. The inundation of groundwater into clay soils can result in shrinking and swelling. This activity could de-stabilize building foundations and crack utility pipelines and pavement if mitigation measures have not been undertaken. Groundwater levels in the planning area typically range from 6 to 8 feet in the Yuma Valley, 8 to 10 feet in the Gila Valley and 80 feet on the mesa. In order to maintain these groundwater levels, the US Bureau of Reclamation and the Yuma County Water Users' Association operate a number of groundwater pumping wells which discharge to the Colorado River. This program was put in place to increase water deliveries to Mexico and alleviate rising groundwater concerns. Increased agricultural operations in the Yuma area and periodic high Colorado River flows contribute to the rise in groundwater levels.

Seismic Activity – The Yuma area is located in seismic zone 4. This is the highest category of risk for seismic activity. This zone is in place due to close proximity to the San Andreas Fault, which is located 70 miles to the west, the location of a number of local fault lines, such as the Algodones, Fortuna Wash and Laguna Mountains Faults, past seismic activity, the 1940 7.2 Imperial Valley Earthquake that caused significant damage in the Yuma Valley and the potential for soil liquefaction in the valleys due to high ground water levels. A detailed review of seismic concerns is addressed in the Safety Element – Chapter 9 of the General Plan.

NATURAL ENVIRONMENT

As noted earlier, Yuma is in a region of the Sonoran Desert. The weather is typically favorable with most days of the year filled with sunshine. The warm climate and the river corridors have created unique wildlife habitats in the region. These habitats contain several species that have special designation due to threats to population or range area.

Climate – The Yuma region is famous for sunny days and clear skies. The average annual rainfall is less than 3 inches. It has a classic low desert climate with extremely low relative humidity and very high summer temperatures. Typical daytime temperatures in the winter are in the seventies and in the summer the low hundreds. According to the National climate Data Center, Yuma is the sunniest city in the United States with 90% average possible sunshine. This is equivalent to 328 days or 4133 hours of sunshine a year. Based on average daily high temperature, Yuma averages 88.2 degrees. The hot temperatures during the summer days are accentuated by the length of the days. A typical day in June will last 14 hours, whereas, in January there are only 10 hours of light.

The area has two rainy seasons. In the winter, storms originating in the Pacific Ocean cross the mountains and deserts of California and Mexico bringing cooler, wetter days. In the summer, monsoon storms originating in southern Arizona and Mexico bring intense brief periods of rainfall. It is not unusual for a single monsoon storm to produce 50% or more of the total year's worth of rain. These intense storms can create flooding situations across the urban area as well as in the desert and washes.

Average Temperatures and Precipitation													
Western Regional Climate Center - YUMA WSO AP, ARIZONA (029660)													
Period of Record: 9/1/1948 to 11/30/2009													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	68.8	73.9	79.3	86.5	94.5	103.3	107.1	105.9	101.5	90.8	77.7	68.8	88.2
Average Min. Temperature (F)	44.8	47.6	51.8	57.4	64.8	72.8	80.9	80.6	74.6	63.1	51.8	44.9	61.2
Average Total Precipitation (in)	0.39	0.29	0.24	0.13	0.04	0.04	0.23	0.47	0.28	0.28	0.20	0.39	2.98
Duration of Daylight for 2010													
United States Naval Observatory													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Hours:Minutes	10:17	11:02	12:00	13:00	13:50	14:16	14:03	13:18	12:21	11:21	10:29	10:02	12:10

Wildlife and Habitats
With the desert climate and riparian areas by the rivers, the Yuma area is host to a variety of unique plants and animals, including a number of migratory birds traveling between winter and summer habitats.

The Arizona Game and Fish Department monitors the status of the animals and their habitats and works with federal, state and local agencies to promote wildlife development. To help accomplish this, the Game and Fish Department maintains a list of Species of Concern. The species included are either listed as a result of the Endangered Species Act or have been identified by another agency as a species of "concern". The animals identified with special designation that reside in the Yuma area or follow migratory patterns through Yuma County include:

Birds

- Southwestern Willow Flycatcher
- Great Egret
- Yellow-billed Cuckoo
- Snowy Egret
- Western Burrowing Owl
- California Black Rail
- Yuma Clapper Rail
- Peregrine Falcon
- Bald Eagle
- California Brown Pelican
- American White Pelican
- Clarks Grebe

Mammals

- Spotted Bat
- Great Western Mastiff Bat
- California Leaf-Nosed Bat
- Yuma Myotis
- Pale Townsend's Big-Eared Bat
- Yuma Hispid Cotton Rat
- Sonoran Pronghorn

Flat-Tailed Horned Lizard
Photo courtesy Al Anderson

Reptiles

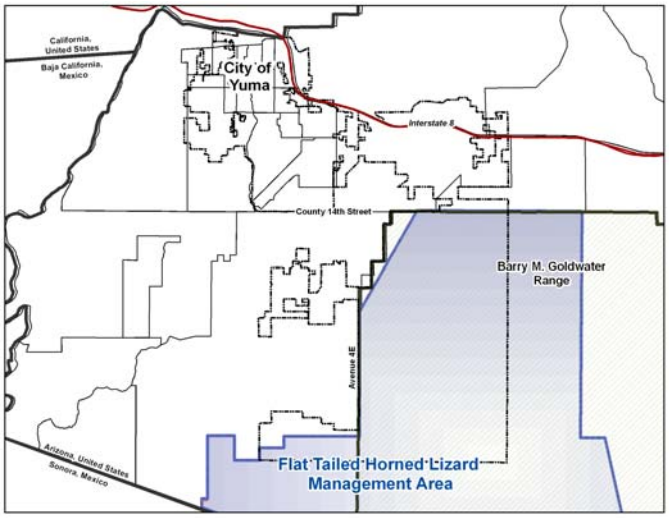
- Flat-Tailed Horned Lizard
- Desert Rosy Boa
- Sonoran Desert Tortoise
- Gila Monster
- Mexican Garter Snake
- Cowels Fringe-toed Lizard
- Yuman Desert Fringe-toed Lizard

Fish

- Razorback Sucker

Plants

- Parish Onion
- Dune Spurge
- Sand Food
- Blue Sand Lily



Of particular note in this list are the Flat-Tailed Horned Lizard, the desert Bighorn Sheep, the Sonoran Pronghorn and birds that inhabit the Colorado River wetlands. The Management Area for the Flat-Tailed Horned Lizard is located primarily to the south and east of the Yuma planning area, although the western boundary crosses into the City limits through the Barry M. Goldwater Range. Mitigation measures must be considered when developing in this area in order to reduce the impact on this habitat. The range of the desert Bighorn Sheep includes the southern Gila Mountains and sites within the Goldwater Range and the range of the Sonoran Pronghorn includes sites within the range. MCAS Yuma has management responsibility for the species that exist within the

Barry M. Goldwater Rang. Impacts on these habitats should be considered as development occurs. The Colorado River provides a major rest point for migratory birds. Over 300 species of birds have been documented in the Yuma area. Maintaining and promoting the biological health of this prime wildlife resource is of utmost importance to the City of Yuma. Currently underway are plans to develop the West and East Wetlands of the Colorado. These projects will promote recreation opportunities on the river, improve water quality and enhance wildlife habitats.

A major element of both wetlands plans is the removal of non-native vegetation. The resilient Saltcedar (also known as Tamarisk), imported for canal bank stabilization, has adapted very well to the lower Colorado. This species has displaced the native willows and cottonwoods. The Saltcedar is not a preferred nesting or roosting site for many bird species, therefore as the range of the Saltcedar has spread, avian diversity has been reduced. Another non-native plant species that has become a concern along the Colorado River is the aquatic fern, Giant Salvinia. This invasive weed can negatively impact agricultural operations and recreation opportunities, threaten fish and wildlife habitat and cause human health concerns.

MANMADE ENVIRONMENT

History of Yuma – The City and County were named for the original inhabitants, the Yumas, now known as the Quechans. The lower Colorado Region consisted of the Quechan, Cocopah, and the Mohave tribes. These tribes were bound by being members of one linguistic group, Yuman. Yuma's written history dates back to 1540 when Hernando de Alarcon, the Spanish explorer, became the first white man to see the site of the present day City of Yuma. From 1540 to 1854, Yuma was under the flags of Spain and Mexico, but in 1854 became a territorial possession of the United States through the Gadsden Purchase. In the 1850's, Yuma became the major river crossing of the California gold seekers. From the 1850s to the turn of the century, steamboats on the Colorado River transported passengers and goods to mines, ranches and military outposts in the area, serving the ports of Yuma, Laguna, Castle Dome, and others. In its early years, Yuma was identified by several names. From 1854 until 1858, Yuma was known as Colorado City, from 1858 until 1873, it was named Arizona City. Yuma received its present name by the Territorial Legislature in 1873. Yuma is rich in the history of the old West; mountain men, Fort Yuma Soldiers, river men, railroaders, and the inmates of the infamous Arizona Territorial Prison, now the Yuma Territorial Prison State Park, made Yuma's history unforgettable.

Common to all the peoples who historically made Yuma home was the attraction of the crossing of the Colorado River. The Yuma Crossing, which narrows to approximately 400 feet at the granite outcroppings, is a natural crossing point. The distance is significant when measured against the historic high water flows of the Colorado and Gila Rivers and the

absence of the levees. At peak, the waters of the Colorado and Gila Rivers covered almost the entire Gila and Yuma Valleys and much of the area into California. Through Yuma was the primary land route to California. The native peoples recognized this, as can be seen from early explorer accounts. A native settlement was regularly identified in the area. The Spanish recognized the importance of the crossing to meet their need for a land route to California Missions and settlements, and the Americans recognized the importance of the crossing, as can be seen from the establishment of Fort Yuma and the Yuma Quartermaster Depot. Unfortunately, due to floods and fires, much of the early history has been lost. Many important buildings and sites from the Spanish and early Native American periods are gone. But, Yuma has a rich historical record from the early and modern American period.

Over the last 60 years the United States military has developed a significant presence in the Yuma area. The Marine Corps Air Station – Yuma, located within the City, and the US Army Yuma Proving Ground, located to the northeast, contribute significantly to the local economy. A major facility for the MCAS to the southeast is the Barry M. Goldwater Range (BMGR). The BMGR has been used continuously since 1941 for training military pilots and aircrew members. The almost 2.7 million-acre facility, second largest military reservation in the US, remains critical to the nation's defense. A portion of the Goldwater Range is within the City limits of the City of Yuma but outside the Focus Area of the General Plan.

Through the 1800's and 1900's Yuma was the major crossing point into California. Travelers from the east arrived by train, wagon, boat and horseless carriage. The construction of the swing bridge by the Southern Pacific railroad provided a train route across the Colorado River and the first means of railroad transportation in Arizona. The construction of the Ocean-to-Ocean Highway Bridge in 1915 provided the first automobile crossing of the mighty river. Another transportation route into Yuma was the river itself. Historic water flows were sufficient to allow paddle wheelers to dock in Yuma and unload goods for local consumption or transport inland.

As a major crossing and shipping point, Yuma became a metropolitan city. Yuma's heyday as a transportation hub was not to last as other crossing points of the Colorado were constructed to the north. As the transportation industry waned in Yuma the agricultural industry exploded. Through the late 1800's and early 1900's the federal government embarked on an effort to increase agricultural capacity in the southwest. This was accomplished in Yuma through the Reclamation Act of 1902 that provided for the construction of a number of canals, drains and ditches that transported Colorado River water inland.

The construction of the Colorado River Levees contained the seasonal flooding of the two rivers. The Yuma Project involved the construction of the Laguna Dam in 1909 and the Yuma Siphon in 1912. These actions opened up the Gila and Yuma Valleys for regular and intense farming operations. The major crops in the Yuma area are field crops, such as

lettuce and melons, and citrus crops, such as lemons. A number of Yuma's crops are exported to other nations.

The operation and maintenance of the canals and drains are under the control of four irrigation districts in a majority of the Planning Area. The first, located in the Yuma Valley, is the Yuma County Water Users' Association. The second, located in the south Gila Valley, is the Yuma Irrigation District. The third, located in the east mesa, is the Yuma Mesa Irrigation and Drainage District. Each district has an allocation of Colorado River Water for delivery to farming and irrigation activities. And the fourth, located in the south mesa, is the Yuma Auxiliary Project Unit B Irrigation District.

The majority of the City of Yuma's water supply is dependent on the canals that supply Colorado River water to the treatment plants. Additional groundwater production wells at the newly completed (2009) Agua Viva Water Treatment Facility (WTF) supply water to the system. The City intends to use groundwater only as a backup emergency supply or to blend with treated surface water during periods of high disinfection byproduct formation. When the wells are in production, groundwater is treated by an iron and manganese treatment system before being discharged to storage reservoirs located at the Agua Viva WTF site.

Water for the Valley Division of the Yuma Project is diverted from the Colorado River into the All-American Canal at the west abutment of Imperial Dam. The All-American Canal flows into California, and water for the Valley Division is diverted into the Yuma Main Canal at a turnout at the Siphon Drop Power Plant. The Yuma Main Canal flows south 3.5 miles to the Colorado River, where water is siphoned underneath the Colorado River to supply the West Main, Main, and East Main Canals of the Valley Division. These canals flow south and irrigate land as far south as the Mexican border. The City diverts the majority of its Colorado River water from the Yuma Main Canal for treatment at the Main St. Water Treatment Plant (WTP) through a pump station and intake located at the Yuma Main Canal immediately downstream of the siphon outlet.

Concurrently, the Gila Project diverts water from the Colorado River into the Gila Gravity Main Canal at the east abutment of the Imperial Dam. Irrigation water is diverted to serve the North and South Gila Valleys and the Wellton-Mohawk area from turnouts along the Gila Gravity Main Canal. The canal extends 20.5 miles in a southerly direction to its termination at the Yuma Mesa Pumping Plant, where water is lifted 52 feet into the "A" Canal. The City of Yuma then receives water from the "A" Canal at the Agua Viva WTF.

Municipal Water Use

The City's surface water rights entitle the City to a total annual consumptive use of 50,000 acre-feet of Colorado River water, which is delivered through the facilities of both the Yuma Project and the Gila Project. The City's Colorado River water allocation was established by the federal government through the authority of the Colorado River

Compact of 1922, Boulder Canyon Project Act of 1928, and the State of Arizona's 1944 contract with the federal government for delivery of Colorado River water. Subsequent contracts with the Bureau of Reclamation, Yuma County Water Users' Association (operator of the Yuma Project), and the Gila Project Contractors specified the means by which Colorado River water is delivered to the City and set conditions for use of the Yuma Project and Gila Project facilities.

Production records from the City's water treatment facilities indicate that the City produced an average of 22.3 millions gallon a day (mgd) of water in 2010. This corresponds to an annual water demand of approximately 25,000 ac-ft/yr. Potable water is used throughout the City for a variety of purposes, including residential, commercial, and industrial uses. The 2010 water demand of 25,000 acre-feet represents 50 percent of the City's Colorado River water allocation.

Urban Heat

With significant summer temperatures and abundant sunshine, shade is a comfort necessity for the desert southwest. Additionally, as demonstrated in the Phoenix Metropolitan Area, with the conversion of farmland and desert to asphalt and concrete, an Urban Heat Island can be a result with a 10 to 20 degree increase in nighttime temperatures. The United States Environmental Protection Agency has identified a number of impacts from heat islands including increases in peak energy demand, air conditioning costs, air pollution and greenhouse gas emissions.

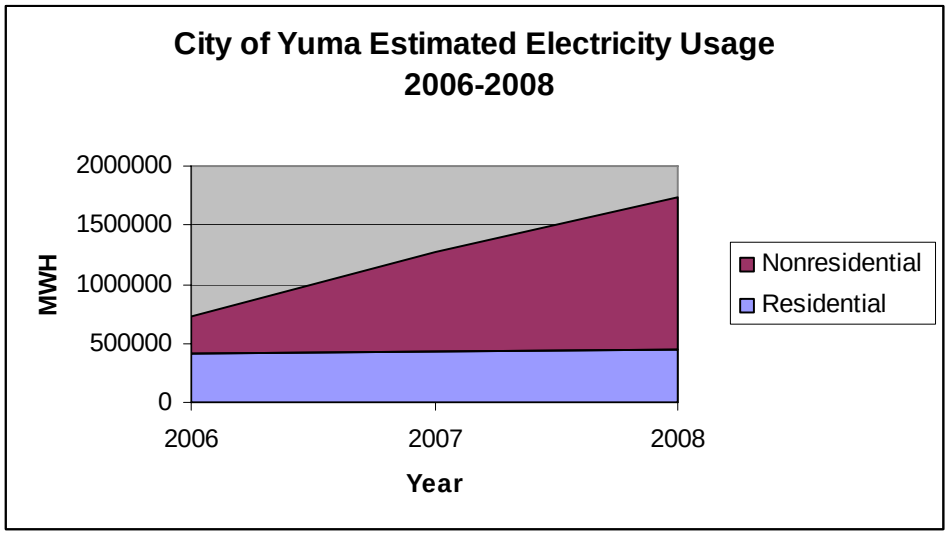
There are a number of ways to reduce urban heat temperatures: shade trees, cool roofs and cool pavements. A simple and effective way is using vegetation for shade. Shade trees are a well established urban tradition. Dense shade can lower the air temperature by almost twenty degrees. To maximize efficiency shade trees should directly shade pedestrian use areas, such as walkways, bus stops, patio areas, seating areas, bank machines, etc. Trees are major capital assets in desert cities and just as streets, sidewalks, water and wastewater lines, public buildings and recreational facilities are part of a community's infrastructure, so are public owned trees. Mature shade trees on the east, west and south side of a house will reduce the air conditioning electric load an estimated 642 kwh per year or 4.6%. Street trees that shade paved surfaces will extend the life of that paved surface. Shade trees also help reduce pollution by reducing energy demands with properly placed trees helping home owners lower their day time air-conditioning bills. Cool roofs are based on using reflective materials to reduce heat gain in structures. Cool pavements can be not only reflective surfaces to reduce heat containment but porous materials that allow stormwater runoff to percolate through the street rather than being heated prior to disposal in the Colorado River. The City of Yuma is committed to community forestry as demonstrated by it's designation as a Tree City USA for the past three years by the Arbor Day Foundation.

Energy Consumption

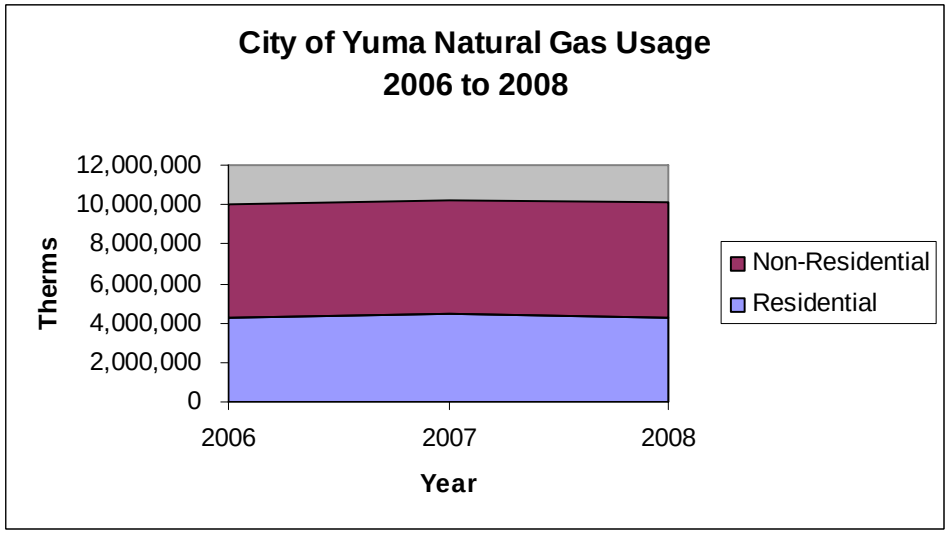
To provide a baseline of current electricity and natural gas use in the City of Yuma, data on electricity and natural gas use from Arizona Public

Service and Southwest Gas Company for the previous three years was analyzed.

Electricity - On a City wide basis for the years of 2006 to 2008 the growth for the Residential Sector averaged a little more than 3.7 percent per year. The major growth in electrical usage came from the Non-Residential Sector. This sector, commercial, industrial and municipal use of electricity grew at an estimated average rate of 4.75 percent per year from 2006 to 2008.
Source: Arizona Public Service

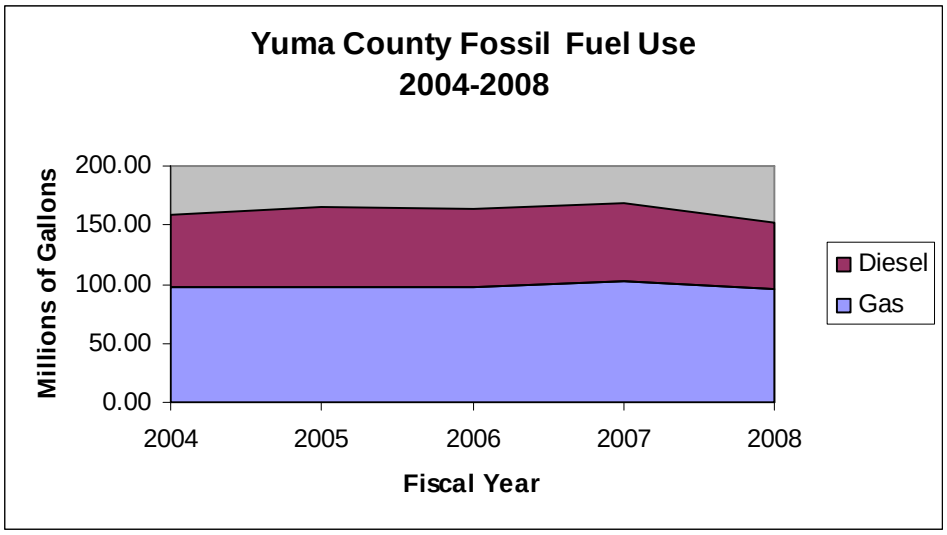


Natural Gas - Estimated Residential natural gas usage within the City of Yuma for the years 2006 – 2008 remained relatively flat with a .8 percent growth over the three years analyzed. Non-Residential usage of natural gas showed the same characteristics. Non-Residential usage declined from 2006 to 2008 by one percentage point.
Source: Southwest Gas Company



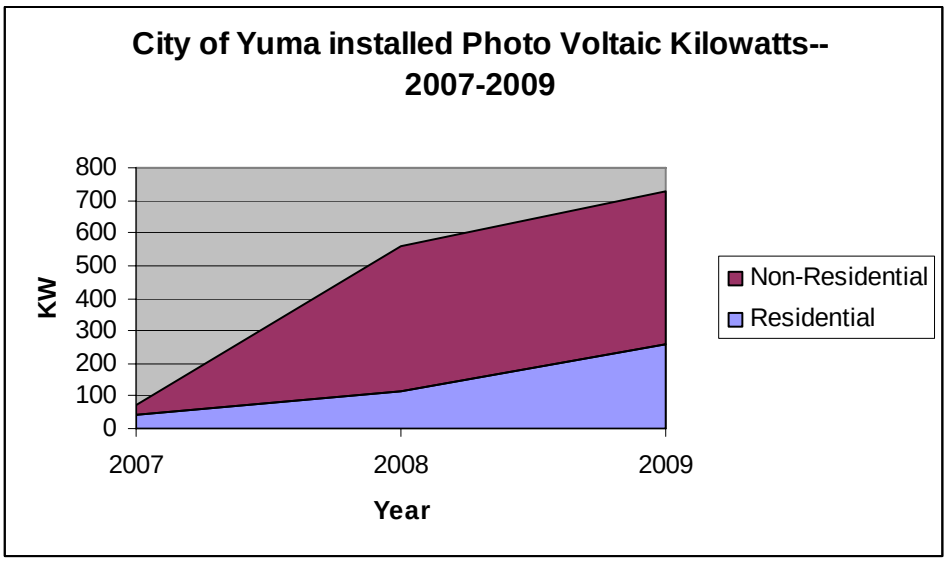
Fossil fuel usage - Yuma County diesel oil and gasoline usage declined minutely from 2004 through 2008, after a gradual increase from 2004 to 2007, the time period from 2007 to 2008 saw a 15 percent decrease. A similar trend is found in Gasoline usage with a 7 percent decline from 2007 to 2008.

Source: State of Arizona Motor Vehicle Division.



Solar Resources - Cities across Arizona are seeking ways to provide greater access to solar energy. Sharp increases in conventionally produced energy prices have caused widespread concern not only over the monthly utility bill but also the potential impacts on local jobs and community growth. With 4000 plus hours of daylight per year, the electric energy potential for the Yuma is significant. Utilization of this resource depends upon many factors: installation cost, availably of incentives or rebates and estimated energy savings.

Source: City of Yuma, Building Division and Arizona Pubic Service.



A total of 57 photo voltaic systems have been installed since 2007. These systems have a connected electric load of 730 KW. The chart on the preceding page shows the photo voltaic connected load by installation year. The number of residential photo voltaic systems installed has doubled each year, from 6 in 2007 to 31 installed in 2009. Non-Residential systems, although small in number, are much larger systems and are 64 percent of total connected electric load.

EVALUATION AND ANALYSIS

This section examines the status of and potential effect on important quality of life indicators including soils, air, water, energy, noise, wildlife and archeological resources as a result of implementation of the General Plan.

SOILS

As noted previously, the Yuma Planning Area is made up of two primary soil classifications: the entisols of the Yuma and Gila Valleys and the aridisols of the Mesa.

Valleys - A majority of the land within the Yuma and Gila Valleys is considered Prime Agricultural land by the United States Department of Agriculture (USDA). Following centuries of river flooding, the soils are rich in materials to promote plant life. As development has occurred in these areas the available prime agricultural land has been reduced. The City of Yuma is committed to protecting this natural resource. In the Yuma Valley, land use and facility planning has focused efforts east of Avenue D and north of 40th Street to limit encroachment. In the Gila Valley, City efforts have focused development to those areas planned for growth. Within the last 10 years, the City has approved a change of approximately 320 acres to urban development.

The City can further enhance conservation efforts through sustainable design. Sustainability balances the attributes of social, economic and environmental importance in a holistic manner. This strategy of sustainability starts at the large-scale land planning level and includes components such as mixed-use development, density and intensity considerations, a jobs to housing balance, microclimatic considerations of the street grid orientation relative to sun, wind and shade and transit oriented development. The multi-purpose strategy for open space that includes water recharge will complement this framework. A sustainability effort could also include detailed components such as the consideration of reducing street pavement widths, alternative pavement materials that provide more porous surfaces, and alternate parking standards. These aspects of design could provide an alternative to the typical suburban model and celebrate opportunities to promote sustainability. Additionally, the social and physical attributes of the sustainable place making efforts could continue to add to the identity and longevity of the community over time.

An example of a Mixed Use development that is to be developed in the Gila Valley is the Laurel project. The proposed project is to develop under the Smart Growth Overlay district which would allow for traditional neighborhood design. The project will also include a development design that includes narrower streets to reduce traffic speeds and promote walk-able neighborhoods.

Mesa – A significant portion of the Mesa lands within the City of Yuma Planning Area have been converted from open desert to agricultural activities. These soils have been identified as Farmland of Unique Importance by the USDA. The bulk of the farming activity on these soils is in citrus. Since 1996 this area has seen a significant amount of growth in both urban development (industrial and single family homes) and rural development (two to five acre single family home lots).

The largest proposal is the Estancia Master Planned Community. This development totals 3,741.5 acres and is located in a recently annexed area of the City south of County 15th Street. The developer has proposed a mixed urban development with approximately 20,466 residential lots. It is the applicant's intent to develop a Master Planned Community that incorporates a mix of land uses and utilizes the Smart Growth Overlay. This area is identified as a future Growth Area in the Growth Area Element – Chapter 11 of the General Plan.

The dominant development pattern on the mesa has been in isolated residential clusters. Access to educational, commercial and jobs is typically by personal automobile. Pedestrian access is limited to a few developments. Fortunately newer developments, like Cielo Verde, are seeing the advantages to having close proximity to commercial development.

Conservation means site planning that minimizes disturbance of the Sonoran Desert vegetation and wildlife. When an area must be disturbed, there should be a concerted effort to save the native plants and/or provide replacement specimens that re-create and enhance the natural character of the site. A program has been implemented to protect Arizona's native plant species. The State adopted the Arizona Native Plant Act, 1991, to promote awareness and conservation of native plants, protect native plants from theft, over-depletion and vandalism and encourage the salvage of native plants.

The Act applies to both public and private property and includes notification requirements in instances where native plants are to be destroyed as a result of urban development as well as legal remedies as a result of improper salvage and transfer of native plants.

A few ways local governments have been trying to resolve the impacts of the loss of farm land on their respective communities are outlined below:

- Conservation easements are deed restrictions landowners volunteer to place on their property to protect resources such as agricultural land, ground and surface water, historic sites,

productive soils, and/or wildlife habitat. The easements enable governments and qualified nonprofit organizations to protect land with important public purpose without compelling landowners to sell their property. They are flexible agreements that can be tailored to achieve specific purposes.

- Arizona allows the Purchase of Agricultural Conservation Easements (PACE). PACE programs are based on the concept that property owners have a bundle of rights that can be exercised jointly or individually. These include the right to use, lease, sell, and bequeath property, borrow money against it, and even protect it from development. Some or all of these rights can be transferred or sold. In exchange, the public or private agency prohibits future land use or activities that would interfere with agricultural uses. Typically, PACE programs pay a sum equivalent to the difference between full market and restricted value to protect farm, ranch, and occasionally forest lands. The easement value is determined by a certified appraisal.
- Transfer of Development Rights (TDR) programs are established by local zoning ordinances to protect farm and other open lands by shifting development from agricultural areas to other areas that can support increased development. The program allows a local government to designate "receiving districts," where higher density development can occur, in exchange for permanent agricultural conservation easements on land designated as "sending districts." Most TDR transactions are between private landowners and developers. Local governments generally do not have to raise taxes or borrow funds to implement TDR programs. For TDR to work, a market must exist for both the development rights (either in the private sector or via a municipal development rights bank) and the higher density development that will result. The complexities involved in administering TDR have kept many localities from utilizing this farmland protection tool.
- Permaculture—a compound of the words "permanent" and "agriculture"—is a design approach that integrates human communities and agricultural systems by mimicking complex ecological relationships. Permaculture focuses on the interrelation and placement of plants, animals, buildings, and infrastructure in the landscape, emphasizing food production while working to conserve energy and resources. It relies on core ecological principles and pairs traditional farming with modern technology, making it broadly applicable to urban design on an individual, neighborhood, or citywide basis. For example, homeowners can build urban soils by constructing a backyard worm-composting system or create habitat by turning an entire yard into a mini-farm, complete with fruit trees, vegetables, and plants that attract beneficial insects. Neighbors or urban planners can transform abandoned lots into community gardens, urban orchards, or cooperatives that raise chickens or honeybees.

Sonoran Pronghorn
Photo Courtesy
National Wildlife Federation

Another important resource that should be maintained is the desert washes of the Gila Mountains. Rain is infrequent in the Sonoran Desert

but when thunderstorms do occur, the resulting waters cascade down the mountain washes headed toward the Gila River. Limiting development in and around the washes will reduce potential flooding to developments and limiting channelization of the system will reduce floodwater speeds. The Gila Mountains are a major natural resource of the community. They provide a view shed, protect the valleys and mesa from southeastern storms and provide habitat for the Sonoran Desert Pronghorn as well as a number of other animals. Encroachment into this mountain range should be carefully considered and limited.

AIR QUALITY

Clear skies and citrus scented breezes characterize Yuma, with clean air as one of the primary reasons many people move to the desert southwest. But with growth and the changing landscape, the ability to maintain clean air standards has become more difficult. The Environmental Protection Agency (EPA) and the Arizona Department of Environmental Quality (ADEQ) monitor six pollutants to determine the level of air quality in areas of the state. Those six factors are Carbon Monoxide, Nitrogen Oxide, Particulate Matter, Ozone, Sulfur Dioxide and Lead. The detrimental health effects from these pollutants range from soiling of fabrics to damage to the respiratory system to renal and nervous system damage.

The Yuma air currently meets the standards for the pollutants identified. Previously, Yuma was designated as non-attainment for Particulate Matter, known as PM-10, as a result of a 1991 air study by the EPA and ADEQ, which noted a violation of the 24-hour national ambient air standard in four consecutive years – 1988 to 1991. Since 1992, monitoring has shown that Yuma has met PM-10 standards and as such the City and ADEQ have been pursuing designation as an Attainment Area. Public agencies have implemented and continue measures to maintain PM-10 standards. Efforts have included paving of roadways and stabilization of bare dirt on vacant lots. The primary sources of particulate matter in Yuma are agricultural tilling and unpaved roads with another factor making up the dust particulates - dust from the open desert carried to urban areas as a result of wind and storm activity.

Future urban development can impact air quality and mitigation measures should be implemented to prevent that from occurring. Activities that could potentially affect air quality include transportation, industrial activity and agricultural operations. Detrimental effects from transportation include dust from unpaved roads, carbon monoxide as a result of fuel burning and dust from dirt parking lots. Detrimental effects from industrial and urban activity include smoke from lot clearing, dust from construction sites and potential exhaust from industrial operations. Potential detrimental effects from agriculture include dust from tilling, activities from pesticide and herbicide application and smoke from field clearing activities.

Mitigating the effects of these activities can occur through a number of existing and possible practices, policies and programs. Some are

obvious and relatively easy to achieve, such as paving roadway surfaces. Others are more intangible and will require a combination of actions for successful achievement. One program currently in effect, which touches on urban development and agricultural operations, is the City of Yuma Burn Permitting Program. The ADEQ and the City of Yuma have an intergovernmental agreement, which allows for both regional and local review and approval of requests to burn vegetation. ADEQ monitors weather conditions to prohibit burning on days and at times when smoke is not likely to disperse, thereby causing an air quality hazard to the community. The City of Yuma prohibits burning in primarily residential areas and on days of ground level high wind speeds, which might promote spreading of the fire.

Methods to reduce auto emissions can take many forms including paving roadway surfaces and parking lots and using landscaping to retain dirt and dust on lots. Appropriate land use planning that allows for compact and mixed-use developments can also reduce driving miles. Examples of this include: locating truck dependent industries close to the Interstate; locating schools within close proximity to residential development; and locating neighborhood commercial activities close to customer bases. Transportation planning also plays a part in reducing auto emissions. Examples include supporting transit opportunities in the Yuma area and developing multi-modal transportation opportunities such as linear parks and bike paths.

Industrial and urban development mitigation measures can range from containing dust and dirt on construction sites with the use of gravel, temporary installation of dust inhibitors and screen fences to reduce dust generation on high wind days, and promoting clean industries.
The agricultural industry currently implements all practical attempts to reduce dust generated through agricultural operations. The City of Yuma is committed to protecting long term agriculture in the Yuma area.

WATER QUALITY AND CONSERVATION

As growth continues in Yuma, water becomes increasingly important. Both urban development and agricultural operations are dependent on sources of clean water. The Yuma area is fortunate to have a sufficient allocation of Colorado River water to support both urban and agricultural uses. But maintaining the quality and quantity of that water is crucial to continued prosperity. Much of the discussion on water resources can be found in the Public Services Element – Chapter 8 of the General Plan. This chapter will address impacts to water quality as a result of development in the Yuma urban area.

There are two sources of water in the Yuma area: surface water from the Colorado River and groundwater from well systems. Water for drinking purposes is diverted from the Colorado at the Imperial Dam and then transported via canal systems for treatment. Even though drinking water is obtained further upstream, the importance of the Colorado River in meeting the recreation needs of the Yuma community and supporting wildlife cannot be ignored. Surface water quality is measured by the

presence of pollutants, turbidity (mud to water content), and ability to support the biological health of the local wildlife and plant habitats.

Groundwater quality is measured by the presence of nitrates, salt and other pollutants. Groundwater is particularly susceptible to leaks from failing septic systems and underground storage tanks and leaching of salts from agricultural activities. In the Yuma and Gila Valleys, groundwater typically ranges in depth from 6 to 10 feet. Therefore, the failing of a septic system or underground storage tank can have an immediate effect. This can result in not only groundwater contamination but also the development of surface cesspools because the ground is too saturated to absorb any additional matter. In times of great need the Arizona Department of Environmental Quality has stepped in and required localized areas to transition to municipal wastewater systems or in the cases of underground storage tank leaks, required soil remediation.

The current state of the Colorado is a river that is safe for recreation and supports a myriad of plants and wildlife. But a number of activities could reduce the viability of the river system. Increased storm water runoff could increase turbidity thereby reducing the oxygen content. This can have a detrimental effect on fish. Increased agricultural runoff could increase the nitrate levels and pesticide content. This can reduce the availability of insect life to support fish and birds. Illicit dumping of toxic chemicals and construction wastes can also have a detrimental effect on the river. A number of projects are underway that are intended to enhance the biological health of the river while still maintaining its ability to transport clean water to Mexico and contain storm water flows.
As mentioned earlier, the Yuma section of the Lower Colorado River has been designated a National Heritage Area. Inclusive of plans within the Heritage Area are efforts to enhance the recreation abilities on the Colorado and the restoration of native vegetation, fish and wildlife habitat. The Yuma East and West Wetlands projects are active initiatives to recover approximately 1,500 acres along the Colorado River.

Water Conservation - Water resources should be high on the list for Conservation. The frequencies of droughts and concern about water quality issues have focused community interest on Low Impact Development practices that provided a holistic approach to site design and sustainable neighborhood developments. Using open space to control storm water runoff distributes storm water across a large area in order to replenish ground water supplies rather than sending it into a system of storm drain pipes and channelized network that in some cases end up in the east main canal. Conservation of land and water resources can be achieved through the utilization of more efficient infrastructure patterns and less land dedicated to street right of ways leaving more land for open space.

Low Impact Development (LID), also known as conservation development or cluster development, is a site design technique that concentrates dwelling units in a compact area in one portion of the development site in exchange for providing open space and natural areas elsewhere on the

site. The minimum lot sizes, setbacks and frontage distances for the residential zone are relaxed in order to create the open space at the site. Open space designs have many benefits in comparison to the conventional subdivisions that they replace: they can reduce impervious cover, storm water pollutants, construction costs, grading, and the loss of natural areas. This approach to land development uses various land planning and design practices and technologies to simultaneously conserve and protect natural resource systems and reduce infrastructure costs. LID still allows land to be developed, but in a cost-effective manner that helps mitigate potential environmental impacts. Some of the benefits are:

- Preserve Open Space and Minimize Land Disturbances
- Protect Sensitive Natural Features and Natural Processes
- Identify and Link On and Off-Site "Green Infrastructure"
- Incorporate Natural Features into Site Designs
- Customize Site Design According to the Site Analysis

Planning for LID communities relies on the performance of a thorough site analysis. Site planners can use the information gathered during the site analysis to create the best balance between development and the conservation of natural resources. By identifying buildable and non-buildable areas of a site, planners can direct development into areas that will experience the least impacts on air, soil, and water.

Reclaimed Water - Reclaimed water is the product of an advanced treatment process which cleans wastewater. This treatment process produces water ideal for plant irrigation and other commercial/industrial uses. The nitrogen and phosphorous in the water provide excellent fertilizers for ornamental plants and turf grass. Duel distribution systems are constructed to serve customers with the reclaimed water and keep it separate from the potable water system.

Reclaimed water is used throughout Arizona for irrigation of parks, golf courses and school property. Municipal effluent is a renewable water supply that grows along with the service area's population. This source water is locally-generated and is treated to meet established water quality standards. This treated supply is further enhanced and is then distributed as reclaimed water. Reclaimed water has been used for turf irrigation and certain industrial applications. The use of reclaimed water offsets a portion of the community's demand that would otherwise be met by additional groundwater or by Colorado River water uses.

The City of Yuma Desert Dunes Water Reclamation Facility currently discharges 1 million gallons per day into the ground water table. This water could be used to irrigate neighboring storm water retention basins or neighborhood lawns of new developments.

Grey Water Systems - Grey water is wastewater that originates from the residential clothes washer, bathtubs, showers and sinks but not the toilets. A separate drainage system is designed within the residence to direct the water from these fixtures into a collection basin on the lot.

Typically, wastewater from toilets, amount to only 25 to 28% of total residential water used. The gray water is then used for irrigation of landscaping, gardening, and composting. This water relieves the potable water system of irrigation duties. Homes retrofitted with a grey water system will produce significant water savings.

Energy Conservation

Energy is an important subject for Yumans due to regional increases in energy prices and notable energy shortages in neighboring states. Arizona Public Service and Southwest Gas Company have planned for increased electricity and natural gas demand but none should be wasted. Energy conservation is not only cost effective as it reduces home energy costs and increases long term reserves but it is better for the environment as it reduces the production of harmful pollutants.

Energy conservation should be addressed at a regional as well as a building specific level. On a state and nation-wide scale, state and federal agencies can provide loans for energy saving programs to businesses and existing residences. On a regional scale, land use and transportation planning can be used to promote compact design that reduces driving miles and promotes bicycle and pedestrian transportation. Also, public transit opportunities could reduce individual energy consumption by reducing the number of vehicles on the road. On a community level, local municipalities can increase energy conservation by using hybrid automobiles and promoting energy efficient building construction. On a construction site scale, the orientation of buildings and the use of landscaping can reduce direct sunlight exposure and cooling costs. On a building specific scale, increased insulation and energy standards can reduce home energy bills.

Yuma's high summer temperatures make energy conservation for home cooling costs of major importance. The abundant winter sunshine also provides residents with a prime opportunity to harness the sun's power for winter heating. Currently, there are no energy conservation requirements for new home construction within the City of Yuma Building Code though it has been local contractor practice to provide sufficient wall and ceiling insulation as well as double-pane windows when constructing new homes. Building orientation, shade landscaping and appliance selection are typically added costs or not considered in new developments.

The State of Arizona sponsors a program that identifies ENERGY STAR building partners. The homebuilders who participate in the program can promote their homes as ENERGY STAR compliant. The ENERGY STAR program certifies through a third party that the homes are 30% more efficient than if the national 1995 Model Energy Code were followed during home construction. This method of energy conservation includes a prescribed list of energy saving methods that range from building orientation to the selection of kitchen appliances. Homeowners can significantly reduce their home energy costs with the construction of an ENERGY STAR home.

Grey Water Retrofit

A home in Casa Del Agua, Tucson, Arizona, began as an existing residence in 1983 and was retrofitted to acquire operational data on residential water use. Modifications included altering landscaping and the rooftop to collect rainwater, separating black water and greywater lines, installing meters, low-water-use appliances and fixtures, and adding underground storage tanks for both rainwater and greywater. This house has achieved a 24% reduction in total water use and a 47% reduction in municipal water use as compared to a typical Tucson residence. This project also helped to establish a method for measuring residential water efficiency known as the W-Index. It was shown that while a typical Tucson residence used approximately 148 gpcd, a fully conserving home could use as little as 35 gpcd. It is estimated that if 30% of the population implemented a water reuse system in their homes, it would produce a 43% reduction in groundwater overdraft in the Tucson area by the year 2025.

Source: Richard Brittain, Casa del Agua and Desert House: Two Residential Demonstration-Research Projects on Water and Energy Efficiency. May 31, 2001. The Center for the Study of the Built Environment. An Essay on a presentation made by Richard Brittain to Diwan al-Mimar.

Casa Del Agua, Tucson, AZ

The State of Arizona - Department of Energy has developed a State Energy Code. The State Energy code is based on the Federal 1995 Model Energy Code and promotes voluntary compliance with code provisions. It is mandatory for all new state buildings.

Another consideration in building construction is the use of passive solar energy for lighting and heating needs. The Yuma area is fortunate to have abundant sunshine nearly year round. The use of skylights for lighting of interior rooms would reduce energy costs. Additionally, the use of solar panels for home and water heating can significantly reduce utility purchased energy.

The City of Yuma's energy future should be based on energy-related principles for policy formation. The following list has been selected as a means of guiding Yuma toward a prudent and sustainable energy future:

1) Enhance the general quality of life through energy strategies that will benefit the community.
2) Promote ecologically friendly propositions that create a healthy environment.
3) Promote good stewardship through energy conservation and efficiency practices.
4) Support opportunities for local economic vitality.
5) Emphasize sustainable/renewable power sources.
6) Favor locally distributed power opportunities.
7) Support options that will reduce market volatility, stabilize rates, and increase reliability.

Based on these principles listed above, action items have been listed in the Action Plan, classified into six functional groupings: (1) advocacy and education; (2) reducing our energy demand; (3) supporting and developing ordinances, policies, programs, and legislation; (4) developing financial possibilities; (5) creating alliances; and (6) improving the city's energy supply.

NOISE POLLUTION

Noise pollution is a byproduct of the urban environment. Extremes in noise can interfere with sleep, work and recreation as well as cause physical and emotional damage. Noise is produced from a variety of sources but most common in the Yuma area is noise related to transportation. Air flights, highway traffic and commercial activities have all played significant roles in recent concerns over noise pollution.

The Yuma International Airport and the Marine Corps Air Station – Yuma provide commercial airline traffic and military flight training opportunities in the region. A Noise Study by the City of Yuma and Yuma County was completed and the resulting noise contours were adopted into the City of Yuma Zoning Ordinance in 1979 as the Airport District. Included within the Airport District is a land use suitability matrix which identifies appropriate land uses in proximity to the airport and building noise attenuation requirements that will minimize conflicts between flight operations and urban development. An example of how the matrix is applied would be the inclusion of 25-decibel noise attenuation for a new

commercial building located within the 70 to 75 noise contour. Additionally, in 1996 the City of Yuma and Yuma County developed and adopted the City/County Joint Land Use Plan that directly addressed providing appropriate land uses within proximity to the Marine Corps Air Station. Statewide concerns over military base viability in light of continued urban growth prompted the legislature to adopt Senate Bill 1525 in March, 2001. This Senate Bill amends state law and requires the application of a stringent land use suitability matrix in communities near military airports. The intent is that by reducing residential development in proximity to military operations, the long-term viability of the military airport can be maintained.

Responding to transportation noise requires a broad based effort. The federal government can mandate higher noise muffling standards on new vehicles and can promote sound attenuation on existing highways. State transportation agencies can attenuate highway noise by the construction of sound walls and implementing other noise mitigation programs. And through land use planning, local agencies can mitigate future transportation noise conflicts by using appropriate commercial and office activities to buffer and separate residential areas from highways and rail corridors. Transportation noise in existing developments should be reviewed and mitigated specific to the needs of that development. Implementation of traffic calming devices could be implemented where high speeds and the number of vehicles are causing road noise in residential areas.

Other generators of noise that can create a direct conflict with neighboring residential developments are commercial and industrial activities. Land use planning can help mitigate this conflict by providing buffering uses such as offices between intense urban activities and lower density residential. Site planning can also mitigate potential noise conflicts. For example, where residential and commercial land uses are adjacent, noise intense activities, such as loading docks and speaker systems, could be oriented away from the residences. In order to minimize conflicts, the City of Yuma has adopted Noise Limitation standards within the Zoning Ordinance for Limited and General Commercial projects that are larger then 35,000 square feet and are within 300 feet of a residential district. The requirements include limited high noise activities and noise mitigation.

WILDLIFE

Located in the Sonoran Desert and including portions of the Colorado and Gila Rivers, the Yuma area is host to a variety of plants and animals. Urbanization of the area has affected the habitats and viability of many local species. Continued urban development should take into account the effect on the natural environment and implement mitigating measures wherever possible.

Potential impacts as a result of urban development can range from increased storm water runoff to reduced natural habitats. If mitigating measures in response to urban development are not taken, then there is

the possibility of tipping the balance of nature. When this occurs, entire species can be lost or drastically reduced. This can have a significant impact on economic development as well as quality of life. For example, if the quality of the Colorado River is not maintained, then insect populations could reduce. If there is a reduction in insects, then the fish and bird populations may decline. The attraction of viewing wild bird populations as well as the recreation opportunity of the annual dove-hunting season could be impacted if bird populations are significantly reduced. The loss of these economic attractions would severely reduce revenues from the tourism industry. Therefore, it is in the best interests of a viable economy and the community's quality of life to consider the impacts of urban development and develop methods to maintain the rivers and other natural areas.

The City of Yuma and other public agencies as well as private citizens are taking the lead in this effort by working to revitalize the Lower Colorado River through the revegetation of the East and West Wetlands. By recognizing this important resource and restoring the nationally recognized heritage area, the Yuma community is working to retain the river for future generations.

ARCHEOLOGY

As mentioned previously, the Yuma community has a long history. Efforts should be made to identify and protect the historic sites in the area. These sites include the nationally recognized buildings, sites and districts, remote pre-historic Indian sites and the community's history.

In addition to the historic districts and sites within Yuma, the trails followed by early explorers are important resources that should be identified and preserved. Juan Bautista De Anza followed the Gila River through Yuma on his search for a land route to California. The Mormon Battalion camped and traveled through the Yuma area on their trek to support the American military garrison in San Diego during the Mexican-American War. The Butterfield Stage route through Yuma provided one of the earliest commercial land routes to the west coast. These and other trails are discussed in more detail in the Parks, Recreation and Open Space Element (Chapter 4) but they are mentioned here to recognize these historic and cultural resources in the community.

The Yuma area has been home to native peoples since long before the Spanish started exploring the west. The history of the Quechan, Cocopah and Mojave tribes are intertwined with the Colorado River. The Gila Mountains contain early records of pre-historic native peoples. Under the protection of the Bureau of Land Management, the location of these sites and petroglyphs are known to only a few in order to protect them from intentional and unintentional encroachment and damage.

Potential impacts to historic and archeological resources are from neglect, vandalism and redevelopment. In order to protect these places of history it is important that public policy recognize their value to future generations.

GOALS, OBJECTIVES AND POLICIES

Goal 1.0: Utilize and sustain our natural spaces and resources, including waterways, parks and historic sites, for recreation and cultural experiences that improve the Yuma community's quality of life.

Objective 1.1: Improve the air quality for the Yuma area.

Policy 1.1.1: The City shall promote sustainable development that minimizes impacts on natural spaces and resources.

Policy 1.1.2: The City shall continue City practices of street cleaning, paving and maintenance and development requirements for paving and landscaping.

Policy 1.1.3: The City shall support efforts to reduce dust emissions from unpaved right-of-way including developing standards for parkway maintenance through a Community Design Policy and requiring dust inhibitor application on unpaved city alleyways

Policy 1.1.4: The City shall develop an Urban Forestry Master Plan to guide overall management and preservation of tree canopy throughout the city. This plan will include a Street Tree Master Plan to guide planting trees during development and redevelopment and to designate appropriate trees for plantings along major roads and corridors.

Policy 1.1.5: The City shall expand opportunities for citizens to live in proximity to work.

Policy1.1.6: The City shall reduce emissions of the City fleet vehicles by expanding the use of Low Emission vehicles.

Policy1.1.7: The City shall support alternatives modes of transportation, bicycle, pedestrian and transit that reduces emissions.

Objective 1.2: Improve the surface water quality for the Yuma area.

Policy 1.2.1: The City shall partner with the Yuma County Flood Control District to meet and exceed the Stormwater Runoff requirements of the Federal Clean Water Act Phase II Rule.

Policy1.2.2: The City shall continue developing the East and West Wetlands in order to improve the water quality of the Colorado River.

Policy 1.2.3: The City shall analyze the existing FEMA designated flood hazard areas to find ways to eliminate the flood hazard potential of each area with emphasis on the East Main Canal flood hazard area.

Objective 1.3: Reduce water consumption.

Policy 1.3.1: The City shall develop a non-potable irrigation water infrastructure system that reduces the demand for potable water and develop management policies to guide efficient use of reclaimed water.

Policy 1.3.2: The City shall reduce the rate of growth in residential water consumption per household through education and incentive programs.

Policy 1.3.3: The City shall review future development impacts of water use and require development designs that foster water conservation.

Policy 1.3.4: The City shall continue to promote low water use desert landscaping in the urban area.

Objective 1.4: Protect and enhance the archeological resources of the Yuma community.

Policy 1.4.1: The City shall promote the adaptive reuse of historic buildings and sites.

Goal 2.0: Increase in local energy independence through conservation, reduced consumption, and the development of efficient and sustainable local energy production.

Objective 2.1: Promote energy efficient development and energy efficient structural design in the built environment.

Policy 2.1.1: The City shall use landscaping and stabilizing paving material other than black asphalt to reduce the "heat island" effect and reduce the need for cooling fuel use.

Policy 2.1.2: The City shall require an increase in cool paving materials, especially in parking lots.

Policy 2.1.3: The City shall reduce the urban heat island effect by promoting the use of cool roofing materials such as reflective tiles, low heat retention tiles, membranes and coatings, or vegetated eco-roofs to reduce heat build-up.

Policy 2.1.4: The City shall require the commercial and residential sectors to consider energy conservation in design and construction.

Policy 2.1.5: The City shall promote the use of solar energy opportunities in building and site design.

Policy 2.1.6: The City shall increase the use of natural and man-made shading for parking lots, streets, and pedestrian areas.

Policy 2.1.7: The City shall require energy conservation measures in the development, maintenance and operation of all City facilities and equipment.

Policy 2.1.8: The City shall develop an Energy Facility Plan that assesses the city's energy needs, and identifies the renewable energy resource potential that exists in the City including solar, wind, water, biomass and geothermal.

Policy 2.1.9: The City shall employ self generation of energy using renewable technologies.

Policy 2.1.10: The City shall promote landfill methane and biomass gasification as an energy source.

Policy 2.1.11: The City shall employ life cycle cost analysis for assessing cost and benefits for a particular product of technology.

Objective 2.2: Promote Energy Conservation.

Policy 2.2.1: The City shall minimize energy use through innovative site design and building orientation that addresses factors such as sun-shade patterns, prevailing winds and

landscapes.

Policy 2.2.2: The City shall pursue the development of "green" sector industries which benefit Yuma's economy and environment.

Policy 2.2.3: The City shall develop and adopt an operational fuel efficiency policy to reduce fossil fuel consumption by City departments, which includes:

- *No idling of all fossil fueled equipment owned or leased by the City, and operated by a City Employee,*
- *Promotion of fuel saving speeds, such as 55 mph as a top speed for the affected fleet,*
- *Similar idling and speed requirement in all City contracts,*
- *Support community outreach programs to achieve similar idling and speed goals in the community.*

Goal 3.0: Create and maintain a sustainable community where our natural resources are protected and conserved for future generations.

Objective 3.1*:* Promote water conservation in order to extend the use of this vital natural resource.

Policy 3.1.1: The City shall implement the Water Conservation Measures identified in the 2001 City of Yuma Water Conservation Plan.

Policy 3.1.2: The City shall institute a water conservation program for area businesses and residents.

Policy 3.1.3: The City shall continue the maintenance and auditing of the City water system in order to eliminate water losses within the water system.

Objective 3.2*:* Promote the protection of the diverse wildlife in the Yuma area and the protection of natural habitats.

Policy 3.2.1: The City shall support and encourage the development of the Yuma East Wetlands restoration area.

Policy 3.2.2: The City shall participate with state and federal agencies in the protection of endangered and listed species, including the Yuma Clapper Rail, the Flat-Tailed Horned Lizard and the Sonoran Desert Pronghorn.

Policy 3.2.3: The City shall partner with county, state and federal agencies to preserve and enhance dove hunting opportunities in the area.

Policy 3.2.4: The City shall support the protection and conservation of important natural resources including the Gila and Laguna Mountains and the Fortuna Wash.

Goal 4.0: Maintain a sustainable community where the conflicts between residential and commercial/industrial development are considered and minimized.

Objective 4.1*:* Promote ways to minimize impacts from high noise and light intensive activities on neighboring residential development.

Policy 4.1.1: The City shall consider noise impacts from roadways, rail corridors and industry on neighboring residential development.

Policy 4.1.2: The City shall continue the use of the Airport Overlay Zoning District to minimize potential conflicts between residential development and airport operations.

Policy 4.1.3: The City shall continue regulation of outdoor lighting to minimize conflicts with the reasonable use and enjoyment of property and with astronomical observations.

ACTION PLAN

Phase	Project	Responsible Department/ Agency	Funding Sources
1-5 Years	Develop and Implement an Energy Facility Plan.	Community Development	General
	Continue to develop the West Wetlands Restoration Area.	Riverfront/ Engineering	Grants
	Develop a water conservation program.	Public Works	WUF/ General/ Grants
	Continue to develop the East Wetlands Restoration Area.	Riverfront/ Other Public Agencies	Grants
	Include energy and water conservation design features in major renovation and new development projects.	Engineering/ Community Development	General
	Update and revise the Landscaping Ordinance to encourage desert landscaping.	Community Development	General
	Complete a noise contour study for major roadway and rail corridors.	Community Development	General
	On an regular basis test all City facilities for carpooling, bicycling, walking, and public transportation access.	Community Development	General
6+ Years	Develop Community Design Standards for all Streets and Alley Ways.	Community Development	General
	Develop a Fugitive Dust and Smoke Control Plan.	Community Development	General
	The City shall replace 10% of its affected fleet in 10 years with electric, hybrid, and/or fuel-cell vehicles.	Streets	General
	The City shall reduce 30% of its vehicle fleet petroleum use by 2020.	Streets	General
	Develop programs and incentives for development projects that exceed State energy and water efficiency standards.	Community Development	General
	Develop design guidelines for urban development that help mitigate noise impacts.	Community Development	General
	Support and facilitate the implementation of a Green Building Ordinance(s).	Community Development	General
	Develop design guidelines for new development that consider minimizing heat gain and energy conservation.	Community Development	General
	Develop an Urban Forestry Master Plan.	Community Development	General
	Analyze the existing FEMA designated flood hazard areas to find ways to eliminate the flood hazard potential of each area with emphasis on the East Main Cannel flood hazard area.	Community Development	General