



NATURAL RESOURCES

INTRODUCTION AND VISION FOR THE FUTURE



Orange benefits from and relies upon its natural resources, which include a variety of landforms that provide the setting for the City, as well as the open spaces and parks that define many of the community's neighborhoods. These amenities provide visual relief from the intensity of urban areas. Open spaces offer areas for passive and active recreation, and for horticulture. They provide habitat for plant and animal life. Used as parks, they house facilities for recreational and civic activities

that are accessed by residents and visitors of all ages. Striking a balance between the built environment and Orange's natural resources is vital to the long-term sustainability of the community. Such sustainability requires that growth occur in a responsible manner that allows natural resources to be preserved and enhanced for future generations.

Orange's *Vision for the Future* is described in the General Plan Introduction. The Vision recognizes that the City's quality of life will be judged by how well we connect with our surroundings. Therefore, this Element focuses on how Orange can maintain and create special places that bring us together, and how the City can reinforce connections between open spaces and the community, so that all of our residents and visitors can share and enjoy the outdoors and other activities. The Vision includes the following objectives related to Orange's natural resources:

- Define neighborhoods through the use of open space areas and a trail system that provides a source of aesthetic beauty and recreational opportunities. These open space areas support a healthy and active community.
- Continue to protect our critical watersheds, such as Santiago Creek, and other significant natural and open space resources.
- Strive to build a comprehensive system of parks, open space, equestrian areas, scenic resources, and undeveloped natural areas, as well as a full array of recreational, educational, and cultural offerings such as sports, entertainment areas, and play facilities.
- Develop a connected multi-modal network for traveling from one end of town to the other that provides the option for residents from different neighborhoods to access parks, open spaces, and scenic areas by vehicle, transit, foot, bicycle or, where appropriate, by horse.



The natural resources, open space, and parks and recreational facilities described throughout this Element are key physical components that are essential to the quality of life in Orange. These facilities provide a variety of benefits. For example, open space provides recreational areas and wilderness areas. Urban parks provide relief and offer a soothing contrast to office, commercial, and residential areas. They provide for both active and passive recreational activities, and are key contributors to neighborhood identity and interaction. Trails and bicycle paths offer non-motorized alternatives for getting around the City. In addition, modern day recreational and visual connections to the Santa Ana River and Santiago Creek are reminders of our Native American and agricultural heritage.

Orange's General Plan combines two state-required General Plan elements – Open Space and Conservation – into a single Natural Resources Element. In addition to meeting other open space and conservation requirements, the Natural Resources Element also provides guidance regarding strategies for reducing urban runoff, maintaining water quality, preserving air quality and combating climate change within the City.

Purpose of the Natural Resources Element

The Natural Resources Element satisfies State requirements for the Open Space and Conservation Elements as stated in the Government Code Section 65302(d) and Section 65301(e). The goals and policies regarding nature conservation must adhere to the underlying intent of the Natural Communities Conservation Plan (NCCP). The Natural Resources Element also includes an optional Parks and Recreation Element, under provisions of General Plan law, which includes designation of parks and recreation facilities to meet the requirements of the state's Quimby Act imposed on cities and counties. The Quimby Act allows the City to collect exactions, in the form of impact fees, conservation easements, or park improvement fees from developers by demonstrating a close relationship between the park demands of a project and the need for additional parkland or recreational facilities.

The purpose of the Natural Resources Element is to establish programs and policies for: (1) preservation and use of open space; (2) renewable and non-renewable nature conservation; and, (3) parks and recreation. The scope of the Natural Resources Element spans areas of land and water used for open-space uses such as:

- preservation of renewable and non-renewable natural resources;
- managed production of resources, such as energy and groundwater supply;
- outdoor recreation; and
- trail-oriented recreational use.

Scope and Content of the Natural Resources Element

The Natural Resources Element contains goals and policies that reflect the community's intent to preserve and efficiently operate programs associated with open spaces, natural resources, and recreational spaces. The Element is divided into three sections:

- (1) Introduction
- (2) Issues, Goals, and Policies
- (3) Natural Resource Plans

The *Issues, Goals, and Policies* section identifies community open space, resource management, and recreational needs. This section also identifies goals and policies related to



various natural resource *issues*. *Goals* are broad statements that reflect the City’s desires and guide the City regarding these issues. The *policies* provide directions for preserving open space, improving parks and recreation, and conserving natural resources. Implementation measures designed to promote achievement of goals and policies are provided in an Appendix to the General Plan.

Relationship to Other General Plan Elements

Successful achievement of the goals and policies within the Natural Resources Element depends, in part, upon their consistency with those of the other Elements in the General Plan. The Natural Resources Element most closely relates to the Land Use, Circulation & Mobility, Housing, Public Safety, and Cultural Resources & Historic Preservation Elements.

The Land Use Element identifies desired future uses for all lands within the City. Such uses include parks, recreational facilities, and public and privately owned open spaces to meet the needs of existing and future generations. The goals and policies of the Land Use Element assign location, intensity of use, and unit densities to properties that influence the contents of the Natural Resources Element. In addition, the Land Use Element provides for Transfer of Development Rights strategies that may increase the availability of future open space resources described in the Natural Resources Element.

The goals and policies of the Circulation & Mobility Element identify, and ensure access to, open spaces and recreational areas requiring access. The Circulation & Mobility Element assigns the location of streets and trail systems for pedestrians, bicyclists, and equestrians in open spaces. The Public Safety Element provides goals and policies addressing public health and safety within the City, including open space lands such as parks, trails, lakes, and wildland areas. Public health issues include natural and man-made hazards in open space. The Cultural Resources & Historic Preservation Element is a companion element to the Natural Resources Element, and provides policies and programs related to conservation of historic and cultural resources within Orange’s planning area.

ISSUES , GOALS AND POLICIES

The goals, policies, and implementation programs of the Natural Resources Element address seven issues: (1) preserving and expanding open space resources; (2) protecting air, water, energy, and land resources; (3) reducing greenhouse gas emissions and adapting to effects of climate change; (4) preserving significant ecological, biological, and mineral resources; (5) providing and expanding recreational facilities and programs; (6) creating a comprehensive trails network; and (7) preserving visual and aesthetic resources.

Open Space Resources

Open space areas are important biological, aesthetic, and recreational resources. They become increasingly valuable as the City develops and the landscape becomes more urbanized. Open spaces create buffers to development and provide both wildlife habitat and recreational opportunities.



- GOAL 1.0:** Provide recreational use, scenic enjoyment, and the protection of natural resources and features in open space areas.
- Policy 1.1: Conserve open space through various public-private funding mechanisms and management strategies including, but not limited to, conservation easements.
- Policy 1.2: Actively seek out new public open space opportunities through land recycling.
- Policy 1.3: Promote development of additional open spaces and access points adjacent to waterways and planned trails.

Air, Water, and Energy Resources

Orange lies within the heart of north-central Orange County, where the best qualities of Southern California living continue to attract new residents every year. Clean water and air, carefully managed land resources, and an efficient circulation network are critical elements of a healthy, sustainable City and watersheds. Orange will maintain and protect these resources through a range of measures to protect public health and quality of life.

- GOAL 2.0:** Protect air, water, and energy resources from pollution and overuse.
- Policy 2.1: Cooperate with the South Coast Air Quality Management District (SCAQMD) and other regional agencies to implement and enforce regional air quality management plans.
- Policy 2.2: Support alternative transportation modes, alternative technologies, and bicycle- and pedestrian-friendly neighborhoods to reduce emissions related to vehicular travel.
- Policy 2.3: Reduce the amount of water used for landscaping through the use of native and drought-tolerant plants, proper soil preparation, and efficient irrigation systems as parks and other City facilities are built or renovated.
- Policy 2.4: Encourage the production, distribution, and use of recycled and reclaimed water for landscaping projects, while maintaining urban runoff water quality objectives.
- Policy 2.5: Continue to work toward local and regional waste-reduction and diversion/recycling goals and promote public education programs.
- Policy 2.6: Encourage sustainable building and site designs for new construction and renovation projects.
- Policy 2.7: Coordinate with energy suppliers to ensure adequate energy supplies to meet community needs, and to promote energy conservation and public education programs for that purpose.
- Policy 2.8: Encourage development that incorporates pedestrian- and transit-oriented design and landscape elements.
- Policy 2.9: Promote City operations as a model for energy efficiency and green building.
- Policy 2.10: Work toward replacing existing City vehicles with ultra low or zero emission vehicles. At a minimum, new City vehicles shall be low emission vehicles as



defined by the California Air Resources Board, except if certain vehicle types are not available in the marketplace. Public safety vehicles are exempted from this requirement.

- Policy 2.11: Protect the ecological integrity and overall health of Orange’s watersheds.
- Policy 2.12: Cooperate with water supply agencies to protect the quantity and quality of local groundwater supplies.
- Policy 2.13: Control surface runoff water discharges into the stormwater conveyance system to comply with the City’s National Pollutant Discharge Elimination System (NPDES) Municipal Permit and other regional permits issued by the Santa Ana Regional Water Quality Control Board.
- Policy 2.14: Reduce pollutant runoff from new development by requiring the use of low impact development practices and [the most](#) effective Best Management Practices (BMPs) currently available.
- Policy 2.15: Minimize the amount of impervious surfaces and associated urban runoff pollutants in new development and significant redevelopment throughout the community.
- Policy 2.16: Protect in-stream habitat and natural stream and channel features.
- Policy 2.17: Educate City residents and businesses on the effects of urban runoff, and water and energy conservation strategies.

Climate Change

The scientific community believes that increasing levels of greenhouse gases (GHGs) in the earth’s atmosphere are contributing to rising global average temperatures. The most abundant GHG is carbon dioxide (CO₂), which is a byproduct of fossil fuel combustion. CO₂ is removed from the atmosphere through sequestration by vegetation and dissolution into the ocean. Carbon sequestration is the absorption or removal from the air of carbon dioxide by plants or natural processes. These sequestration processes happen naturally, but human-generated emissions may be outpacing these removal processes, resulting in excessive GHG concentrations accumulating in the atmosphere, and leading to a subsequent trend of unnatural global warming.

- GOAL 3.0: Prepare for and adapt to the effects of climate change and promote practices that decrease the City’s contribution to climate change.**
- Policy 3.1: Evaluate the potential effects of climate change on the City’s human and natural systems and prepare strategies that allow the City to appropriately respond and adapt.
- Policy 3.2: Develop and adopt a comprehensive strategy to reduce greenhouse gasses (GHGs) within Orange by at least 15 percent from current levels by 2020.

Ecological, Biological and Mineral Resources

Wildlife habitat is crucial for the survival of native animal and plant species, and for maintaining the biodiversity of the City and larger Orange County region. Significant wildlife



habitat can be found in the City’s undeveloped hillside areas, East Orange, and parks and open spaces (particularly near Santiago Creek, Santiago Oaks Regional Park, Irvine Regional Park, and Peters Canyon Regional Park). Human-created landscaping is also an important environmental element, particularly in urban areas. Landscaping elements such as street trees contribute to an improved aesthetic and biological environment while providing a natural means of cleansing the air and minimizing urban heat. Sand and gravel resources in the planning area provide valuable sources of aggregate material for new construction. These resources benefit the region as a whole. In accordance with guidelines established by the State Mining and Geology Board, City policy recognizes the need to protect these resources from premature urbanization.

The following goals and policies reflect the City’s desire to maintain and support prudent management of these important environmental resources.

GOAL 4.0: Conserve and protect wildlife habitat, plant and animal species of concern, and general biodiversity.

- Policy 4.1: Preserve and protect native and habitat-supporting plant resources throughout the City.
- Policy 4.2: Work with agencies, including the Orange County Flood Control District, to identify opportunities to enhance the natural qualities of Santiago Creek to protect habitat and reintroduce native plants and animals.
- Policy 4.3: Reduce the impact of urban development on important ecological and biological resources.
- Policy 4.4: Repair or improve ecological and biological conditions in the urban and natural environments when reviewing proposals for site development and redevelopment, as well as public improvements.
- Policy 4.5: Protect the Santiago Creek and Santa Ana River corridors from premature urbanization to ensure the continued availability of important sand and gravel, flood control, water recharge, biological, and open space resources.

Recreational Facilities and Programs

The City’s active and passive recreational resources consist of designated parks, trails, and open space areas. Continued provision of recreational opportunities through preservation of open space, park maintenance and development, and the creation of new facilities will ensure improved quality of life for residents.

GOAL 5.0: Provide recreational facilities and programs that adequately serve the needs of residents.

- Policy 5.1: Maintain existing City parks at levels that provide maximum recreational benefit to City residents.
- Policy 5.2: Provide a range of high quality recreational facilities and programming to serve a broad cross section of residents, including youth, seniors, young adults, mature adults, and people with disabilities.



- Policy 5.3: Establish joint recreational use of open space land and facilities owned by school districts and/or the City.
- Policy 5.4: Develop new public parks and open space resources by establishing incentives to use creative techniques available to property owners and developers that support public-private open space partnerships.
- Policy 5.5: Explore and pursue new approaches to new park development and to providing a balanced mix of amenities and facilities.
- Policy 5.6: Identify areas within the City that are currently underserved by existing open space, and develop programs to purchase land and build park amenities at a minimum level of 3 acres per 1,000 persons and the goal of 5 acres per 1,000 persons. Support provision of a total of 10 acres of parkland per 1,000 persons, inclusive of County regional parks within the planning area.
- Policy 5.7: Consider the use of Transfer of Development Rights (TDR) as a means to acquire and develop more publicly accessible open space.

Comprehensive Trails Network

Trails within the City serve important recreational and transportation needs, but are currently disconnected and in some areas incomplete. The Santiago Creek corridor has been recognized as a potential spine for a City-wide network of multi-use trails that connect parks, open spaces, recreational facilities, and other City amenities. Other opportunities to improve trail networks may include the conversion of active and inactive railroad rights-of-way to trails, and joint use of utility easements and flood control rights-of-way for trail purposes. While providing for pedestrian, bicycle, and equestrian circulation, a trails network would also create a valuable greenway system throughout the City and would support the physical health and active lifestyle of Orange residents.

- GOAL 6.0: Provide for alternative modes of transportation and access to recreational resources through a multi-use trail system that links the City’s parks and regional open space amenities.**
- Policy 6.1: Complete multi-use trail links throughout the City that serve recreational and circulation purposes as funding is available.
- Policy 6.2: Ensure consistent, safe, and efficient maintenance of trails, and minimal impacts to the environment.
- Policy 6.3: Work with the Rails-to-Trails Conservancy, surrounding residents, utility providers, flood control and water agencies, and community organizations to pursue the joint use of local rights-of-way and easements for multi-use trails.
- Policy 6.4: Link existing equestrian trails and provide outlets to open space areas, particularly in the northeast region of the City, to reach regional parks such as Santiago Oaks, Irvine, Peters Canyon, and the Cleveland National Forest.
- Policy 6.5: Ensure that the trail system has a safe interface with existing development.
- Policy 6.6: Encourage an integrated relationship between trails and developed areas through the site planning and design of private development and trail projects.



Visual and Aesthetic Resources

Portions of Orange are characterized by scenic vistas that include hillsides, ridgelines, or open space areas that provide a unifying visual backdrop to the urban environment. These “viewsheds” contribute to the City’s identity and quality of life. The City will preserve open space areas and view corridors where possible and will encourage landscaping in urban areas to improve boulevards, neighborhoods, and commercial and industrial districts.

GOAL 7.0: Protect significant view corridors, open space, and ridgelines within the urban environment.

Policy 7.1: Preserve the scenic nature of significant ridgelines visible throughout the community.

Policy 7.2: Designate Santiago Canyon Road east of Jamboree Road as a City Scenic Highway to preserve the scenic nature of the open space adjacent to the road.

Policy 7.3: Encourage the development of landscaped medians and parkway landscaping along arterial streets in public and private projects, and encourage the state to provide freeway landscaping.

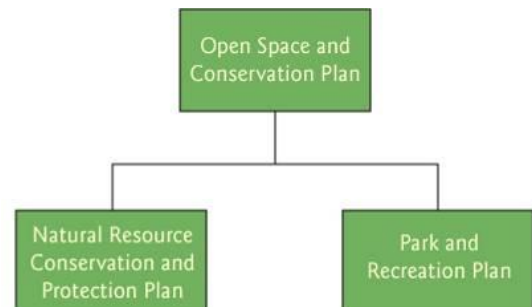
Policy 7.4: Coordinate with Southern California Edison and other utilities to place utility lines underground wherever possible.

Policy 7.5 Encourage the retention and enhancement of scenic corridors and visual focal points within the community.

NATURAL RESOURCE PLANS

The Natural Resources Element establishes the City’s approach to protecting and enhancing its natural, open space, and recreation resources. The City has established goals and policies to preserve these resources. The following Natural Resource Plans provide an outline for future actions to conserve and improve the natural resources in Orange’s planning area. Implementation programs, which describe and detail the City’s specific actions, are included in an Appendix to the General Plan.

The Natural Resources Element covers a wide range of diverse issues, from the protection of water resources to the establishment of recreational trails. In order to focus policy and implementation programs on each specific issue, the Natural Resource Plan is divided into two “mini-plans”—a Natural Resource Conservation and Protection Plan, and a Park and Recreation Plan.



NATURAL RESOURCE CONSERVATION AND PROTECTION PLAN

Before Orange was an incorporated city, people were attracted to the area by its wealth of natural resources—the temperate climate, clean air, abundance of water, variety of plants



and animals, and vast acres of open space, from the alluvial plains below the Santa Ana Mountains to the rolling hills and shaded canyons. People found Orange to be a desirable place to farm, raise a family, and pursue a high quality lifestyle.

Population growth in the 20th century transformed Orange from a quiet farming community into a sizable urban city. The sand and gravel resources of the Santa Ana River and Santiago Creek were used to support urban development, first on the flatlands, and then into the hills of east Orange.

Growth has been accompanied by a gradual reduction in the quality and quantity of the natural resources which first attracted people to the area. Growth in Orange, as well as throughout the region, has contributed to a decline in air and surface water quality, reduction in local groundwater supplies, and elimination of some open space areas suitable for agricultural production and wildlife habitat.

Despite the reduction and loss of some resources, Orange residents have not lost sight of the benefits natural resources provide the community. Clean air and water are vital to ensure the protection of public health and to support wildlife. Plant and wildlife resources enrich the urban setting by providing changes in scenery and environment. They contribute to the biodiversity and ecology of the region. Also, preservation of some open space areas (floodplains, steep hillsides) is necessary to protect public safety. Finally, aggregate resources (sand and gravel) provide the community with a source of income and a source of readily available building materials to support new construction and growth in appropriate areas of the community.

Open Space Resources

Open space lands may be set aside for many purposes, including the provision or preservation of: (1) parks for recreation or wildlife habitat preservation; (2) water resources for groundwater recharge and support of plant and animal habitat; (3) environmental hazard zones for the protection of public safety; and, (4) prominent geologic features and scenic resources for the visual enhancement of the urban environment.

As shown in Figure NR-1, Orange's planning area includes approximately 7,400 acres of open space, which is about one-third of the planning area's total land area. Open spaces include lands used as City or County parks, ridgelines, and areas designated as Open Space on the Land Use Policy Map. The greatest concentration of open space within the planning area is in the Cleveland National Forest, a portion of which is located within the City's Sphere of Influence. This open space includes several hundred acres in the Peralta Hills area and several hundred acres in the hills south and east of Orange Park Acres, consisting of Santiago Oaks Regional Park, Irvine Regional Park, and Peters Canyon Regional Park. An additional 15,800 acres of open space lies within the City's Sphere of Influence, east of the planning area.

The open space areas also include a portion of the 37,000-acre reserve area established by the *Central and Coastal Orange County Natural Communities Conservation Plan/Habitat Conservation Plan* (NCCP/HCP). This area encompasses portions of Santiago Hills II and east Orange. Additionally, the Irvine Ranch Land Reserve affects the pattern of developable and undevelopable land in the eastern portion of the planning area. The reserve stretches from Weir Canyon near State Route (SR) 91 at the north end of Irvine Ranch, connects with the



Cleveland National Forest along the northeast border of the ranch, continues south to include large regional open space systems in the northern and southern hillsides of the City of Irvine, and extends to the Laguna Coast Wilderness Park and Crystal Cove State Park near Laguna Beach.

Conserving current open spaces and creating new open spaces are important concerns. As development pressure increases in the hillside areas east of the City, one key to preserving the quality of life for Orange residents lies in providing open spaces that preserve scenic vistas, provide habitat for wildlife, and maintain the ecological balance of the area. Additionally, because most of Orange's open spaces are located adjacent to the many reservoirs and creeks located within the City, opportunity exists to improve water quality in the region by enhancing and adding open spaces around these reservoirs and creeks.

To increase the amount of open space within the City, Orange will work with large landowners to secure open space dedications where feasible. The City will also work with land trusts and non-profit agencies to secure grant funds for acquisition and conservation of open space areas. Where appropriate, this process may include the use of conservation easements, which are voluntary agreements that allow landowners to limit the type or amount of development on their property while retaining private ownership of the land. The easement is signed by the landowner, who is the easement donor, and by a government agency or non-profit organization, which is the party receiving the easement. The landowner continues to privately own and manage the land, and may receive tax advantages for having donated the conservation easement. The government or non-profit accepts the easement with the understanding that it must enforce the terms of the easement in perpetuity. After the easement is signed, it is recorded with the County Clerk and applies to all future owners of the land.

Air, Water, and Energy Resources

The quality of air, water, energy, and land resources must be preserved, not only for public health, environmental, and economic reasons, but also to improve and maintain the quality of life for Orange residents. All of these resources generate regional issues. Therefore, resolving issues related to air, water, energy and land resources requires the coordinated efforts of many jurisdictions. Collectively, smaller local actions can have wide-reaching impacts.

Air Resources

Orange has seen steady growth in both population and development over the past decades, which has urbanized a once rural town. The population growth in Orange and surrounding jurisdictions has led to declining air quality in the regional air basin. Orange is located within the South Coast Air Basin, managed by the South Coast Air Quality Management District (SCAQMD), which is the regional agency responsible for regulating pollutant emissions in the air basin.

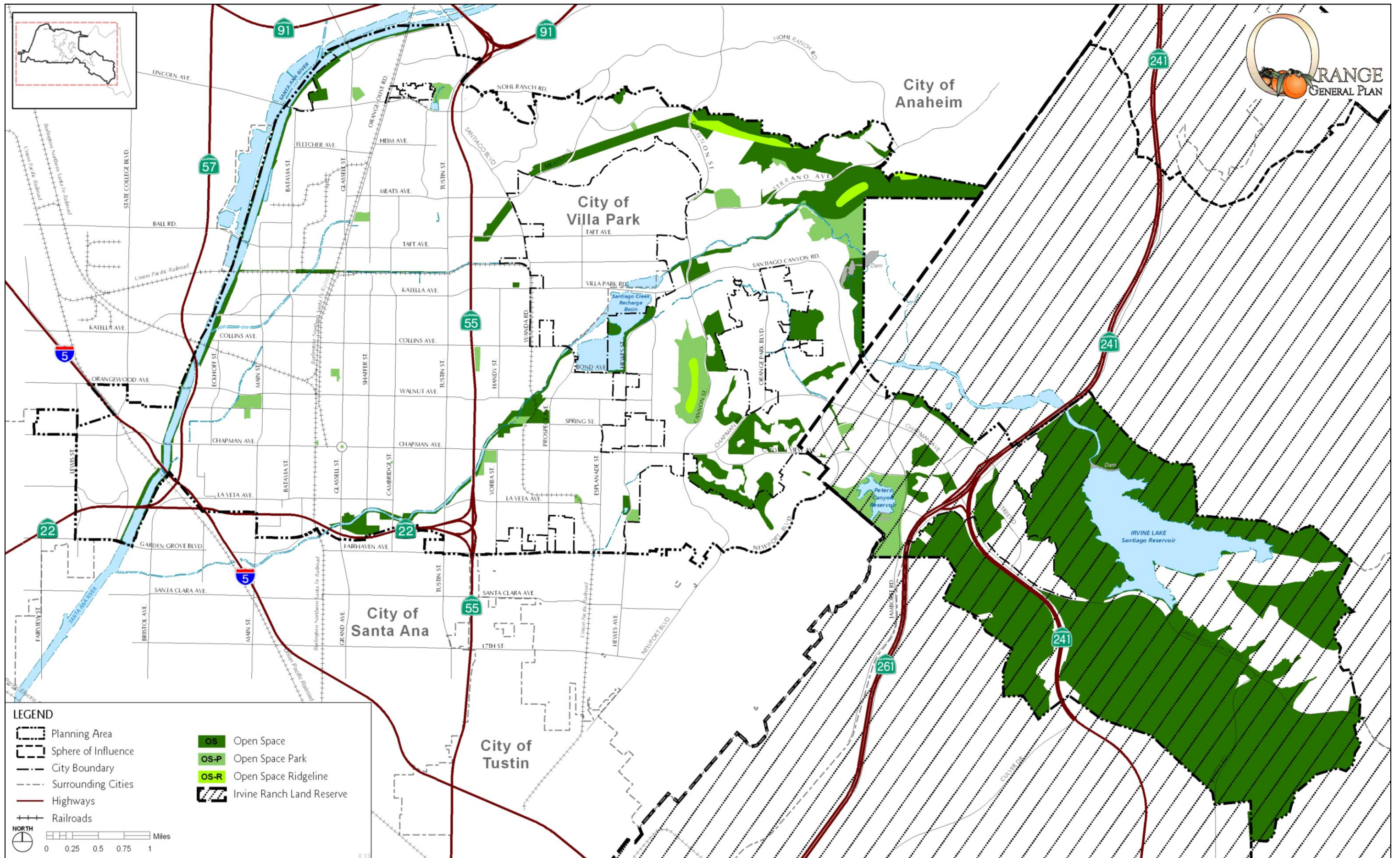


Figure NR-1 Open Space Resources



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In order to protect and improve air quality at a regional level, the City will continue to cooperate with SCAQMD to implement the *Air Quality Management Plan*. At a local level, the City will carry out the following programs to help improve regional air quality:

- Assess project impacts on air quality as part of the environmental review process. Whenever appropriate, environmental review and mitigation measures will be coordinated with SCAQMD.
- Support efforts to provide public transit, and routes that are user-friendly for bicyclists and pedestrians throughout the City.
- Support the development of pedestrian-friendly neighborhoods. As described in the Land Use Element, more intensely used commercial and mixed-use areas will be concentrated in identified opportunity areas located throughout the western portion of the City. Centralizing these uses may encourage mass transit to better serve core employment areas. Also, increased business opportunities within the City may reduce the number of area residents commuting greater distances to work (e.g. to downtown Los Angeles or Irvine).
- Require major employers to institute Transportation Demand Management (TDM) Plans. Such plans establish incentives to encourage employees to carpool, take public transportation, bicycle, walk, or use some means other than private automobiles to get to and from work.

Water Resources

Water is a resource that must be preserved, not only for public health, environmental, and economic reasons, but also to improve and maintain quality of life. Water quality is most definitely a regional issue. Pollutants entering the hydrologic system are dispersed outward, with the potential to affect all who use the water within the system.

Water sources are considered most vulnerable to contamination from industrial activities and/or environments such as chemical processing, petroleum pipelines and storage, gas stations, and sewer collection systems. The local issue of household chemicals entering water sources is also a challenge to water safety. Pollution of urban runoff and stormwater, and threats to the City's water supply arise from improper use of household hazardous materials, such as solvents, fuels, paints, swimming pool chemicals, miscellaneous flammable and corrosive substances, and from improper disposal of household hazardous wastes, including used motor oil. Reliable water supplies are essential to public health, safety, and welfare, and the City tests all water supply sources to assure safety and compliance with all drinking water standards.

Ground Water Quality and Supplies

Protection of water supply and ground and surface water quality is imperative for the health and quality of life of Orange residents, businesses, and visitors. Between 60-80 percent of the water supply to the City is drawn from municipal wells drilled into the Santa Ana River Aquifer from the Lower Santa Ana River groundwater basin managed by the Orange County



Water District (OCWD). The City is a member of this District, which manages the Orange County Groundwater Basin and monitors and maintains ground water quality in the region.

Other water sources include surface water runoff into Irvine Lake purchased from the Serrano Water District. The Lower Santa Ana River basin, which extends from San Bernardino County southwest to the Pacific Ocean, underlies the entire western portion of the planning area. The Santa Ana Mountains and foothills form the basin's eastern boundary. The ground water supply is supplemented by imported water purchased through the Metropolitan Water District of Orange County (MWDOC).

Figure NR-2 identifies major surface water bodies, waterways, and watershed areas in the planning area. A watershed is the geographic area draining into a river system, ocean, or other body of water through a single outlet and includes receiving waters. Watersheds are usually bordered and separated from other watersheds by mountain ridges or other naturally elevated areas. Three watersheds are located within Orange's corporate boundaries: the Santa Ana River Watershed (Lower Santa Ana River drainage basin), the San Diego Creek Watershed, and the Westminster Watershed (Los Alamitos/East Garden Grove/Bolsa Chica drainage basin). Most of Orange falls within the Santa Ana River Watershed. The southeastern portion of the planning area falls within the San Diego Creek Watershed, and consists primarily of residential communities with scattered neighborhood-serving commercial areas. A small southwestern portion of the planning area falls within the Westminster Watershed. These watersheds are based on the hydrologic areas delineated by the Orange County Flood Control District.

Irvine Lake, Villa Park Reservoir, and Peters Canyon Reservoir are artificial lakes constructed to provide water storage and flood control capabilities. All three lakes lie within areas designated for open space uses on the Land Use Policy Map. Villa Park Reservoir and Peters Canyon Reservoir lie within areas designated for public park uses. Therefore, land use policy ensures the preservation of these water resources for both resource conservation and recreation uses.

Irvine Lake is planned for continued use as a water reservoir, and such use includes related recreational uses such as fishing, sailing, and boating. Resort and commercial recreation uses on adjacent lands enhance the lake's recreation function. In determining the mix of recreation uses for the lake, the Irvine Ranch Water District and the Serrano Irrigation District recognize the primary use of the lake as an agricultural and domestic water supply reservoir. Desilting activities may continue as a part of the lake's management program to assure sufficient capacity for water storage.

The Santa Ana River, which forms the City's western boundary, is the major drainage course for the Santa Ana River basin. The river performs valuable flood control and groundwater recharge functions along its entire route. In recognition of the important role the river plays in providing groundwater recharge areas and adequate flood protection for Orange County, land use policy calls for open space uses along the river.

Santiago Creek flows from the Santa Ana Mountains through Orange and empties into the Santa Ana River in the City of Santa Ana. In addition to controlling floodwaters and recharging the groundwater basin, Santiago Creek has become a defining feature of the community, characterized by trails and recreational open space throughout portions of its

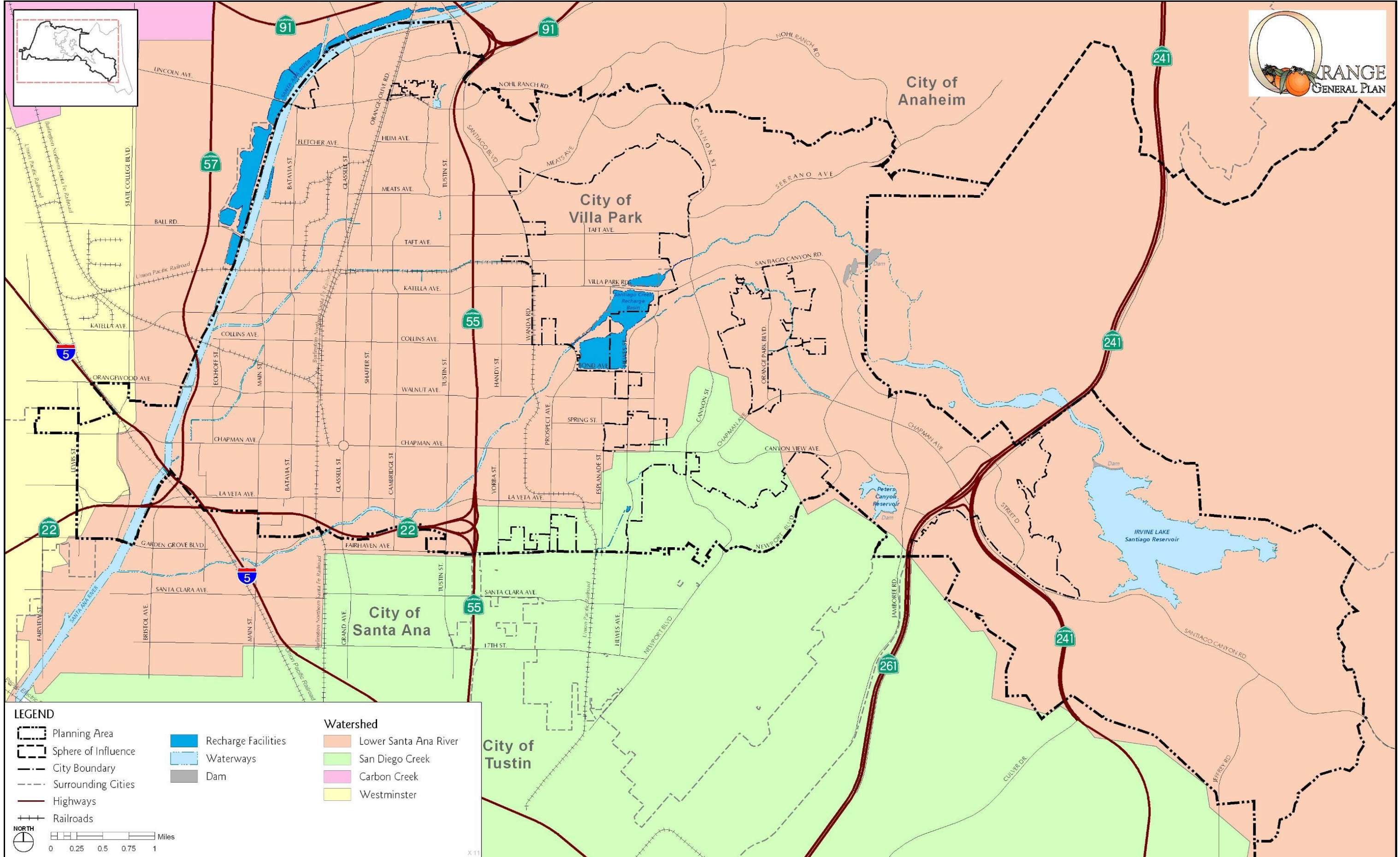


Figure NR-2 Drainage Areas and Water Recharge Facilities



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length within Orange. Community members identify with the creek, and the City seeks to incorporate natural characteristics of Santiago Creek in the design of adjacent future projects. The upper portions of Santiago Creek are characterized by large, abandoned mining pits. In particular, the pits near Bond Street serve valuable groundwater recharge purposes. Land use policy recognizes these uses by designating the creek and several surrounding properties as Open Space or Open Space-Park.

Handy Creek is a minor drainage course flowing from Peters Canyon Reservoir to Santiago Creek. Water flows from Peters Canyon Reservoir are channeled through Handy Creek to the recharge basin system at Santiago Creek near Bond Street, where it replaces water pumped from wells and helps maintain levels of groundwater supply for the area.

To promote water conservation, the City will encourage all developments to utilize water conservation measures in accordance with the City's Municipal Code, and will encourage sustainability in project site planning and building design. The City will use native and drought-tolerant plants for landscaping, and will use recycled and reclaimed water for irrigating landscape projects whenever feasible. Reclaimed water is the reuse of treated wastewater, and is usually used for non-drinking purposes. Using recycled or reclaimed water instead of expensive and increasingly scarce potable water helps to ensure the long-term availability of drinking water to Orange residents.

Urban Runoff

Urban stormwater runoff occurs when rainfall that in a nonurban environment would have been absorbed by groundcover or soil is instead collected by storm drains. In urbanized areas such as Orange, vegetation and top soil have been largely replaced by impervious surfaces such as buildings, roads, sidewalks, and parking lots. When it rains, trash, litter, silt, automotive chemicals, fertilizers, animal wastes and other contaminants can be washed into the storm drain system. Since storm drains are designed to carry only stormwater, these drains typically are not equipped with filters or cleaning systems. Consequently, they can carry contaminants found in urban runoff directly into local flood control channels, lakes and the ocean. Many of the contaminants found in this runoff affect water quality and can, at elevated concentration levels, be toxic to aquatic and marine life.

National Pollutant Discharge Elimination System

Local stormwater pollution control measures are implemented in accordance with the 1972 Federal Water Pollution Control Act (Clean Water Act) and the National Pollutant Discharge Elimination System (NPDES). The Clean Water Act prohibits any person from discharging pollutants through a "point source" into a "water of the United States" unless they have a NPDES permit. The NPDES Program, mandated by Congress under the Clean Water Act, is a comprehensive program for addressing the nonagricultural sources of stormwater discharges that adversely affect the quality of the nation's waters. The Program uses the NPDES permitting mechanism to require the implementation of control and monitoring measures designed to prevent harmful pollutants from being washed into local water bodies by stormwater runoff. The NPDES program requires the owner or operator of any facility, including publicly owned facilities, or any person responsible for any activity that discharges waste into the surface waters of the U.S., to obtain an NPDES permit. The Clean Water Act



amendments of 1987 established a framework for regulating stormwater discharges from municipal, industrial, and construction activities under the NPDES program.

The Clean Water Act provides that states are authorized to operate their own NPDES programs, provided that such programs meet minimum federal requirements. In California, the NPDES Program is administered by the State Water Resources Control Board and its nine Regional Water Quality Control Boards. The NPDES Municipal Storm Water Permit for northern and central Orange County, including the City of Orange, is issued by the Santa Ana Regional Water Quality Control Board (Region 8). The City of Orange, along with other northern and central Orange County cities, currently operates under Santa Ana Regional Board Order No. R8-2009-0030 (NPDES Permit No. CAS 618030) as amended by Order R8-2010-0062. The Permit, issued in May 2009 and amended in October 2010, requires the City of Orange to minimize short- and long-term impacts on receiving water quality from stormwater and non-stormwater discharges, potential impacts associated with new development and significant redevelopment are reduced through the implementation of low impact development practices (LID) and other onsite retention practices to the maximum extent practicable. As part of the NPDES permit program, Orange adopted a *Local Implementation Plan* in 2003, which was revised and readopted in September 2011 to conform to the May 2008 permit.

The City will require all new development and significant redevelopment projects to use LID and Best Management Practices (BMPs) to reduce stormwater runoff and increase on-site retention. BMPs are effective methods that prevent and control the amount of pollutants entering the storm drain system, where pollutants eventually enter the surface water system. These practices closely follow federal stormwater requirements and regulations. In addition, the Orange County Model Water Quality Management Plan, adopted in August 2011 provides BMPs for source, structural and treatment control. Source control BMPs include such techniques as site planning and landscaping, and activity restrictions. Structural BMPs include providing messaging on catch basins to prevent illegal dumping, trash storage design, and energy dissipation for runoff. Treatment control BMPs include natural treatment options such as constructed wetlands, biofiltration planters and vegetated swales. The City will continue to support implementation of NPDES requirements on new development and significant redevelopment projects.

Energy Resources

The City will continue to promote energy conservation, both by encouraging conservation measures on the part of homeowners, the business community, and institutions, as well as by encouraging green building techniques for new construction and renovation projects.

Green Building

Green building concepts can be incorporated into site and building design to reduce energy use within the City as a whole, to improve aesthetics and comfort, and to provide a more cost-effective means of living. According to the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED), seven concepts of green building can help conserve energy and preserve the environment:

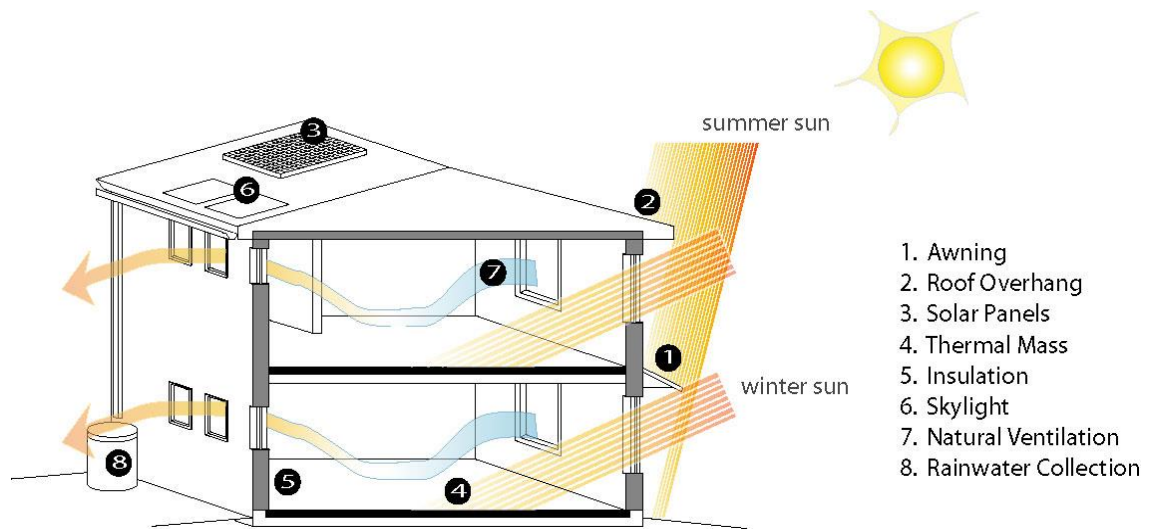
- Location and transportation



- Sustainable sites
- Water efficiency
- Energy and atmosphere
- Materials and resources
- Indoor environmental quality
- Innovation and design process

Sustainable sites require development designs that work with existing topography, building on previously developed sites, integrating natural surroundings, using existing infrastructure, building on brownfields (sites previously used for industry) through site remediation, and selecting sites near public transportation and diverse land uses. These measures will ultimately help preserve natural habitats, reduce negative effects on water and air quality, and minimize automobile use.

Incorporating water efficiency at the time of construction will maximize water conservation through a building's lifetime. Using non-potable water or gray water to irrigate landscaping or using xeriscape (landscaping requiring minimal water usage) to conserve water, installing water-efficient fixtures, and incorporating innovative wastewater technologies and plans will reduce water demand and limit extraction and pollution of groundwater supply.



Green building incorporates site orientation, window placements, skylights, solar panels, and high insulation to improve indoor comfort and to conserve valuable natural resources.

Providing natural ventilation and effective insulation in buildings can reduce energy demand and utility bills. Natural ventilation will allow residents to cool living spaces without relying on air conditioners, and increased building insulation will sustain moderate variations to indoor temperature. Orienting buildings to invite natural light or using solar panels will reduce electricity demand. These measures will not only reduce demand for natural resources and minimize effects on climate change, but they will also increase comfort for residents and should encourage street-fronting design using more windows and detailing.



Judicious selection of materials and maximizing landscaping in parking lots, rights-of-way, and overall building sites can further provide natural indoor cooling and reduce heat island effects and glare in our urban environment. Choosing natural materials will improve indoor environmental quality by limiting toxic emissions associated with components such as adhesives and formaldehyde often found in building materials. Constant monitoring and innovation in sustainable building design will enhance the aesthetics of the built environment while improving the comfort and health of residents.

The City already practices building material waste reduction through its protection of historic building resources. These efforts, combined with construction waste management and efforts to incorporate recycled content and natural materials into new construction, will reduce the amount of waste destined for landfills and conserve non-renewable resources.

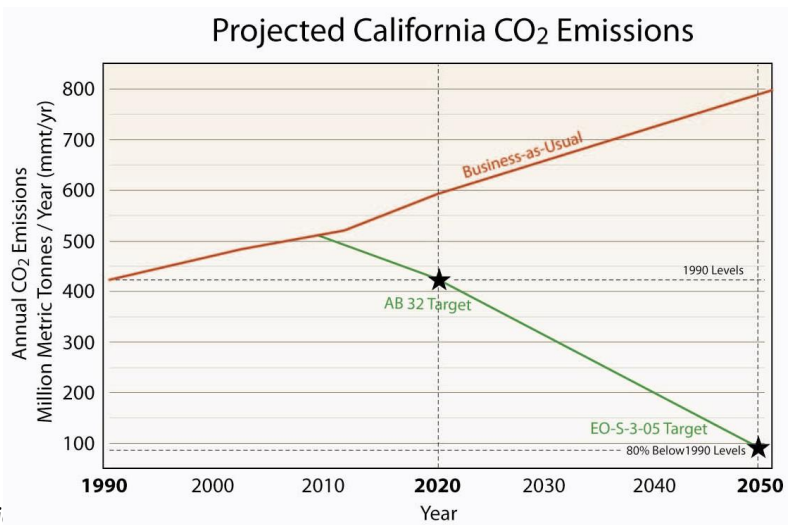
Climate Change

Climate change refers to a change in the state of the climate that persists for an extended period, due to natural processes, human-caused changes in the composition of the atmosphere, or land use changes that lead to atmospheric changes. According to the United Nations Intergovernmental Panel on Climate Change (IPCC)¹, the scientific authority on the subject of climate change, certain findings are widely accepted by the scientific community:

- Greenhouse gases (GHGs) such as carbon dioxide (CO₂), when introduced into the atmosphere, have a warming effect on the earth;
- Human activities have increased the levels of GHGs in the atmosphere since pre-industrial times; and
- The global climate has warmed by an average of 1.0-1.7 degrees Fahrenheit from 1906-2005.

Greenhouse gases are gases that trap heat in the atmosphere. GHGs include CO₂, methane, nitrous oxide, and fluorinated gases. The human activities during which these gases are emitted include burning, manufacturing, and transportation-related combustion of fossil fuels. Livestock and solid waste emissions also contribute to the buildup of GHGs.

The effects of climate change include increased global average temperature, subsequent altered precipitation patterns, thermal expansion of the ocean, and loss of polar and global sea ice extent. In Orange, these changes would translate to water and energy supply issues, increased risk of wildfire and



¹ IPCC 2007; *Climate Change 2007: The Physical Assessment Report of the IPCC*. Cambridge University Press. Cambridge, UK.



floods, and possible human health complications.

Responding to climate change requires a two-pronged approach. On one hand, the City must adapt to change and prepare for the already-foreseeable effects of global warming that have already occurred and, on the other hand, the City must coordinate with agencies, residents, and businesses to modify behavior to decrease the citywide contribution to GHG emissions and associated effects on the climate.

Greenhouse Gas Emissions

The California Global Warming Solutions Act of 2006 (AB 32) was created by the state legislature to address the threat global warming poses to the state’s “economic well-being, public health, natural resources, and the environment”. The Act directs the California Air Resources Board (ARB) to “adopt a statewide GHG emissions limit equivalent to the statewide GHG emissions levels in 1990 to be achieved by 2020.” California Executive Order 03-05 (EO-S-3-05. June 2007) requires statewide GHG emissions to be reduced to a level 80 percent below 1990 levels by 2050. These laws require maintenance of a statewide inventory of emission levels as well as taking action to decrease emission levels. Actions needed to decrease emission levels statewide were documented in a Scoping Plan approved in 2008, and subsequently amended in 2011, 2014 and 2017.

Senate Bill 375 (2008) requires metropolitan planning organizations (such as the Southern California Association of Governments (SCAG)) to include sustainable communities strategies in regional transportation plans for the purpose of reducing GHG emissions from automobiles and light trucks through integrated transportation, housing, and use and environmental planning. In compliance with SB 375, the Orange County Council of Governments (in coordination with the Orange County Transportation Authority) prepared a sub-regional Sustainable Communities Strategy for Orange County (OCSCS), which was incorporated into the Regional Transportation Plan adopted by the SCAG. However, all jurisdictions in California have a responsibility to contribute to this effort with changes in operations, technology, and policies that enable residents and businesses to follow suit. This General Plan provides a comprehensive framework for Orange’s approach to climate change and GHG emission reduction. The types of policies that deal with climate change and GHG emission are far ranging. The City has located policies and programs throughout the General Plan that have multiple outcomes. They help the City to achieve a high quality of life for its current and future residents and businesses, reduce the City’s contributions to climate change, and help residents and businesses adapt to changing circumstances.

State and local governments will play a critical role in addressing this important issue. The OCSCS identifies policies and measures that will minimize GHG emissions at a regional level. However, the City believes that in order to achieve the emission reductions mandated in AB 32 and EO-S-3-05, each sector must do its fair share to reduce total emissions, and local action is needed to manage and measure activity within each sector as it relates to land use planning. For this reason the City is establishing a GHG emissions reduction goal of at least 15 percent of current levels by 2020.

To achieve this goal, the General Plan advocates primarily compact “infill” future development, focusing on introducing urban-scale mixed-use projects at locations near transportation corridors and transit, and creating additional retail and employment



opportunities within the City that increase the range of goods and services available to residents and improve the community's jobs-housing balance. Future "greenfield" development is limited to previously-approved entitlements in east Orange. The General Plan includes a broad spectrum of policies related to climate change. These policies have been integrated throughout the relevant General Plan elements, as detailed in Table NR-1.

Adaptation Strategies

Climate change has been recognized as a threat that could alter social, economic, and ecological conditions in the City. Concentrations of GHGs have dramatically increased in the atmosphere due to the use of fossil fuel-based energy sources. Additionally, the earth's capacity to capture and store GHGs has been reduced due to extensive deforestation and the conversion of grasslands and other carbon rich natural communities, as well as saturation of the ocean with dissolved CO₂. Rigorous scientific analysis conducted by the IPCC, the National Research Council of the National Academies, and other agencies indicates that increased concentrations of GHGs have already begun to result in significant warming, and will lead to changes in precipitation patterns, sea level rise, and more frequent extreme weather events. Other effects could include constrained water and energy availability, more frequent flooding, health impacts related to increases in vector borne diseases, air pollution, and habitat loss.

Wildfire Hazards

Research conducted at the U.S. Department of Energy's Lawrence Berkeley National Laboratory indicates that climate change will increase the frequency and size of wildfires in California. Hotter, drier climates, aided by prolonged drought, will promote increased accumulation of fire-prone vegetation. When fires occur, stronger winds will continue to fan the flames, spreading fires faster and farther than previously experienced. This will expand the size of the urban-wildland interface, because more residential communities will be within reach of wildfire activity. An expanded urban-wildland interface will require increased resources, planning, and funding to maintain and defend.

Adaptability is important in considering how the City can protect its citizens from the negative effects of climate change. In terms of fire protection, The City will continue to adapt by regularly updating fire protection requirements, especially in transition areas between developed and undeveloped land, and by enforcing the strongest construction and design standards. Additionally, the City will work to preserve open space where significant hazards exist.

Flooding

The California Climate Change Center, a research arm of the California Energy Commission, has found that climate change will result in new flooding concerns throughout California. Climate change will result in increased severity of winter storms, particularly in El Niño years. Such weather events will result in higher levels of seasonal flooding than those currently experienced. This will strain dam capacity and increase floodplain areas. Policies regarding flood protection under Goal PS-2 (in the Public Safety Element) will help the City deal with existing and increased potential for flooding. The City will continue to work with the Orange County Hazard Mitigation Task Force in its planning and implementation of the Hazard Mitigation Plan, and will update its Emergency Operations Plan to identify and fund flood control improvements regularly. Public



NATURAL RESOURCES

facilities must be flood-proofed, and buildings in floodplains must adhere to construction standards.



<p align="center">Table NR-1 Climate Change Related Policies</p>		
Issues	Topic	Policies¹
Community form	Compact development	<p>Land Use Element 1.1: Jobs and housing balance 2.1: Mixed-use projects in older commercial and industrial areas 2.4: Mixed-use projects with compatible uses and supporting public and community facilities 2.2: Transfers of development rights for high-rise office and residential structures 2.9: Mixed-use development to include ground floor retail</p> <p>Cultural Resources & Historic Preservation Element 1.4 and 1.5: Alternatives to building demolition</p> <p>Urban Design Element 1.4: Pedestrian-oriented places and connections 1.6: Street-oriented development, parking and commercial activities 2.1: Commercial corridors as pedestrian-friendly streets that balance mobility and accommodate compact development 2.4: Building design and orientation to promote active street life</p> <p>Economic Development Element 4.3: Lot consolidation for integrated development with improved pedestrian and vehicular circulation 5.4: Redevelop and rehabilitate underutilized and vacant lands and public rights-of-way</p>
	Commercial use locations	<p>Land Use Element 3.2: City business promotion and local patronage 3.4: Clean commerce and industry</p> <p>Urban Design Element 2.1: Pedestrian-friendly commercial corridors that balance mobility and accommodate compact development 2.2: Pedestrian and transit access through commercial and mixed-use corridors 2.5: Design standards for urban parks and open spaces within mixed-use corridors 4.6: Pedestrian linkages between commercial districts and neighborhoods 6.1: Development standards for high quality building and site design integrated with infrastructure and circulation 6.2: Infill development to benefit surrounding corridors/neighborhoods and provide additional park space</p> <p>Economic Development Element 4.2: Reduce land, infrastructure and environmental deficiencies within commercial corridors</p>



**Table NR-1
Climate Change Related Policies**

Issues	Topic	Policies ¹
	Industrial use locations	<p>Land Use Element 4.1: Maximize industrial land resources for industrial and office uses 4.3: Protect residents and the environment from impacts of industrial operations 4.4: Mixed office, industrial, and support commercial uses in light industrial areas 4.5: Environmentally friendly business atmosphere</p>
	Live-work uses	<p>Land Use Element 5.1: Targeted development of mixed-use, transit-oriented development surrounding the Santa Fe Depot 5.2: Adaptive re-use of industrial and agricultural historic structures</p>
	Access to employment centers	<p>Land Use Element 2.2: Transfers of development rights for high-rise office and residential structures</p> <p>Circulation & Mobility Element 3.3: Transit-oriented design within commercial, employment, medium density residential, and mixed-use areas</p> <p>Growth Management Element 1.8: Housing within close proximity to jobs and services 2.3: Match residents with local jobs to reduce long commutes and improve community fiscal and public health</p> <p>Economic Development Element 2.1: Public-private partnerships to support business and employment growth 2.5: Retention of existing retail businesses 3.4: Higher density residential and mixed-use projects to provide community-based workforce and market 7.1: Sites appropriate for housing development for all income groups that support commercial development 7.2: Mixed-use developments providing housing close to employment hubs</p>
	Open space management	<p>Land Use Element 1.5: Recreation, open space and visual resources in east Orange 1.7: Range of open space and park amenities to meet diverse needs 2.3: Transfers of development rights to promote creation of accessible open spaces 6.4: Open space to provide recreational opportunities, protect vistas and ridgelines, and conserve natural resources</p> <p>Natural Resources Element 1.1: Public-private funding mechanisms and management strategies to conserve open space 1.2: Land recycling opportunities for new public open space 1.3: Additional open spaces and access points adjacent to waterways and planned trails 5.3: Joint recreational use of open space land and facilities</p>



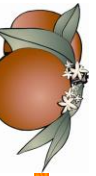
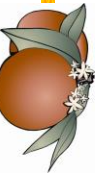


Table NR-1 Climate Change Related Policies		
Issues	Topic	Policies¹
		5.4: New public parks and open space resources through incentives and creative techniques 5.6: Identify areas currently underserved by open space, and develop programs to purchase land and build park amenities 5.7: Transfer of development rights to acquire and develop more publicly accessible open space Public Safety Element 2.2: Protecting critical public and private facilities located within floodplain and inundation areas 2.4: Reduce impervious surface area within new development Urban Design Element 4.5: Incentives to create neighborhood parks and green spaces, particularly within commercial and mixed-use corridors
	Wildfire safety	Public Safety Element 3.1: Identification and evaluation of new potential fire hazards and fire hazard areas 3.2: Non-traditional methods of controlling vegetation in undeveloped areas 3.3: Planting and maintenance of fire-resistant slope cover, stringent site design and maintenance standards, and use of native, non-invasive plant materials
	Economic adaptation to climate change	Infrastructure Element 5.4: Disaster mitigation strategies incorporated into City infrastructure master plans
City Operations	City of Orange as model	Natural Resources Element 2.9: City operations as model for energy efficiency and green building
	Low emission City vehicles	Natural Resources Element 2.10: Replace existing City vehicles with ultra low or zero emission vehicles and purchase new low emission vehicles
	Other	Land Use Element 7.4: Benefits from regional transportation, land use, air quality, waste management and disposal, and habitat conservation plans 7.5: Other agencies and service providers to minimize impacts of their facilities 7.6: Joint use agreements with other agencies to share existing and future public facilities among institutions Growth Management Element 2.1: Address regional issues and opportunities related to growth, transportation, and infrastructure
Ecosystems	Wildlife migration	Land Use Element 6.8: Integrate natural amenities and connections within design of urban and suburban spaces



**Table NR-1
Climate Change Related Policies**

Issues	Topic	Policies ¹
	Habitat management	<p>Land Use Element 6.12: Recognize value of natural and cultural resources in undeveloped areas</p>
		<p>Natural Resources Element 2.16: Protect in-stream habitat and natural stream and channel features 4.1: Preserve and protect native and habitat-supporting plant resources 4.2: Enhance the natural qualities of Santiago Creek to protect habitat and reintroduce native plants and animals 4.3: Reduce impacts of urban development on important ecological and biological resources 4.4: Repair or improve ecological and biological conditions in site development, redevelopment, and public improvements 4.5: Protect the Santiago Creek and the Santa Ana River corridors from premature urbanization</p>
	Tree protection and planting	<p>Land Use Element 6.9: Maximize landscaping along streetscapes and within development projects</p>
Energy Efficiency	Energy efficient technology	<p>Infrastructure Element 3.4: Use energy-efficient street lights 4.4: Integrated and cost-effective design and technology features within new development</p>
Green Building	Public education	<p>Natural Resources Element 2.7: Ensure adequate energy supplies to meet community needs, and promote energy conservation and public education programs</p>
	Efficient infrastructure systems	<p>Natural Resources Element 2.6: Sustainable building and site designs for new construction and renovation projects 4.4: Integrated and cost-effective design and technology features within new development</p>
Renewable Energy	Reduced fossil fuel reliance	<p>Natural Resources Element 2.2: Alternative transportation modes, alternative technologies, and bicycle- and pedestrian-friendly neighborhoods</p>
Transit	Adequate transit to employment centers	<p>Circulation & Mobility Element 3.3: Incorporate transit-oriented design within commercial, employment, medium density residential, and mixed-use areas</p>
	Systems along major corridors	<p>Circulation & Mobility Element 1.1: Integrated, hierarchical, and multi-modal system of roadways, pedestrian walkways, and bicycle paths Urban Design Element 2.1: Active, pedestrian-friendly streets and corridors that balance auto, transit and pedestrian mobility</p>
	Expanded passenger rail service	<p>Circulation & Mobility 3.1: Assess City public transportation needs and ensure delivery of services when and where they are needed 3.2: Convenient and attractive transit amenities and streetscapes to encourage use of public transportation</p>



<p align="center">Table NR-1 Climate Change Related Policies</p>		
Issues	Topic	Policies¹
	Non-motorized transportation	<p>Land Use Element 2.6: Transit, bicycle, and pedestrian sidewalks, paths, paseos, and trail systems in and around mixed-use areas 2.7: High-quality architecture, landscape design, and site planning of mixed-use projects, emphasizing pedestrian orientation and safe and convenient access</p> <p>Circulation & Mobility Element 1.4: Prohibit on-street parking to reduce bicycle/automobile conflicts in appropriate target areas 4.1: Comprehensive bicycle network integrated with other transportation systems, including Santiago Creek, the Santa Ana River, and the proposed Tustin Branch Trail 4.2: Racks and safe storage facilities at parking areas for City facilities 4.4: Provide adequate bikeway system signage, trail markings, and other amenities 4.5: Defensive trail design features, lighting, emergency access, and links to the roadway signal system 4.6: Abandoned rail corridors as segments of bikeway and pedestrian trail system 4.7: Accessible sidewalks and pedestrian amenities</p> <p>Natural Resources Element 6.1: Multi-use trail links that serve recreational and circulation purposes 6.2: Consistent, safe, and efficient maintenance of trails, and minimal trail impacts to the environment 6.3: Pursue joint use of local rights-of-way and easements for multi-use trails 6.5: Safe trail system interface with existing development 6.6: Integrated relationship between trails and developed areas</p> <p>Public Safety Element 9.1: Traffic control devices, crosswalks, and pedestrian-oriented lighting, within design of streets, sidewalks, trails, and school routes 9.2: Safe routes that encourage children to walk or bike to schools and recreational facilities 9.3: Remove barriers to pedestrian and bicycle access</p> <p>Noise Element 2.3: Alternative transportation modes to minimize traffic noise</p> <p>Growth Management Element 1.7: Expansion and development of alternative methods of transportation</p> <p>Infrastructure Element 3.5: Preserve and improve existing on-street bike paths within rights-of-way</p>



**Table NR-1
Climate Change Related Policies**

Issues	Topic	Policies ¹
	Transit-supporting facilities	<p>Circulation & Mobility Element 2.7: Use of rail corridors for the movement of freight and goods</p> <p>Growth Management Element 1.9: New development incorporates non-motorized and alternative transit amenities 2.5: Provide bus shelters, shade, and other special streetscape treatments at transit stations that encourage use of regional bus and train services</p>
Transportation	Shorten travel distances	<p>Growth Management Element 2.4: Infill development and mixed-use opportunities wherever possible as developable space becomes more limited</p>
	Technical solutions	<p>Growth Management Element 1.12: Traffic reduction strategies within the City’s Transportation Demand Management Ordinance</p>
	Roadway maintenance and design	<p>Land Use Element 5.7: Roadway improvements within Old Towne designed to promote walkability and a safe pedestrian environment 5.9: Promote attractive and safe pedestrian access between the Santa Fe Depot and the Plaza</p> <p>Circulation & Mobility Element 1.3: Improve street capacity and increase safety on City arterials and neighborhood streets</p> <p>Growth Management Element 1.4: Transportation impact fees for improvements within the City and within established County Growth Management Areas 2.2: Maintain and expand roadway and bikeway systems</p> <p>Infrastructure Element 3.6: New developments funds fair-share costs associated with City provision of right-of-way maintenance services</p>
Air quality	Reduce vehicle emissions	<p>Natural Resources Element 2.1: Implement and enforce regional air quality management plans 2.2: Support alternative transportation modes, alternative technologies, and bicycle- and pedestrian-friendly neighborhoods</p>
	GHG emission reduction strategies	<p>Natural Resources Element 3.1: Evaluate the potential effects of climate change on the City’s human and natural systems and prepare strategies that allow the City to appropriately respond and adapt 3.2: Develop and adopt a comprehensive strategy to reduce greenhouse gasses within Orange to at least 1990 levels by 2020</p>
Water management	Water use efficiency and reduced consumption	<p>Natural Resources Element 2.3: Native and drought-tolerant plants, proper soil preparation, and efficient irrigation systems for landscaping</p>





Table NR-1 Climate Change Related Policies		
Issues	Topic	Policies¹
		2.4: Recycled and reclaimed water for landscaping projects 2.11: Ecological integrity and health of watersheds 2.12: Protect the quantity and quality of local groundwater supplies 2.13: Control surface runoff water discharges into the stormwater conveyance system 2.14: Reduce pollutant runoff from new development through use of Best Management Practices 2.15: Minimize impervious surfaces and associated urban runoff pollutants in new development and redevelopment Infrastructure Element 1.2: Correct deficiencies in the City’s infrastructure systems and work toward environmentally sustainable systems 1.3: Water conservation programs aimed at reducing demands 1.4: Environmentally efficient infrastructure improvements 1.5: Cost-effective methods to reduce storm water infiltration into the sewer system 1.6: New development to fund fair-share costs associated with water, sewer, and storm drain service
Waste reduction	Waste management and recycling	Natural Resources Element 2.5: Local and regional waste-reduction and diversion goals Infrastructure Element 2.3: Programs for residents to donate or recycle surplus furniture, old electronics, clothing, and other household items 2.4: Outreach and education to all City customers regarding residential collection of household hazardous wastes
	Solid waste reuse	Infrastructure Element 2.2: Expand outreach and education regarding recycling opportunities
Note: 1 – Policies are abbreviated for presentation in this table. Please refer to the text of each policy in the identified General Plan element and corresponding Implementation Programs in the General Plan Appendix.		



The City will continue to require flood/storm control facilities for proposed development and redevelopment projects, and upgrade street storm drains to deal with potential flooding hazards. These programs not only take into account the potential flood events now, but are adaptable enough to account for a potential increase.

Water Supply

Several recent studies have shown that existing water supply systems are sensitive to climate change; however, experts are uncertain about what the overall effects will be on water supply. Some models indicate that drier conditions will cause decreased reservoir supplies and river flows. Other models predict wetter conditions with increased reservoir inflows and storage, and increased river flows. Although there is some uncertainty, it is widely accepted that changes in water supply will occur and that water yields from reservoirs are expected to be unreliable. Whether or not climate change is responsible, Orange must prepare for a future where competition for water resources is even greater than at the present time.

Many of the policies and programs governing water resources under Goal NR-2 will serve to prepare the City for the possible consequences of climate change on water supply. Such policies include protecting groundwater supplies, using native or drought-tolerant plants in landscaping, using recycled water in irrigation, and promoting other water conservation efforts.

Climate Action Plan

Primary among the City's climate change planning efforts is the development and adoption of the City of Orange Climate Action Plan (CAP), as outlined in the General Plan Implementation Program Appendix. The City will develop and adopt the CAP by December 31, 2012. The CAP will address both GHG emissions from activity within Orange (residential, commercial, industrial, and transportation sectors) and the emissions specifically from City government operations. The plan will first create a GHG emissions inventory for the base year and forecast GHG emissions for the year 2020. The Plan will determine the quantity of emissions to be reduced to meet the GHG reduction target of 15 percent below current levels by 2020.

Together, the policies contained in the General Plan and additional GHG reduction measures to be developed as part of the CAP will allow Orange to respond to this critical issue. Achieving the targeted GHG reductions and successful adaptation to the effects of climate change will demand genuine and significant effort from civic leaders, residents, and businesses.

Ecological, Biological and Mineral Resources

In order to ensure preservation of plant and wildlife resources, some land must be protected from development to provide areas for native plants and wildlife to thrive. Additionally, many significant mineral resources are present within the City. The following sections describe the City's approaches to conservation of ecological, biological, and mineral resources.

Ecological and Biological Resources

Though a large part of Orange consists of urbanized areas that generally have low habitat value for wildlife, a significant amount of land in east Orange, Santiago Oaks Regional Park, and Peters Canyon Regional Park is set aside as open space, which includes the Irvine Ranch Land Reserve



(IRLR) and the Nature Reserve of Orange County (NROC) established by the Central/Coastal Orange County NCCP. These areas contain valuable ecological and biological resources.

Important vegetation communities located in these areas include coastal sage scrub, woodlands, grasslands, chaparral, and riparian habitat. Characteristic vegetation species associated with scrub habitat include coastal sage brush and various species of sage and buckwheat. Woodland communities are multilayered, non-riparian, with tree canopies that have 20 to 80 percent tree cover. Local grassland communities consist of native bunchgrasses and non-native annual grasses. Chaparral communities are characterized by sclerophyllus shrubs. Species found in riparian habitats are associated with and dependent upon bodies of water, such as streambeds.

Sensitive wildlife, fish, amphibian, and reptile species in these Orange habitats include Santa Ana speckled dace, Western spadefoot toad, Southern pacific pond turtle, banded gecko, horned lizard, orange-throated whiptail, silvery legless lizard, coast patch-nosed snake, mountain kingsnake, two-striped garter snake, and the northern red-diamond rattlesnake. Sensitive bird species include the double-crested cormorant, osprey, white-tailed kite, northern harrier, sharp-shinned hawk, cooper's hawk, Swainson's hawk, Ferruginous hawk, golden eagle, Merlin, American peregrine falcon, prairie falcon, Western burrowing owl, long-eared owl, southwestern willow flycatcher, loggerhead shrike, least Bell's vireo, California horned lark, coastal cactus wren, gnatcatcher, California yellow warbler, yellow-breasted chat, rufous-crowned sparrow, Bell's sage sparrow, grasshopper sparrow, tricolored blackbird, and the black-chinned sparrow. Sensitive mammal species include the pallid bat, pale big-eared bat, California mastiff bat, pocketed free-tailed bat, small-footed myotis, yuma myotis, San Diego black-tailed jackrabbit, dulzura pocket mouse, northwestern San Diego pocket mouse, southern grasshopper mouse, San Diego desert woodrat, American badger, and mountain lion.

The City's main approach to conserving the many ecological and biological resources in the planning area is participation in the Orange County NCCP. Orange lies within the Coastal subregion of the Orange County NCCP. In 1996, the County of Orange and participating jurisdictions approved the Central and Coastal Subregion NCCP and an associated Implementation Agreement. Both the City of Orange and The Irvine Company are signatories to this agreement. Three species were designated as "target species" by the NCCP to be used as umbrella species to guide the design of a permanent habitat system within the Central and Coastal Subregion. The three species are the coastal California gnatcatcher, coastal cactus wren, and the orange-throated whiptail lizard, all of which are currently on the federal list of threatened or endangered species. By providing long-term protection for habitat required by the three target species, sufficient coastal sage scrub (CSS) and other habitat would be protected to benefit a much broader range of CSS-related species.

The 37,000-acre NCCP Habitat Reserve area borders the eastern portion of the planning area on the north and south, and includes portions of Santiago Hills II and east Orange. As shown in Figure NR-3, areas designated as NCCP Habitat Reserve include areas surrounding Irvine Lake, Santiago Reservoir, Peters Canyon Reservoir, and along Cannon Street at the "El Modena Open Space Area." Within the Habitat Reserve area, the NCCP restricts the kinds of permitted uses to protect long-term habitat values. Residential, commercial and industrial uses are prohibited, as are new active recreational uses outside already disturbed areas. However, the NCCP recognizes that some new non-habitat uses, particularly involving public infrastructure, will need to be sited in the Reserve area, and that some current uses will be maintained. New recreational facilities



will be sited in locations compatible with habitat protection based on the understanding that recreational use is subordinate to habitat protection within the reserve. The Reserve area is administered by the NROC, which includes representatives of the U.S. Fish and Wildlife Service, California Department of Fish and Game, participating landowners, and three public members. Implementation of the Reserve policies will protect sensitive plant and wildlife species in accordance with the NCCP.

Substantial area is also designated as Non-Reserve Open Space located primarily in the East Orange area. Non-Reserve Open Spaces designate regional open spaces that were in public ownership prior to adoption of the NCCP. A “special linkage area” is also designated along the Southern California Edison corridor that traverses the northern portion of the City and along Santiago Canyon Road in East Orange. These open spaces are not subject to the development requirements associated with the Reserve system, but they are recognized as integral components of the overall subregional conservation strategy.

The City’s General Plan land use designations in these areas conform to the NCCP in that all areas currently proposed for urban development are areas identified as permitted for development and “take” by the Central/Coastal NCCP. All remaining areas are designated Open Space. Landowners in Orange who have properties within the boundaries of the NCCP Reserve area are classified as either “participating landowners” or “non-participating landowners.” Participating landowners have the option to develop their properties without preparing a Habitat Conservation Plan (HCP). The Irvine Company is the City’s only participating landowner. The Irvine Company donated the 50,000-acre Irvine Ranch Land Reserve to the NCCP, and pays for the management of the area as part of the mitigation plan for new development in the easternmost portion of the planning area. Lands located within the Reserve must be “reserved in perpetuity as open space and for recreational purposes.” As a participating jurisdiction, the City is responsible for project review for participating landowners. The City is responsible for ensuring that non-participating landowners have paid “in-lieu” fees to the NROC for the native areas that will be removed due to development. In this case, the City is also responsible for coordinating with the NROC to make sure that the development is not in a restricted native open space area. The City will continue to ensure that all development proposals conserve the greatest amount of open space possible.

The City is committed to the protection and preservation of plant and wildlife resources, and will ensure the preservation of such resources wherever possible. The City will also encourage the use of native landscape materials in new and renovated project sites.

Mineral Resources

Mineral resource deposits in Orange are primarily limited to the sand and gravel resources contained in and along the Santa Ana River and Santiago Creek. Sand and gravel resources are referred to collectively as “aggregate.” Aggregate is the primary component of Portland cement concrete, a material widely used in the construction industry. The state requires general plan land use policy to recognize the importance of these deposits to the region’s economy. As these resource deposits are important to the region’s economy, the City will evaluate development proposals within these areas, and ensure adequate mitigation or preservation of the areas for future aggregate mining activity.

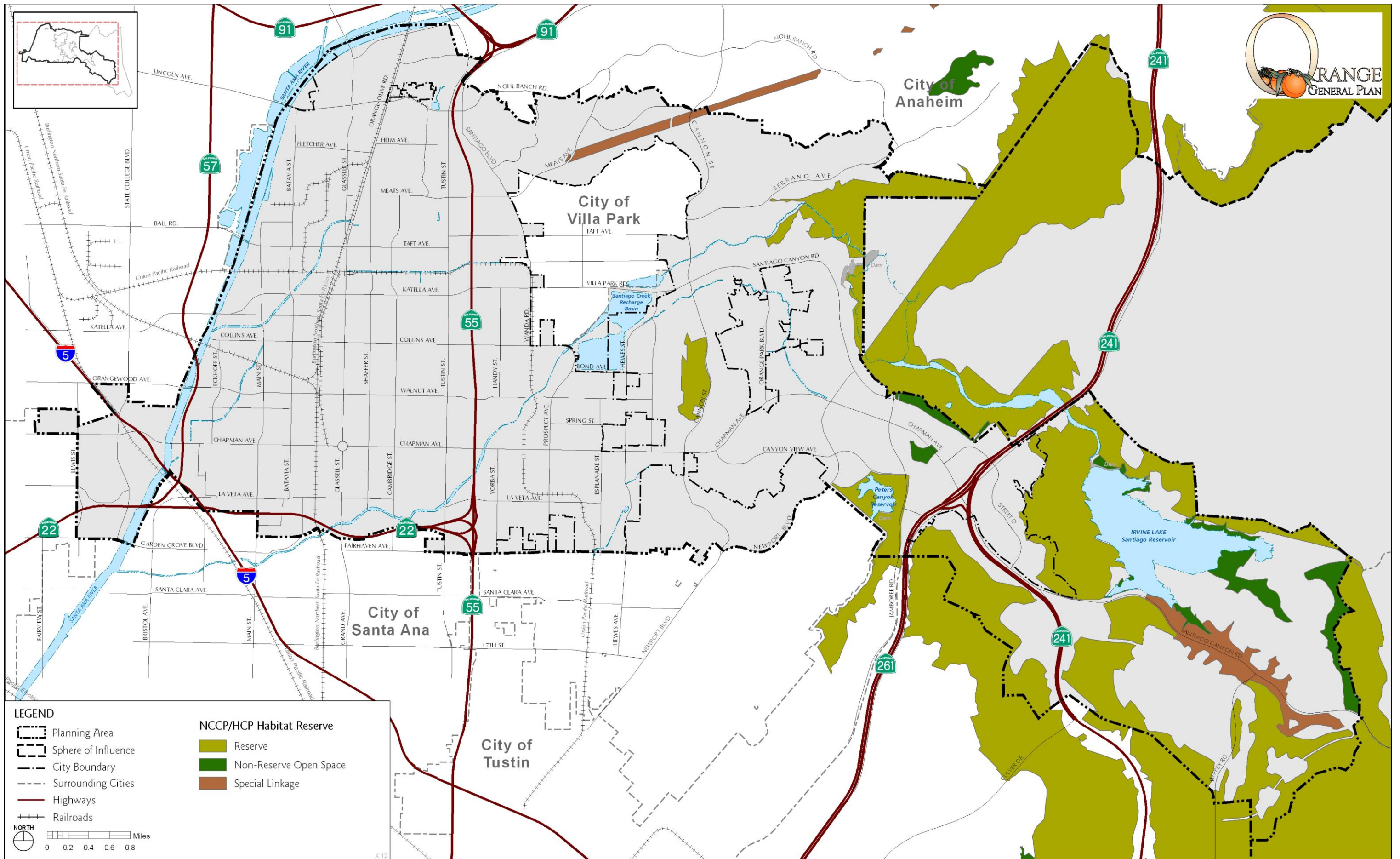


Figure NR-3 NCCP Habitat Reserve Area



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The Land Use Element provides a means to protect the aggregate resource areas from premature urbanization. Historically, Orange contributed to the gravel industry, but the City's mineral resources have been mostly exhausted. Over the years, Orange has been characterized by numerous state-designated Mineral Resource Zones (MRZs), which identify the locations of regionally significant aggregate deposits. The MRZs have since been declassified, either as a result of completed mining activity, or as a result of urban development.

However, the Land Use Policy Map (in the Land Use Element) designates an area comprising and surrounding the two groundwater recharge pits (Bond Pits) on Santiago Canyon Road within the northeastern portion of the City as a Resource Area for the purpose of conserving mineral resources and allowing mining activities. Additionally, the approximately 18-acre site of the R.J. Noble Company, which lies within the northwestern unincorporated portion of the planning area, is another Resource Area currently used for aggregate extraction and crushing operations. Portions of Irvine Lake in East Orange that are currently designated as Open Space may be used in the future for desilting activities, with the possibility of aggregate extraction.

The Resource Area land use designation allows for only aggregate extraction or recreation uses. Although the Open Space designation does not permit mining, it will protect areas from urbanization, making it possible to mine the areas at some future date if necessary. Areas containing mineral resources protected in this manner include the resource zones at the west end of Lincoln Avenue, areas adjacent to Santiago Creek, and the north, east, and west sides of Irvine Lake in East Orange. The mineral resource areas in East Orange would also require amendment to the NCCP before extraction could occur.

Visual and Aesthetic Resources

Preservation of ridgelines and steep hillsides is an important objective for the City, for both aesthetic and public safety reasons. To that end, Orange has adopted a hillside grading policy that prohibits grading on ridgelines designated Open Space Ridgeline on the Land Use Policy Map. Wherever hillside grading occurs, the policy requires that graded slopes must be contoured and extensively landscaped with native vegetation or other compatible plant materials.

The largely undeveloped Santiago Hills II and East Orange portions of the planning area have many scenic resources that include Irvine Lake, grassy valleys, rugged hillsides, rock outcroppings, and winding canyons. People traveling along Santiago Canyon Road have spectacular views of these abundant scenic resources. These views should be protected while still allowing development to occur. As identified on Figure NR-4, the City will work to designate Santiago Canyon Road as a City Scenic Highway, and will develop standards for appropriate treatment of the roadway and its surroundings.

In the more urbanized areas of the City, boulevard landscaping can effectively provide a sense of visual open space. The City will review and strengthen landscaping standards as necessary to provide green areas within commercial and industrial districts, consistent with strategies outlined in the Urban Design Element.

The City will also promote provision of street trees on City streets, in accordance with the *Street Tree Master Plan*. The City of Orange currently has over 22,000 public street trees along residential and arterial streets. The *Street Tree Master Plan* was adopted in 1999 in an effort to provide guidelines for all future street tree planting projects, as well as for the removal and



replacement of trees and shrubs on public rights-of-way or streets. An update to the *Street Tree Master Plan* will be completed to emphasize aesthetics, theme, and maintenance of both trees and sidewalks. The Master Plan update will also consider safety issues posed by street tree debris and roots.

The City will also continue to enforce its Street Tree Ordinance and Tree Preservation Ordinance as part of the City of Orange Municipal Code. The Street Tree Ordinance has clear specifications and requirements for the planting, removal and maintenance of trees and shrubs. The Tree Preservation Ordinance provides protection for healthy, mature trees on private property and provides criteria under which trees may be removed. The *Street Tree Master Plan*, Street Tree Ordinance, and Tree Preservation Ordinance will help preserve and manage the City’s urban forest, and maintain the City’s Tree City U.S.A. status.

To reduce visual clutter along commercial corridors, the City will work with utility providers to identify existing arterial corridors that would benefit from moving overhead utilities underground and improving the placement of utility service boxes, consistent with the City’s *Utility Undergrounding Master Plan*. Undergrounding minimizes unsightly views of utility lines, which are currently prominent in areas such as the Lincoln Avenue corridor. The City will also encourage developers of all new infill projects to include underground utilities. Where placing utilities underground is not feasible, the City will work with utility providers and developers to relocate utilities away from arterial roadways. The City will also update and implement the sign provisions of the Zoning Ordinance to reduce visual clutter caused by signage and improper setbacks.

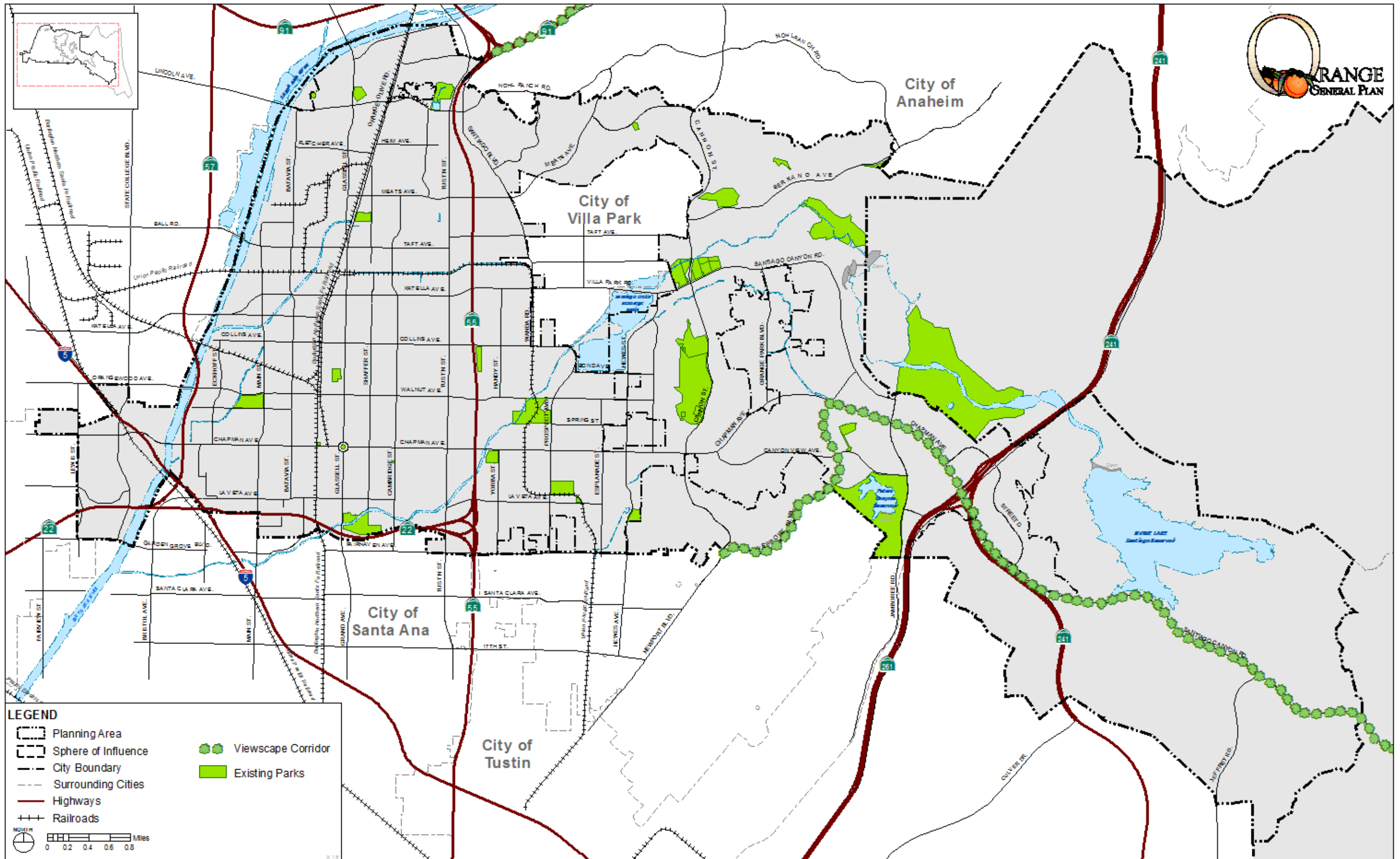
Parks and Recreation Plan



Parks and recreation facilities are vital resources for the City. They provide residents with a broad range of health benefits, and the quality of these resources helps attract new residents and businesses to Orange. The City currently lacks adequate lands designated for public parks and open space to meet the recreational needs of its residents. Park facilities and recreation programs are essential to the health and economic well-being of Orange residents. The City has made improving its park system and recreational programs a high priority so that all residents

can enjoy close access to a playground, a park, or a natural area. The City offers a full range of recreational programs and facilities that are heavily used by people of all ages.

This section of the Natural Resources Element establishes long-range strategies and standards for the maintenance of existing park facilities and the development of new parks and recreational programs in Orange. This plan will serve as a basis for future park facilities planning. In addition, the Element identifies standards that apply not only to the development of future parks and facilities, but also to the type and nature of sites and facilities obtained through purchase or dedication, as well as their intended role in the community.



Source: City of Orange 2015

Figure NR-4 Viewscope Corridors



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A number of key issues will continue to affect the City's ability to maintain and expand recreation facilities and services in coming years. First, the easternmost portion of the City will continue to experience a substantial amount of residential development. The increased population will require a full range of services, including those related to parks and recreation. These needs are addressed by the parklands provided in the development plan for East Orange. The recreation needs of the older, well established neighborhoods in Orange will also have to be monitored, particularly in light of the combined public desire for more parkland and the expanded opportunities for mixed-use residential and commercial development advocated by the Land Use Element

Additional issues and concerns that will have a bearing on the future maintenance and development of parks and recreation facilities include the following:

- Orange will find it increasingly difficult to finance major capital improvements for parks. In addition, obtaining land for new park sites in the western portion of the city is challenging because the amount of undeveloped land is limited, and costs and competing priorities for this land have increased.
- Orange is presently deficient in improved recreational open space, according to standards established by the National Recreation and Parks Association (NRPA). A number of park sites have been acquired that, when developed, will reduce the gap between the standards and available parkland. Also, school grounds, through joint use agreements with the City, will help to meet parkland needs.
- Orange maintains and provides a wide range of specialized facilities such as game courts, athletic fields, and community buildings in existing parks. However, additional facilities are needed to meet future demands.
- A number of easements, including those for flood control, rail lines, and utilities, are located in Orange and present the City with unique opportunities to expand the existing system of trails and bikeways.
- Recent trends in land use law will make it increasingly difficult for the City to reserve private open space lands for future recreational use.

Park Types

A Master Plan for the City's park facilities and recreation and community services was completed in November 1999. The *Master Plan for Parks Facilities* establishes an organized and structured process for the development of new recreation facilities and the renovation of existing City parks and facilities. The Plan also discusses the preservation of open space and the development of new recreational programs.

The City maintains three types of park facilities: neighborhood parks, community parks, and special use recreational facilities.

Neighborhood Parks (4 to 10 acres) provide for the daily recreation needs of residents in the immediate area. Typical facilities may include landscaped picnic areas, tot lots, hard court areas, multipurpose ball fields, and limited parking.



Community Parks (15 to 40 acres) are larger in scale and provide a greater variety of recreational opportunities and facilities. Six of the community parks (Hart, Grijalva, El Camino Real, El Modena, Handy, and Shaffer) host active organized sports leagues and have lighted sports fields. Special use recreational facilities provide a wide range of activities to serve the community. These facilities include joint-use properties and historic community assets such as Plaza Park, Pitcher Park, and Depot Park and Veterans Memorial.

Orange’s parks also provide passive recreation opportunities that include walking, hiking, and biking. Most of the parks have picnic sites, many with barbeques. Programs for seniors are available at the Orange Senior Center. The senior program is largely funded by the City and administered by a non-profit organization. Orange also provides a wide variety of recreational programs for all ages. Many of the programs are joint ventures with local nonprofits, commercial vendors or volunteer groups. The most popular activities include swimming and sports.

Parks Inventory and Acreage Standards

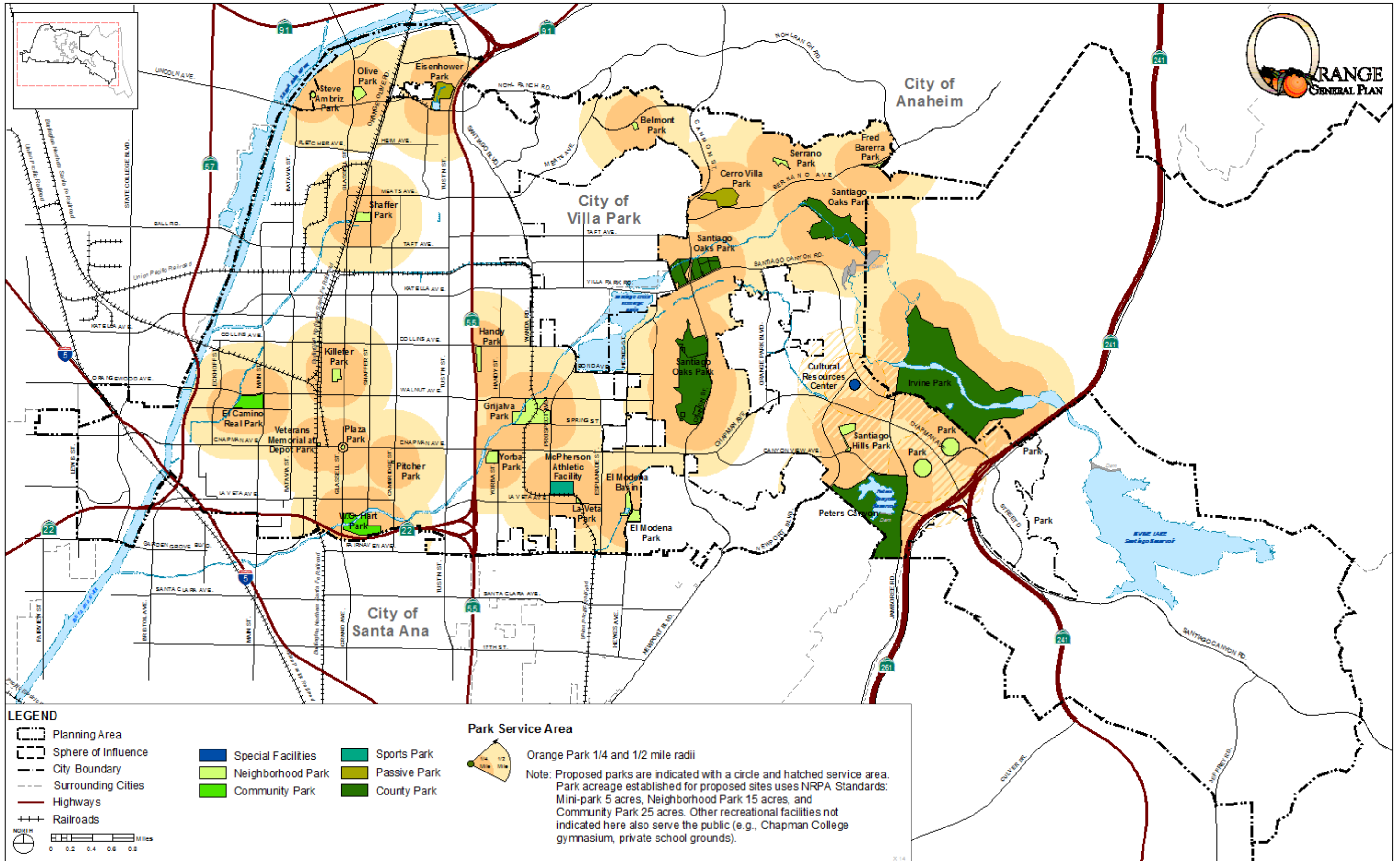
Figure NR-5 shows the locations of City parks and recreation facilities, and Table NR-2 provides a summary of the City’s existing parks, recreation and joint-use facilities, future planned City parks, and County regional parks.

The City owns and has developed 22 parks, which consist of about 246 acres of parkland, and also enjoys about 19 acres of additional joint-use school/City recreation facilities. Additional parkland is planned in the eastern portion of the planning area. A combination of active and passive neighborhood parks, as well as a sports park, will be developed to serve the new population in East Orange. The City may also consider the use of joint school/park facilities if the option presents itself.

The precise location and size of future parks will be defined in conjunction with the approval of specific development plans and as further elaborated on in the future preparation of planned communities or specific plans. Because of proximity in East Orange to the existing or proposed natural and/or active regional parks, along with the extent of scenic open space preserved in the immediate area, the emphasis on park planning should be on active neighborhood or sport park facilities.

Table NR-3 presents estimates of the City’s current and future ratios of parkland per 1,000 persons. Separate ratios are presented for facilities provided or planned for by the City and those provided or planned for by the County.

To calculate the parkland ratio per 1,000 residents, the acreage of currently developed City parks, City open space areas, and joint-use recreation facilities listed in Table NR-2 are combined for a total of about 251 acres. Given the City’s estimated 2020 population of 140,065, this equates to a current ratio of 1.79 acres of current parkland per 1,000 persons, which is notably lower than the National Recreation and Park Association’s recommendation of 3 acres per 1,000 population. According to this recommendation, the City has a current park shortage of approximately 169 acres. However, City residents also enjoy access to approximately 1,187 acres of County regional parks. If regional parks are factored into the



Source: City of Orange 2015

Figure NR-5 Parks Master Plan



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**Table NR-2
Orange Park System Inventory**

	Location	Date Acquired (for City parks)	Acres	Function
Belmont Park	4536 E. Via Escola Ave.	1994	2.50	Neighborhood
Cerro Villa Park	5850 Crest de Ville	1971	26.70	Open space
Eisenhower Park	2864 N. Tustin Ave.	1969	16.46	Community
El Camino Real Park	400 N. Main St.	1978	18.67	Community
El Modena Basin	Hewes St. & Jordan Ave.	1973	7.37	Neighborhood
El Modena Park	555 S. Hewes St.	1974	9.32	Neighborhood
Fred Barrera Park	8380 East Serrano Ave.	2006	3.00	Neighborhood
Grijalva Park at Santiago Creek	368 N. Prospect Ave.	2003	37.00	Community
Handy Park	2143 E. Oakmont Ave.	1978	7.31	Neighborhood
Hart Park	701 S. Glassell St.	1934	41.76	Community
			12.00	Open space
Killefer Park	615 N. Lemon St.	1956	4.95	Neighborhood
La Veta Park	3705 E. La Veta Ave.	1956	1.62	Neighborhood
			1.00	Open space
Olive Park	2841 N. Glassell St.	1975	8.02	Neighborhood
Pitcher Park	204 S. Cambridge Ave.	1992	0.50	Special use
Plaza Park	Plaza Circle	1886	0.72	Special use
Santiago Hills Park	8040 E. White Oak Ridge	1990	7.95	Neighborhood
Serrano Park	2349 Apache Creek Dr.	2004	4.00	Neighborhood
Shaffer Park	1930 Shaffer St.	1964	7.32	Neighborhood
Veterans Memorial at Depot Park	100 N. Atchison St.	1887	0.44	Special use
Yorba Park	190 S. Yorba St.	1962	8.54	Neighborhood
Steve Ambriz Memorial Park	610 Riverbend Parkway	2008	10.50	Neighborhood
<i>Subtotal Current City Parks</i>			237.65	
Fred Kelly Stadium	3920 Spring St.		2.00	Joint-use (OUSD)
McPherson Athletic Facility*	333 S. Prospect Ave.	1997	9.00	Joint-use (OUSD)
Santiago Canyon College	8045 E. Chapman Ave.		2.58	Joint-use (RSCCD)
<i>Subtotal Current Joint-use Agreements</i>			13.58	
Irvine Company I	East Orange	N/A**	6.00	Neighborhood
Irvine Company II	East Orange	N/A**	3.00	Neighborhood
<i>Subtotal Planned Future Parks</i>			9.00	
<i>Subtotal City Current and Planned Future Parks and Joint-use Facilities</i>			260.23	
Irvine Regional Park	East Orange	N/A***	477	Regional Park
Santiago Oaks Regional Park	Northeast Orange	N/A***	356	Regional Park
Peters Canyon Regional Park	East Orange	N/A***	354	Regional Park
<i>Subtotal County Regional Parks</i>			1,187	
Total Park Acreage			1,447.23	

Sources: Orange Master Plan for Park Facilities, 1999; Community Services Department staff interview, 2015; Orange County Parks Department, 2007.

Notes:

* Although the McPherson Athletic Facility encompasses 18 acres, the City of Orange only uses the facility half of the time. This results in the designation of 9 acres of joint-use acreage allocation.

** Planned future parks scheduled for construction.

*** Regional parks not owned by the City.



**Table NR-3
Park Ratio Calculations**

	Current (2020) Population: 140,065		Future (post-2030) Population: 178,471	
	Acres	Ratio (Acres/ 1,000 Population)	Acres	Ratio (Acres/ 1,000 Population)
City parks, open spaces and joint-use facilities	251.23	1.83	260.23	1.46
County regional parks	1,187	8.47	1,187	6.65
Total	1,438.23	10.27	1,447.23	8.12

Note: Population totals, City park acreages, and resulting ratios are based on the 2007 incorporated City limits. They do not include the City's sphere of influence, where parks are provided and maintained by the County of Orange.

parkland ratio, the ratio improves to approximately 10.27 acres of parkland per 1,000 population.

If further growth occurs in accordance with policies described in the Land Use Element, Orange's population may increase to approximately 178,471 at some point in time after 2030. Assuming that the planned park improvements in east Orange (described in Table NR-1) are completed prior to 2030, this would result in a future ratio of 1.46 acres of parkland per 1,000 residents. Approximately 275 acres of additional parkland beyond the planned parks in east Orange is required to achieve the recommended ratio of 3 acres per 1,000 population. An additional 632 acres would be required to achieve the *desired* ratio of 5 acres per 1,000 persons, as stated in General Plan policy. If County regional parks are factored into the ratio, the future ratio would be approximately 8.1 acres of parkland per 1,000 population.



Strong demand and immediate need exist for more parks, accessible open spaces, active recreational areas, and well-lit multi-use facilities in Orange. The current shortage of parkland in Orange has caused the City to develop joint-use facilities agreements, specifically with the Orange Unified School District (OUSD) and Rancho Santiago Community College District. Although joint-use arrangements have been successful, they are sometimes difficult to implement, and result in the City being able to claim only 50 percent of the use or effectiveness of a facility toward its objectives.

New Parks and Recreation Facilities

Because City residents will benefit from additional parkland and recreation programming, Orange will work actively to acquire, build, and maintain additional parkland and park facilities. Specifically, the City will pursue adding approximately 246 acres of additional parkland beyond the inventory of current and planned facilities listed in Table NR-2, in order to achieve a minimum parkland ratio of 3 acres per 1,000 persons by 2030, working toward a desired ratio of 5 acres per 1,000 persons by 2050. The City will evaluate progress toward achieving this goal in a report to the City Council and community every five years.



As a separate, but compatible, objective, the City will work with the County to facilitate the provision of overall parkland, inclusive of both City facilities and County regional parks, at a ratio of 10 acres per 1,000 population. Achieving this objective by 2030 would require acquisition of an additional 303 acres of parkland beyond the inventory listed in Table NR-1, and this additional acreage could be provided by either the City or the County.

To support these objectives, the City will require dedication of parkland at a rate of 3 acres per 1,000 anticipated residents or payment of in-lieu fees for new residential projects. Payment of in-lieu fees constitutes sufficient mitigation for parks impacts under California law, and new development projects cannot be required to directly mitigate existing parkland deficiencies. However, the City will utilize fees collected to the fullest extent possible to improve current park facilities and to acquire additional lands for the construction of new parks.

To increase incentives for new projects to provide viable, active park space, and to help compensate for current parkland deficiencies, the City will offer a variety of development incentives, including transfer of development rights (TDR) strategies, to developers of residential or mixed-use projects who are willing to provide community open space in excess of the standard 3 acres per 1,000 persons requirement. TDR refers to a method of transferring development rights from one property to another or from one part of a property to another part of the same property. In this context, a TDR would allow for conservation of open space or creation of a new community park at one location, in exchange for increased density or larger building sizes at another location. Furthermore, the City will continue to pursue all available joint-use opportunities with school districts, community college districts, and institutions, including Chapman University, in an effort to increase the utility of spaces throughout the City that are already functioning as open space. In its reviews of mixed-use developments within the focus areas established in the Land Use Element, the City will encourage such developments to include not only required park space but also common open spaces, portions of which may be required to be accessible to the public.



Meeting the stated needs for additional recreational open space will also require the City to pursue new types of parks and open spaces, such as pocket parks, linear parks, public plazas and paseos. Provision of these spaces is strongly encouraged by land use policy supporting the development of mixed-use residential and commercial areas in the Land Use Element.

The City will also acquire land for, build, and maintain parks currently identified in the *Master Plan for Parks Facilities*, and will amend the Master Plan on a periodic basis to reflect current conditions. The City's Park, Planning and Development Commission is currently working through the planning stages of several new parks throughout the City, which are identified within the *Master Plan for Parks Facilities*.



Site Selection Standards for New Parks

The City of Orange and areas within the City's sphere of influence have grown considerably in recent decades. While the rate of growth in the future is difficult to predict, thousands of new housing units will be constructed during the next several decades, both in east Orange and within the focus areas established in the Land Use Element. This in turn will require the development of new parks and facilities, and of convenient ways to access them.

A major goal of the City's Community Services Department is to make sure that all future park sites obtained through dedications or purchases are adequate in terms of meeting the recreational needs of the City. A "park" that is inaccessible, lacks usable open space, or is otherwise constrained has limited utility to the residents it is designated to serve. To ensure that this does not happen, the following standards are established to apply to the acquisition of new parkland:

- The service area should not be divided by natural or man-made barriers such as arterial highways, railroads, freeways, and commercial or industrial areas that would render the site inaccessible or undesirable as a park.
- Neighborhood parks should be located adjacent to elementary schools whenever possible. The primary consideration should be whether the existing school has adequate play space to serve both its educational needs and the needs of the neighborhood for playground space.
- The site for a community park should be of sufficient size to include a recreation building unless adjacent school facilities can be designated to serve public uses when school is not in session.
- The site for a neighborhood park should have street frontage. If it is located where adjacent streets are not sufficient for parking, the site should have a parking lot. Community park sites should have direct access to an arterial street.
- All neighborhood and community park sites should be accessible by foot, by bicycle, or within a short drive.

Santiago Creek and the Santa Ana River

Santiago Creek is one of a limited number of natural creeks in southern California, and provides recreational, ecological, flood control and cultural benefits to the City. Orange residents strongly identify with the Creek, and are unified in their desire to preserve the natural characteristics of the Creek, and to use it as a link that connects City parks and other gathering places. Residents also seek long-term preservation of the hydrologic and ecologic functions of the creek.

In 1999, the City applied for, and was granted, technical assistance from the National Park Service Rivers, Trails, and Conservation Assistance Program to prepare a conceptual master plan for Santiago Creek. The plan addresses three major components: recreation trails, open space, and flood control. The City will continue to work toward implementation of its recommendations, consistent with General Plan policies concerning the Creek.



The Santa Ana River also provides important flood control benefits and recreational opportunities for City residents. Current and planned land uses located along the Santa Ana River are among the City's highest intensity uses, providing great opportunities to improve access to the recreational trails that follow the River. The City supports future development of highly-visible access points to the River, particularly at Chapman Avenue, Katella Avenue, and Lincoln Avenue. Also, the City seeks to partner with the City of Anaheim, resource agencies, water districts, the Orange County Flood Control District, and community organizations to complete a vision plan for the Santa Ana River, similar to efforts currently underway for Santiago Creek. A key objective of the vision plan should be achieving more flexible use of the Santa Ana River corridor as a recreational amenity.

For both Santiago Creek and the Santa Ana River, the City supports preserving undeveloped portions of the waterways to support riparian habitat areas and improve surface water quality. Such preservation would be accomplished through the use of Open Space land use designations. For portions of Santiago Creek that abut developed areas, the City desires that future commercial and residential projects respond to the presence of the creek as a community and ecological amenity to be incorporated in their site plans, building design and orientation, and landscaping.

Recreational Programs and Services

The City will also establish an ordinance to provide opportunities for funding for recreational services and facilities. Additionally, Orange will off-set and minimize impacts to the existing system caused by increased population associated with new residential development.

Comprehensive Trails Network

Trails serve important transportation and recreational needs for both City residents and visitors. They also help link the community through greater accessibility between neighborhoods, employment and retail centers, civic and cultural areas, nature areas, and schools. Pedestrian trails and bikeways enhance Orange's community mobility, provide opportunities for recreation and exercise, and also reduce dependence on the automobile. Orange's warm, dry climate and generally flat landscape make it perfect for walking and bicycling amenities such as trails, walkways and bike paths.

The City experienced tremendous growth in the 1980s. During the 1989 General Plan update, the City Council identified a need for additional recreational opportunities and recognized that construction on previously undeveloped areas rendered many "open spaces" no longer usable or accessible to the public. Recognition of this need was the motivation for development of the *Recreational Trails Master Plan* in 1993. Master Plan objectives include: goals for development of the trails system, a set of design standards, and an implementation and management maintenance program. Implementation of the Master Plan relies on the combination of City efforts and the efforts of a dedicated, well-informed and highly organized group of trail activists who devote their time and economic resources to preserving and enhancing current trails and to developing and maintaining new trail opportunities.

NATURAL RESOURCES



The City is pursuing strategies for the maintenance and enhancement of the following community trail assets:

- Over 70 miles of existing trails
- Numerous City and County administered parks and open spaces located throughout the City that provide natural destination points, staging areas, and rest areas
- Santiago Creek, which provides potential for a trail traversing the City from east to west, with connections to regional trails on each end
- The Santa Ana River, which provides multiple benefits, including a multi-purpose recreational trail that connects the San Bernardino Mountains to the Pacific Ocean

Additionally, 104 miles of proposed future trails are planned throughout the City on land currently used for a variety of purposes, including flood control, railroad rights-of-way, and roadways.

Although the City's trails are heavily used by residents, often trails are located in areas that are disconnected and not readily accessible from neighborhoods. For example, horse trails are located in single-family neighborhoods, and pedestrian trails are located in equestrian areas. The City will work in the future to refine the definition, purpose and use of trails, as well as appropriate links and access from neighborhoods.

The City has also put a high priority on creating a trail network that links the City's open spaces, featuring the Santiago Creek Trail as the spine of the network. Orange completed a paved bike trail along Santiago Creek from Tustin Street to the Santa Ana City limit, at which point the trail continues on to Main Place Mall and the Discovery Science Center. Three additional segments of this bike trail are complete; they connect Tustin Street to Grijalva Park, as well as Collins Avenue along Santiago Creek, and then travel north from Walnut Avenue to Collins Avenue along the City-owned portion of the Santiago Creek Bike Trail Right-of-Way. The Santiago Creek Trail then extends through the City with a future connection to the regional Santa Ana River trail to Santiago Oaks Regional Park and wilderness areas east of Orange. The City will continue to work toward designing a comprehensive trail system that is highly accessible and safe for those who wish to use it. Additional information, maps and policies related to Orange's comprehensive trails system are provided in the Circulation & Mobility Element.

NATURAL RESOURCE IMPLEMENTATION

The goals, policies and plans identified in this Element are implemented through a variety of City plans, ordinances, development requirements, capital improvements, and ongoing collaborations with regional agencies and neighboring jurisdictions. Specific implementation measures for this Element are contained in the General Plan Appendix.