TECOLOTE CANYON NATURAL PARK
NATURAL RESOURCE MANAGEMENT PLAN

November 2016

Prepared by:

City of San Diego

Park and Recreation Department

Open Space Division

Based on:

2006 Draft

HELIX Environmental Planning, Inc

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1.0 INTRODUCTION

The purpose of this Natural Resources Management Plan (NRMP) is to provide guidance for the protection of natural resources at Tecolote Canyon Natural Park (Park). The NRMP fulfills the City of San Diego's (City) Multiple Species Conservation Program (MSCP) Subarea Plan (City 1997) requirement to develop area-specific management directives (ASMDs) for the protection of natural resources at the Park. The NRMP is intended not only to make provisions for the protection and preservation of natural and cultural resources, especially sensitive resources, but also to allow safe and accessible use of the Park to meet the needs of the surrounding communities.

The NRMP provides information relating to existing conditions within the park, adaptive management strategies, ASMDs, potential impacts of climate change, and maintenance and utilization of the Park while preserving the Park's natural resources. The guidelines outlined in the NRMP are intended to be updated at least every ten years, or as needed, with input from the City, Tecolote Canyon CAC, Friends of Tecolote Canyon, San Diego County Archaeological Society and applicable resource agencies.

The City's MSCP Subarea Plan identifies the following Goals and Objectives for Tecolote Canyon (collectively grouped with other canyons and titled "Urban Habitat Lands" Section 1.5.7): "The optimum future condition for the urban habitat lands scattered throughout the City of San Diego is a system of canyons that provide habitat for native species remaining in urban areas, 'stepping stones' for migrating birds and those establishing new territories, and environmental educational opportunities for urban dwellers of all ages."

The Master Plan for Tecolote Canyon, developed by the Tecolote Canyon Citizens Advisory Committee (TCCAC 2982) identifies the following priority for management (Section A. General Plan): "The primary emphasis of the park master plan is the enhancement, restoration, and preservation of the near natural environment available for all in the midst of our urban setting."

The specific objectives of this NRMP are:

1. To identify sensitive species and habitat mapping;
2. To identify communities of species threatened by common threats and stressors;
3. To identify threats to sensitive species and habitats;
4. To develop management priorities for species, habitats, and/or communities based on MSCP conditions of coverage;
5. To establish management directives within an adaptive management framework for MSCP-covered species within the Park.
6. To integrate management actions with climate-smart planning principles to prioritize actions based on both existing and potential future threats.

1.1 Location

Tecolote Canyon Natural Park is an open space area located within a narrow coastal valley in the City of San Diego 0.5 mile to the east of Interstate 5 (I-5) and 0.8 mile to the east of the Pacific Ocean (Figure 1). The approximately 950-acre Park is 6.0 miles long in a generally north-south direction and up to 0.5 mile in width. The Tecolote Canyon Golf Course (an 18-hole public golf course, which is currently under lease from the City until 2022) is situated in the central portion of the Park. The park is located within the Multi-habitat Planning Area (MHPA) of the City's MSCP (Figure 2). A majority of the Park is located in the community of Clairemont Mesa, with the southeastern portion of the Park in the community of Linda Vista (Figure 3). The Park is isolated from other open space areas but is located 0.5 miles south of the Marian Bear Memorial Park in San Clemente Canyon, 0.5 miles east of Mission Bay, and 0.75 miles north of the San Diego River.

The Tecolote Nature Center and main entrance into the Park are located near the southern end of the Park. The University of San Diego (USD) is located adjacent to the southern boundary of the Park. The northern tip of the canyon is located at North Clairemont Recreation Center, south of Bannock Avenue. Genesee Avenue and Linda Vista Road form the Park's eastern boundary. The top of the steep slope parallel to Clairemont Drive and Cowley Way forms the western boundary of the Park. Two side canyons are included within the boundary of the Park: Manning Canyon and Elbrus Canyon.

Several roads also divide the Park including Mount Acadia Boulevard, Snead Avenue (which leads to the golf course), Boyd Avenue and Balboa Avenue (Route 274). Mount Acadia Boulevard and Balboa Avenue both cross the Canyon on fill material, with large culverts allowing for drainage. Snead Avenue is located along the floor of the Canyon, and Boyd Avenue is cut into the Canyon slope.

The vast majority of the Park is owned by the City. San Diego Gas and Electric (SDG&E) owns approximately 24 acres of the Park. Remaining acreage exists in the form of paper streets and right-of-ways within the boundaries of the Tecolote Canyon Natural Park. As part of the development of the Tecolote Canyon Natural Park Master Plan, SDG&E had no objections to designating the SDG&E right-of-way through the Park planning area as 'Natural Park', as long as the designation did not restrict SDG&E's ability to develop and maintain the facilities within the right-of-way (TCCAC 1982).

1.2 Park History

The Park was established in 1977 through a grassroots community effort to provide and protect an open natural area, in perpetuity, near the geographic center of the City (see Appendix C for more history of the Park). As a resource-based park, Tecolote Canyon exhibits distinctive natural and cultural resources and is intended for regional use. Due to its location, it affords a unique

opportunity for visitors to experience a relatively natural environment in an urban setting. In 1982, the City adopted the Master Plan, which currently serves as the primary planning document for the Park.

1.3 Parkland Dedication

The boundaries of Tecolote Canyon Natural Park were legally defined in Ordinance No. 12234 N.S. adopted by the San Diego City Council on December 14, 1977, dedicating 788.33 acres "for the purpose of preserving open space" (TCCAC 1982). The dedication ordinance states that the "said property should be set aside and preserved for the lasting enjoyment and benefit of the people of the City of San Diego" (TCCAC 1982). Since then, several additions have been made to the Canyon to reach its current size of approximately 950 acres.

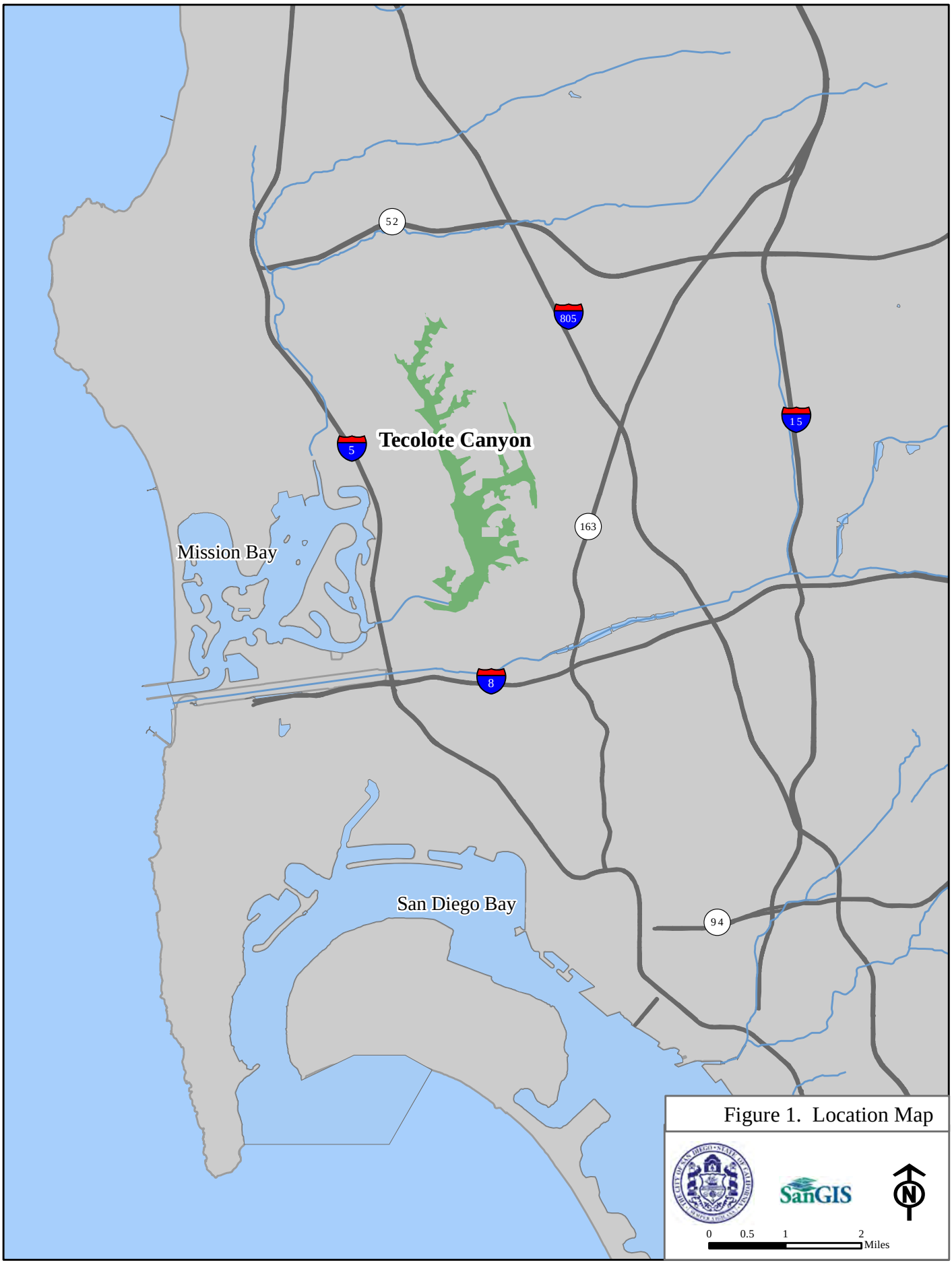


Figure 1. Location Map

Figure 2. Multi-Habitat Planning Area

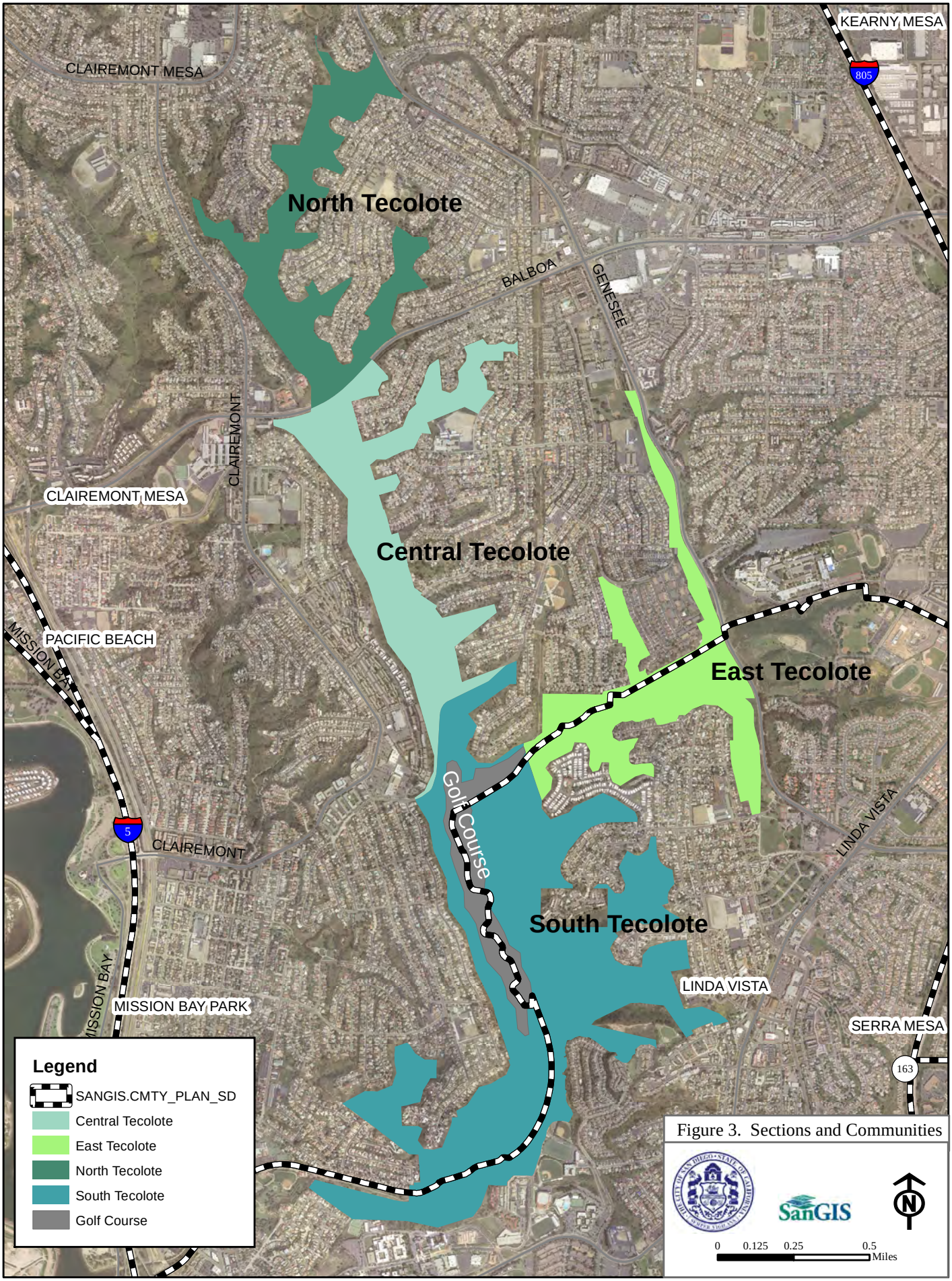


Figure 3. Sections and Communities

2.0 AGENCY JURISDICTION AND APPLICABLE PLANS

2.1 City of San Diego

The day-to-day management of the Park is the responsibility of the Park and Recreation Department, operating under the authority of the Mayor. The Open Space Division of the Park and Recreation Department performs tasks such as trash removal, maintenance of physical structures (i.e., fences, restrooms, signs and trails) and brush management. Additionally, this division provides park rangers, whose primary responsibilities include enforcement of City and State regulations; oversight of enhancement and restoration efforts; oversight of trail building and maintenance; interpretive activities; and coordination with volunteers. Park Rangers perform daily patrols of the canyon in order to identify and immediately respond to issues such as but not limited to dumping, encroachment from private property, and off-trail use.

Other City departments involved in the Park include the Police, Fire-Rescue, Public Works (Engineering and Capital Projects), Transportation & Storm Water, Public Utilities (Water and Wastewater) and Development Services departments.

2.2 Project Permitting and Compliance

Any individual project proposed within or adjacent to the Park is required to meet the most current regulations outlined in the following plans, ordinances and laws: San Diego Multiple Species Conservation Program (MSCP), City of San Diego Land Development Code, City of San Diego Multiple Species Conservation Program Subarea Plan (MSCP Subarea Plan), Tecolote Canyon Master Plan as to be amended, applicable community plans (listed below), City of San Diego Progress Guide and General Plan, and City environmental and construction standards and requirements. Depending on the scope of the project, federal and state permits could be required from the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, California Department of Fish and Wildlife, and/or State Water Resources Control Board / Regional Water Quality Control Board.

2.3 Approved Plans

City of San Diego MSCP Subarea Plan

The MSCP Subarea Plan (City 1997) is a part of a larger adopted regional conservation plan that allows the participating jurisdictions to maintain development flexibility by proactively planning a regional preserve system. The program focuses on protection and management of habitats rather than on preservation efforts for one sensitive species at a time. The City's Subarea Plan is divided into five areas (Southern, Eastern, Urban, Northern, and Hodges Cornerstone Lands/San Pasqual Valley). Tecolote Canyon is located in the Urban Area. These areas contribute to the City's MHPA by providing habitat for native species or shelter and forage for migrating species and by providing environmental education opportunities for urban dwellers of all ages.

The MSCP Subarea Plan provides general planning policies and design guidelines for areas within the MHPA. The major issues identified with Urban Areas include:

- Intense land uses and activities adjacent to and in covered species habitat (addressed in Threats Section 5.1)
- Dumping, litter, and vandalism (addressed in Threats Section 5.2)
- Itinerant living quarters (addressed in Threats Section 5.3)
- Utility, facility and road repair, construction and maintenance activities (addressed in Threats Section 5.7)
- Exotic (non-native) and invasive plants and animals (addressed in Threats Section 5.5)
- Urban runoff and water quality (addressed in Threats Section 5.4).

No specific management directives were developed for the Urban Area; however, the MSCP Plan states that the Urban Areas should be managed according to the general management policies and directives (Section 1.4.2), which include:

- Existing permitted roads and utility lines are considered a compatible use within the MHPA, and will be maintained;
- Fencing or other barriers will be used where it is determined to be the best method to achieve conservation goals and adjacent to land uses incompatible with MHPA;
- Lighting shall be designed to avoid intrusion into the MHPA and effects on wildlife;
- No riprap, concrete or other unnatural material shall be used to stabilize creek banks. Banks shall be natural and stabilized where necessary with willows and other appropriate native plantings. Rock gabions may be used where necessary to dissipate flows and should incorporate design features to ensure wildlife movement.

In addition to existing roads and utility lines, passive recreation and brush management (Zone 2) are considered conditionally compatible within the MHPA so long as they meet the conditions set forth in the biological objectives of the MSCP.

Tecolote Canyon Natural Park Master Plan

The main purpose of the Master Plan, adopted by City Council in 1982, is to define the guidelines for the optimum development and use of the Park. The Master Plan recommends minimal development to accommodate activities compatible with the natural character of the Park and provides objectives, critical issues, standards and recommendations, and short- and long-term guidelines for the Park.

An amendment to the Master Plan allowing for an update of the plan for trails and park entrances is in process concurrent with adoption of this NRMP. The Master Plan's guidelines, goals, and objectives have not been changed as part of the amendment process.

Clairemont Mesa Community Plan

The Clairemont Mesa Community Plan (City 1990) identifies single-family residences as the primary land use surrounding the Park within the community of Clairemont Mesa (Figure 3). Several schools and parks also occur in the area, as well as multi-family residential areas. Limited amounts of commercial areas are located nearby the Park. One commercial area, Garfield Plaza, is located adjacent to a small branch of the Park, at Clairemont Drive and Balboa Avenue.

The Clairemont Mesa Community Plan identifies issues of concern to the community including one issue that directly relates to the Park: the need to eliminate and prevent future contamination of Tecolote Creek by urban pollutants and to reduce and prevent siltation.

Linda Vista Community Plan

The Linda Vista Community Plan (City 1998) states that grading and development of canyons designated as open space should be avoided. Guidelines to minimize impacts to the Park from adjacent development include sensitive grading techniques (e.g., minimizing grading of slopes exceeding 25 percent and contouring graded areas to a slope not exceeding a 2:1 ratio, building design (e.g., low profile and angled to follow the canyon rim), site design (e.g., setting structures back from the canyon rim and minimizing hardscape) and landscape design (e.g., planting disturbed slopes with native, drought-tolerant species). The natural surface drainage system of hillside sites should be maintained and hardscape should be minimized in order to minimize runoff onto the slopes of the Canyon.

Planned land uses that are largely built out adjacent to the Park within the community of Linda Vista include several community and neighborhood parks, single and multi-family residential areas, a mobile home park and two schools, including the University of San Diego (USD). The community plan also recommends that development on USD should not encroach into designated open space and should respect and maintain scenic hillsides and sensitive vegetation.

Tecolote Canyon Rim Development Guidelines

The guidelines set forth in the Tecolote Canyon Rim Development Guidelines (City 1987) are to be used in the area adjacent to Tecolote Canyon only. The intent of this document is to ensure that development along the rim of the Canyon occurs in such a way that native habitat within the Canyon is enhanced and protected from damage associated with development. The document provides guidelines for structures, traffic circulation, grading, drainage, landscaping and fire protection.

2.4 Public Utilities Department Canyon Sewer Cleaning Program and Long-term Canyon Sewer Maintenance Program

In response to an Administrative Order from the U.S. Environmental Protection Agency, and in an effort to reduce sewer spills and beach closures, and under the direction of Council Policies 400-13 and 400-14, the City of San Diego's Public Utilities Department adopted the Canyon Sewer Cleaning Program and Long-term Canyon Sewer Maintenance Program to access, clean and repair miles of sewer infrastructure located in canyons and other environmentally sensitive areas. A Programmatic Environmental Impact Report (PEIR) was prepared to study the Program and in July 2004 the City of San Diego approved Coastal Development Permit No. 13506 and Site Development Permit No. 13507 for the Program (City 2003a). The first component of the program is studying the feasibility of redirecting sewage flow out of canyons and other environmentally sensitive lands; if unfeasible, the Program requires maintaining access routes for the existing major trunk sewers, associated sewer laterals and manholes.

Past and future impacts related to the City sewer and water line construction and maintenance within Tecolote Canyon require mitigation, including both creation and enhancement in wetland and upland areas (City 2013c). Mitigation and/or restoration have been implemented in several locations within Tecolote Canyon, including two mitigation projects with wetland creation and enhancement and upland buffer areas, and three restoration and revegetation projects (City 2013b).

2.5 SDG&E Subregional Natural Community Conservation Plan (NCCP)

SDG&E has developed a Subregional NCCP to provide a framework for its compliance with the state and federal Endangered Species Acts. The Subregional NCCP governs SDG&E facility and utility siting, construction, operation and maintenance activities in the Park. It contains, among other things, 61 operational protocols designed to avoid, minimize and reduce potential impacts associated with siting, construction, operation and maintenance of SDG&E's natural gas and electric facilities and utility systems. In addition to governing the behavior of SDG&E crews, the NCCP's operational protocols include requirements to keep vehicles and equipment on designated access roads, minimize impacts to sensitive resources and wildlife, and avoid littering. The SDG&E's NCCP is compatible with this NRMP.

2.6 Tecolote Watershed Comprehensive Load Reduction Plan

In 2012, the City of San Diego Transportation & Storm Water Department and Caltrans developed a watershed-based Comprehensive Load Reduction Plan (CLRP) for the Tecolote Creek Watershed. The document was required by Total Maximum Daily Load for Indicator Bacteria, Project 1 – Twenty Beaches and Creeks in the San Diego Region (Bacteria TMDL), which was approved by the San Diego Regional Water Quality Control Board and took effect April 2, 2011. The City of San Diego and Caltrans plan to use the CLRP to plan the implementation of best management practices (BMPs), evaluate their effectiveness, and make adjustments over the anticipated 20-year implementation period allowed by the TMDL. An update to the CLRP was

completed in 2013 to further optimize the recommended BMPs and refine their costs. The 2012 CLRP, titled “Tecolote Creek Watershed CLRP”, and the 2013 Updates are available on the Storm Water Division's website (http://www.sandiego.gov/stormwater/plansreports/index.shtml).

2.7 Draft Mission Bay Watershed Management Area Water Quality Improvement Plan

The City of San Diego Transportation & Storm Water Department is currently developing a Water Quality Improvement Plan for the Mission Bay Watershed (including Tecolote Creek). This is a watershed-based plan that is a requirement of the City’s new Municipal Storm Water Permit (San Diego Regional Water Quality Control Board Order Number R9-2013-0001, National Pollutant Discharge Elimination System [NPDES] Permit and Waste Discharge Requirements from the Municipal Separate Storm Water System [MS4] Draining the Watersheds Within the San Diego Region).

3.0 LAND USE AND RECREATION

Tecolote Canyon Natural Park offers visitors an escape from the urban environment, and recreational opportunities are limited to non-motorized uses such as birdwatching, photography, and trail use (e.g. walking, jogging, and mountain biking). No active recreational opportunities are allowed. A trail plan is located in the amendment to the Master Plan, being prepared concurrently with adoption of this NRMP.

The main entrance to the Park, located at the eastern end of Tecolote Road, contains the Tecolote Nature Center, which houses interpretive displays, a classroom for school field trips and lectures, and offices for City Park and Recreation Department rangers and other on-site staff. Together the Park and the Nature Center provide many opportunities to allow members of the community and other visitors to appreciate and enjoy nature.

Within the southern section is the Tecolote Canyon Golf Course, totaling approximately 67 acres offering an 18-hole public golf course and driving range, designed by legendary golfer Sam Snead and built in 1964 (Battle, pers. comm.). The property is currently leased to American Golf Corporation on a 35-year term which will expire in 2022.

The U.S. Navy maintains a jet fuel line running from the Park's main entrance to the golf course driving range (Figures 4-7). City water lines occur in the southern portion of the Park, as well as in Balboa and Boyd Avenues. The Tecolote Canyon Trunk Sewer exists as a 15- to 24-inch pipe throughout the length of the Canyon, and an 18-inch sewer parallels the main in the southern portion of the Canyon. Fourteen side mains enter the Tecolote Canyon Trunk Sewer at various locations.

In addition to public facilities, private utility companies also have linear facilities within the Canyon. SDG&E facilities on 24 acres of SDGE-owned property within the Park include above-ground transmission and distribution lines, underground natural gas transmission line and distribution lines, and communication lines, along with associated manholes, transformers, switches, and appurtenances. (Figures 6-7).

3.1 Park Rules

Visitors to the Park are asked to respect the sensitive nature of the Park and the many animals and plants that call Tecolote Canyon home. Park Rules (example below) are posted on the City's Website and on signs at trailheads; as new rules and laws are approved, the website and signs will be updated as appropriate.

1. Stay on and use only designated trails. Leaving these established damages sensitive habitat and disturbs wildlife.

2. Overnight camping is prohibited. The park lands are closed from sunset to sunrise.

3. Open fires are prohibited.
4. No glass containers are allowed.
5. All plants, animals, and cultural resources are protected. Collection or destruction of any natural feature is prohibited. Hunting is prohibited. Defacing rocks, structures, or property is prohibited.
6. Possession of firearms or weapons of any type is prohibited.
7. Littering and dumping are prohibited, and subject to a fine. Pack out what you pack in. Put all trash in proper receptacle.
8. Feeding or harassing wildlife is prohibited. Releasing domestic animals is prohibited. Dogs must be leashed. Clean up after your pet.
9. Motorized vehicles are not permitted on trails.
10. Do not trespass on private land. Do not cut switchbacks. Note: All areas may be closed due to fire or flood hazard. You are responsible for knowing parkland rules. If you have any questions regarding park use, please call the City of San Diego Park Ranger office at (619)235-5262. PLEASE REMEMBER that you are part of a natural park area. The trails traverse land in its largely natural condition, includes rocks, streams, and wildlife. Proceed with caution. The City of San Diego is not liable for injuries. Individuals using the park must assume all risk of injury to person or property.

3.3 Surrounding Land Use

Surrounding existing land use is primarily single-family residential (Figure 8*).* Other land uses within 500 feet of the Park boundary include multi-family residential, a mobile home park, commercial uses, churches, schools, open space and recreational areas. There are 22 schools, ranging from kindergarten to college, located within one-half mile of the Park boundary. Several of the recreational areas (i.e., community and neighborhood parks) abutting the Park provide access to the Park's trails. Recreational activities at the community parks include sports such as basketball, baseball, softball, tennis, aerobics and other active sports. The community parks also provide Park users with amenities such as restrooms, parking lots, playgrounds and picnic tables.

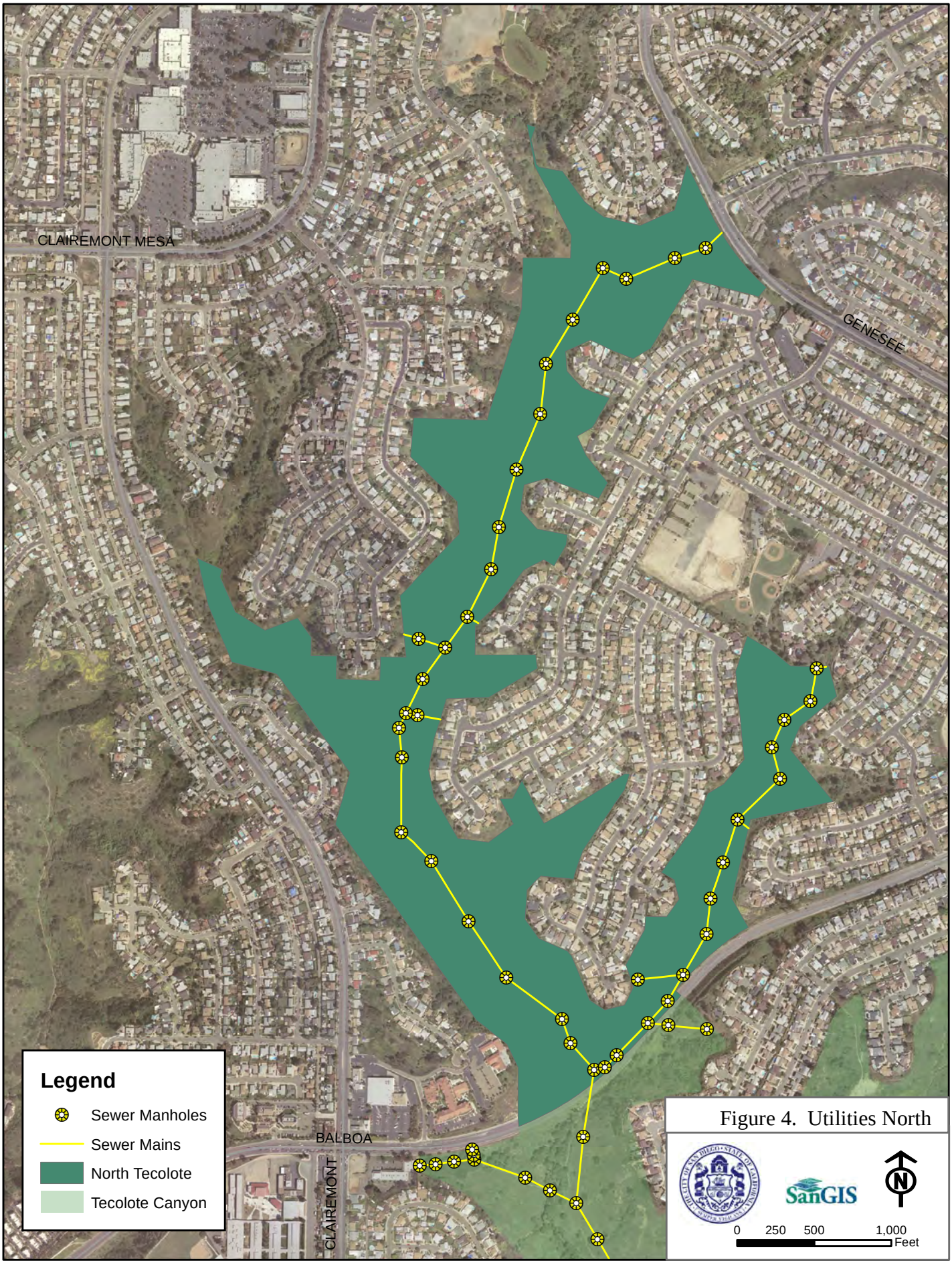


Figure 4. Utilities North

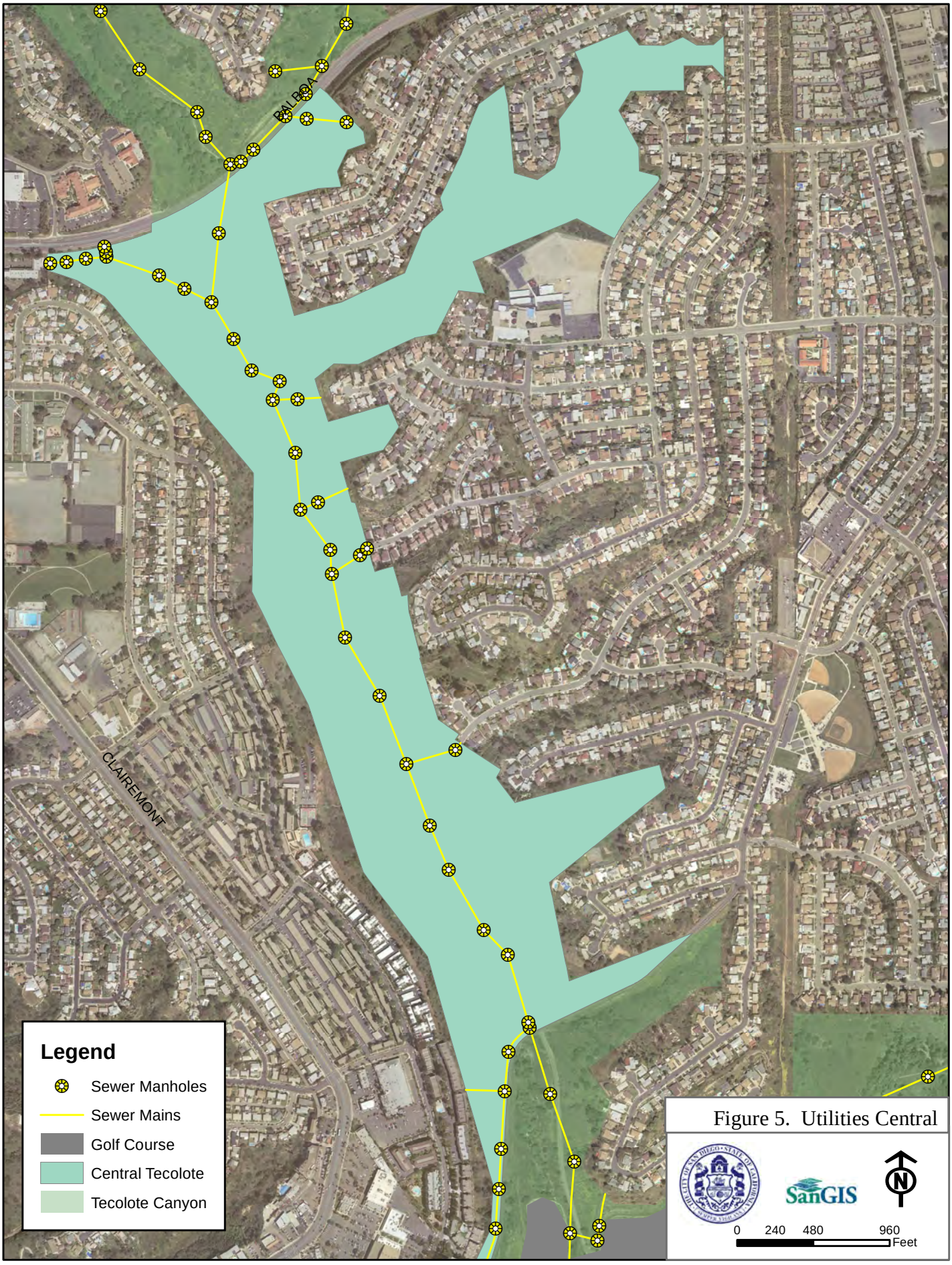


Figure 5. Utilities Central

Figure 6. Utilities East

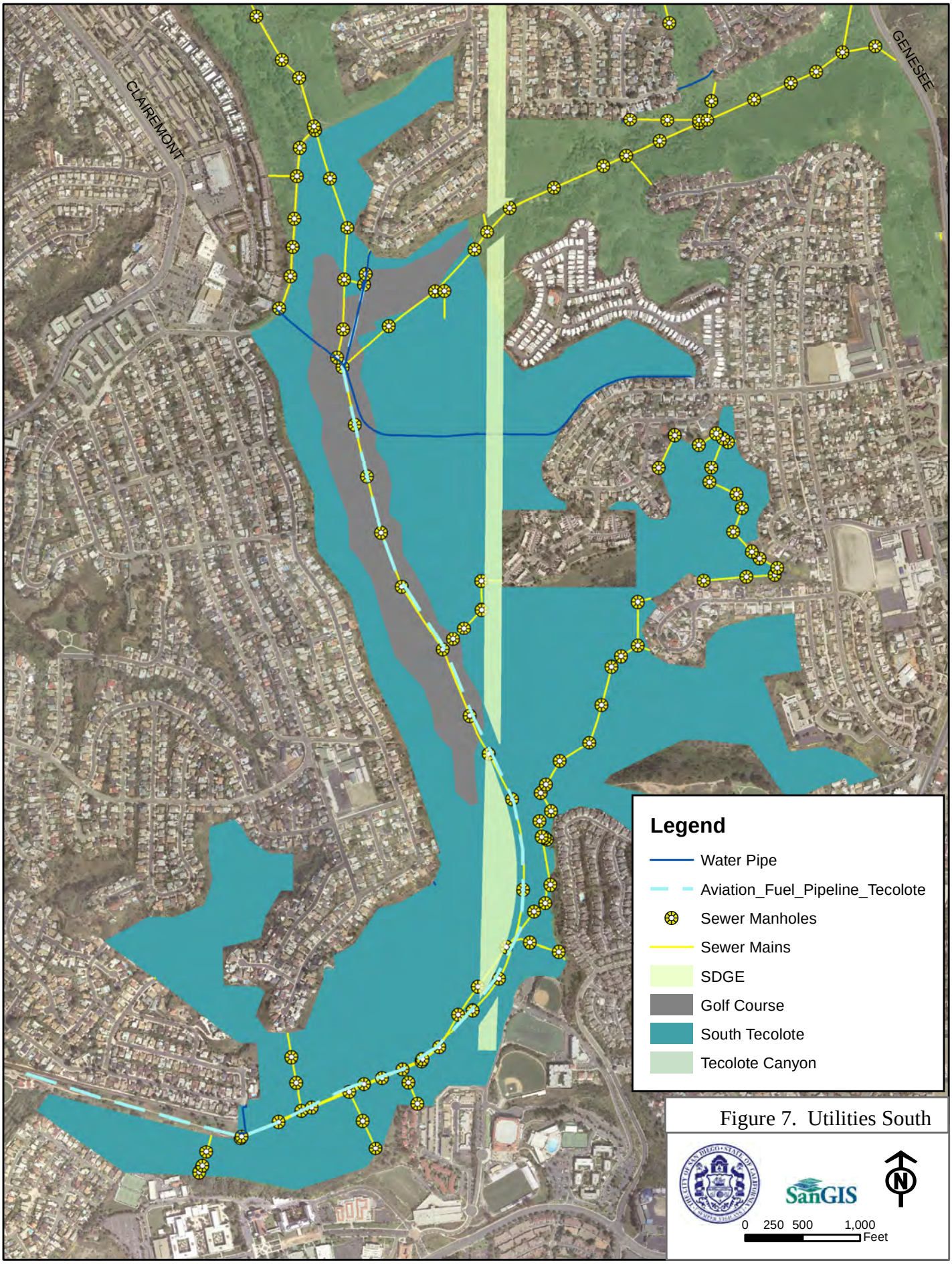


Figure 7. Utilities South

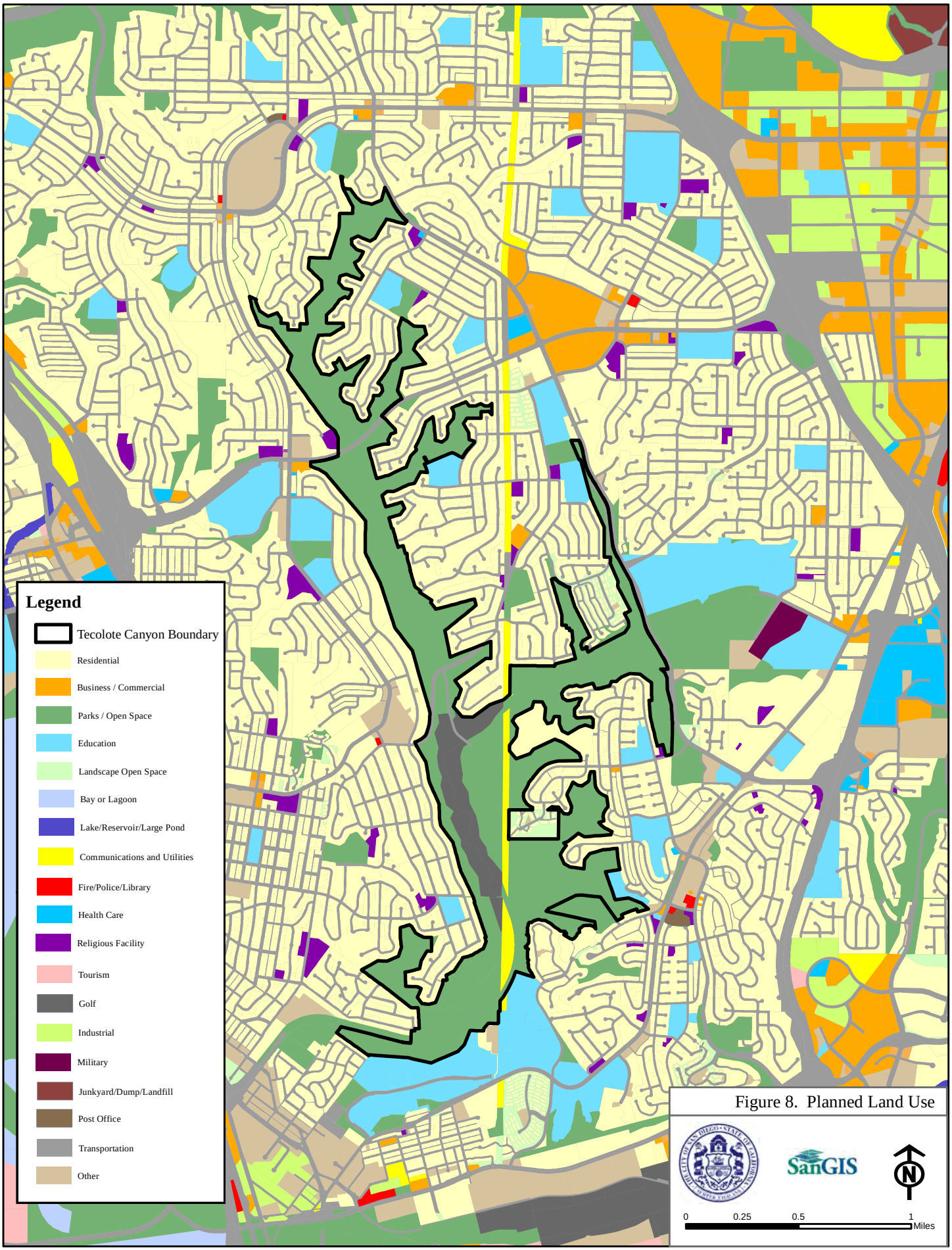


Figure 8. Planned Land Use

4.0 EXISTING CONDITIONS

4.1 Geology/Soils

The Park is located in the coastal subprovince of the Peninsular Ranges Geomorphic Province, a region characterized by northwest-trending structural blocks and fault zones. The coastal subprovince in the San Diego area (also known as the San Diego Embayment) consists of a thick sequence of marine and non-marine sediments deposited during numerous sea level transgression-regression cycles (i.e., advances and retreats) over approximately the last 55 million years. More recent uplift and erosion has resulted in the characteristic canyon and mesa topography present today. Geologic units within the Park include Quaternary (approximately 11,000 years to 2 million years old) alluvium/slope wash deposits, and Quaternary to Tertiary (approximately 2 to 65 million years old) marine and non-marine sedimentary rocks deposited during the noted transgression-regression cycles.

Natural slope gradients within the Park include horizontal areas along portions of the Canyon bottoms and nearly vertical grades along a number of Canyon side slopes. Most of the Canyon walls are steep, with slopes of up to 1.5:1 (horizontal to vertical), or 65 percent, common in much of the Park. On-site elevations range from a low of approximately 40 feet AMSL near the main Park entrance, to a high of 320 feet AMSL along a number of mesa tops in the central and northern portions of the Park. Some of the steep side slopes range up to 200 feet high.

4.1.1 Topsoils

The majority of the Park is covered with Holocene (less than approximately 11,000 years old) topsoil deposits consisting predominantly of loams or loamy sands. Topsoil mapping by National Cooperative Soil Survey, National Resources Conservation Service (USDA 2012) describes 11 soil categories within the Canyon (Figure 9). The most common soil type within the Canyon is Gaviota fine sandy loam, a well-drained fine sandy loam derived from marine sandstone.

Table 1. Soils Within Tecolote Canyon
National Cooperative Soil Survey, National Resources Conservation Service

Category	Area (acre)	Category	Area (acre)
Carlsbad – Urban land complex	30	Loamy alluvial land – Huehero complex	16
Chestern – Urban land complex	5	Olivenhain cobbly loam	71
Chestern fine sandy loam	214	Reiff fine sandy loam	177
Gaviota fine sandy loam	445	Salinas clay loam	<1
Huehero-Urban land complex	<1	Terrace escarpments	170
Huehero loam	41		

4.1.2 Geologic Units

Geologic units mapped in the Park include Quaternary alluvium/slope wash, Bay Point Formation and Lindavista Formation; and Tertiary Stadium Conglomerate, Friars Formation and Scripps Formation.

4.1.3 Structure/Seismicity

The Park is located within a broad seismically active region characterized by a series of northwest-trending faults associated with the San Andreas Fault System. The closest active faults to the Park are associated with the Rose Canyon Fault Zone, which is located approximately 1,000 feet to the west at its closest point. Active faults are defined as those exhibiting historic seismicity or displacement of Holocene materials.

4.1.4 Landsliding

The occurrence of landslides and other types of slope failures (e.g., mudslides) are influenced by a number of factors, including slope grade, geologic and soil characteristics, moisture levels and vegetation cover. Landsliding can be triggered by one or more specific (or combination of) events, including seismic activity, gravity, fires, and precipitation. The Park encompasses numerous steep Canyon slopes in combination with unstable geologic structures, resulting in a high potential for landslides throughout much of the Park.

4.1.5 Erosion/Sedimentation

The Park contains a number of geologic units and topsoils with moderate to high erosion potentials. Areas susceptible to erosion are associated primarily with steeper slopes and development or use areas within or adjacent to drainages (e.g., road, trail and utility stream crossings). Wet weather runoff events lead to an increase in watershed erosion including creating gullies and increasing stream bank erosion. Dry weather flows carry less sediment but can contribute significantly to hydromodifications that can alter flow regimes and lead to increased stream bank erosion (City 2012b).

The potential exists for erosion hazards to be exacerbated by both existing conditions (e.g., large areas of non-native vegetation) and planned facilities/activities (e.g. utility upgrade/maintenance).

4.2 Paleontological Resources

A registered fossil mammal site (Los Angeles County Museum CIT 314, University of California Mammal Project V6882, University of California-Riverside RV7046) is found approximately 1,000 feet southwest of the southwest corner of the Mesa College property line, at or near the junction of the Scripps Formation and Friars Formation. Additionally, a paleontological dig was completed in the southern portion of the Canyon by the San Diego Museum of Natural History in 1980,

yielding excellent specimens of Pliocene marine mammal skeletal remains (TCCAC 1982). The remains recovered included whale bones, a porpoise skull and shark teeth (Battle, pers. comm.).

4.3 Hydrology and Water Quality

4.3.1 Watershed and Drainage Characteristics

The Park is within the Tecolote Hydrologic Area (HA) of the Peñasquitos Hydrologic Unit (HU). The Peñasquitos HU is a triangular area of approximately 170 square miles and extends from Poway on the east to Mission Bay-Del Mar along the coast. The Tecolote HA is a subdivision of the Peñasquitos HU based on local drainage characteristics, and extends inland from the southwestern boundary of the HU (and the southwestern portion of Mission Bay) to encompass the 9.5-square mile Tecolote Creek watershed. Surface drainage in the Tecolote HA occurs through Tecolote Creek and a number of small to moderate size tributaries.

The entire Park (and all of the Tecolote HA) drains to Tecolote Creek, with flow directions varying locally with topography. Flows within Tecolote Creek move generally south and west through the Park, and eventually enter Mission Bay approximately 0.7 mile west of the main Park entrance. Flows within the Park (and the entire Tecolote HA watershed) are derived from seasonal storms, as well as landscape irrigation runoff from adjacent and upstream urban development. Due to the extensive nature of this development (including substantial areas within and adjacent to the Park), most of the Tecolote Creek Channel is highly incised and flows within it are typically perennial or nearly perennial.

4.3.2 Drainage Facilities and Flood Hazards

Substantial urban development occurs in areas adjacent to and surrounding the Park, with approximately 95 associated storm drains emptying into the Park (Figures 10-13). Existing drainage facilities associated with the described development include bridges or culverts at paved or unpaved road crossings; at-grade or culvert stream crossings along unpaved roads and trails; several flow control structures (i.e., rock gabions and brow ditches); and approximately 200 linear feet of channelized drainage along Tecolote Creek near the main Park entrance.

4.3.3 Water Quality

Surface water within the Park consists primarily of runoff associated with seasonal storm events and landscape irrigation. There are 6.6 miles of Tecolote Creek listed as impaired under Section 303(d) of the Clean Water Act (CWA). The Section 303(d) List of Water Quality Limited lists Tecolote Creek (SWRCB 2010) for elevated levels of contaminants including bacterial indicators, cadmium, copper, lead, zinc, selenium, nitrogen, phosphorous, toxicity, and turbidity. Potential sources are listed as unspecified point, nonpoint, and urban runoff. Mission Bay near Tecolote

Creek is also listed on the basis of eutrophic conditions, enterococcus and coliform counts (pathogens), and lead.

A Bacteria TMDL was developed for beaches and creeks in San Diego, including Tecolote Creek (CRWQCB 2010), which sets targets for maximum levels of fecal coliform, total coliform, and enterococcus for wet and dry weather per year. A TMDL for cadmium, copper, lead, phospoorous, toxicity, turbidity, and zinc is anticipated for 2019; the TMDL for nitrogen and selenium is anticipated for 2021.

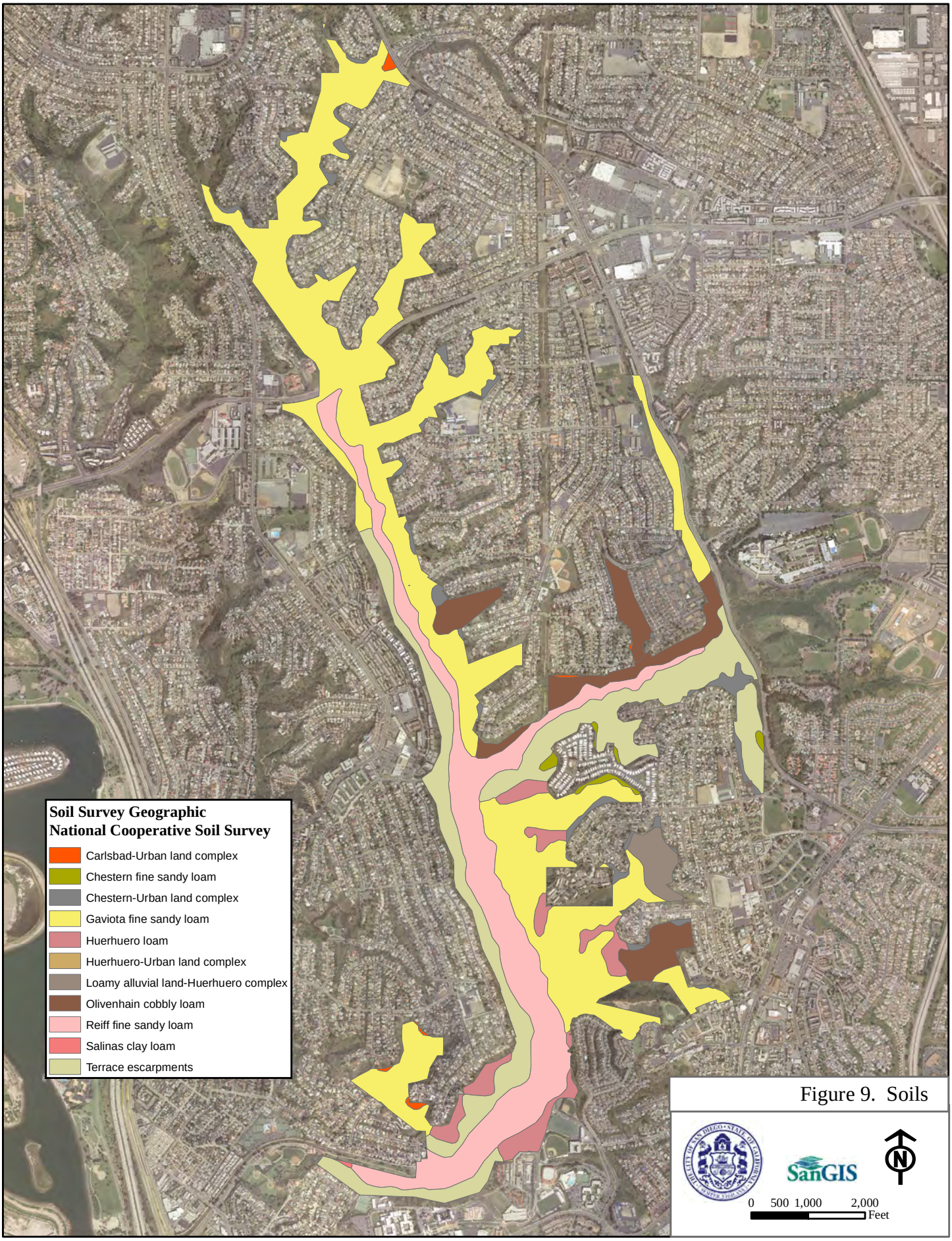


Figure 9. Soils

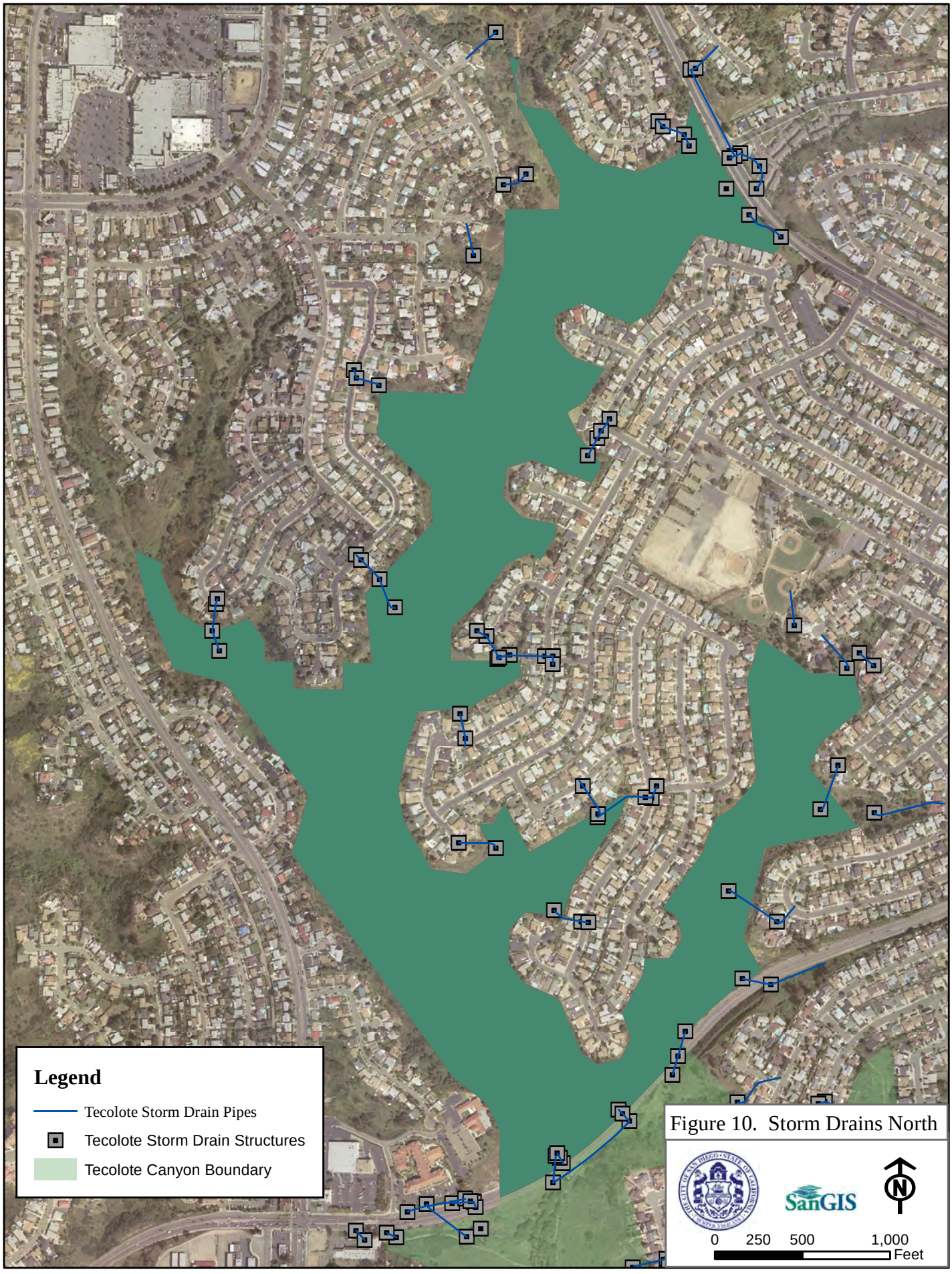


Figure 10. Storm Drains North

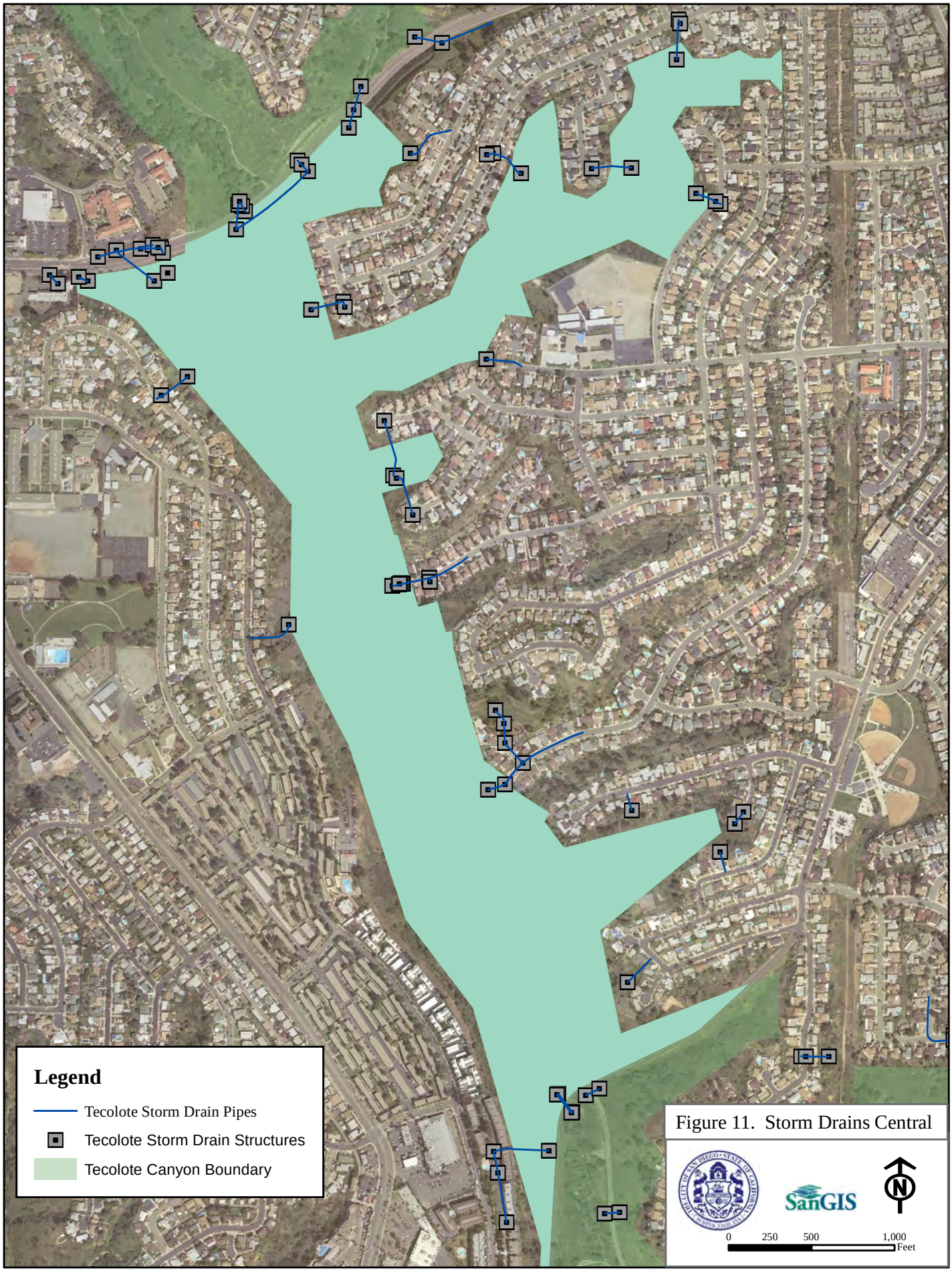


Figure 11. Storm Drains Central

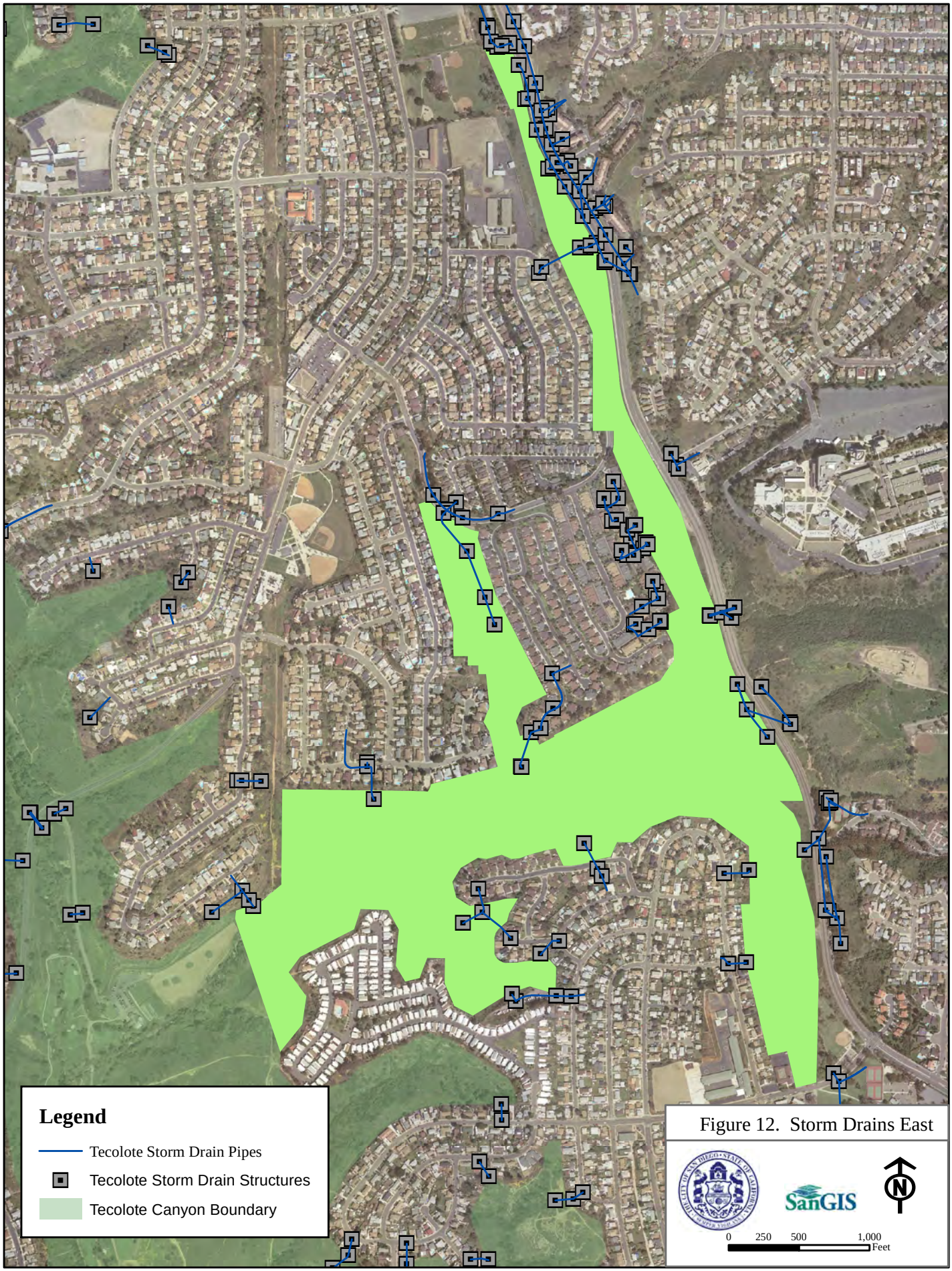


Figure 12. Storm Drains East

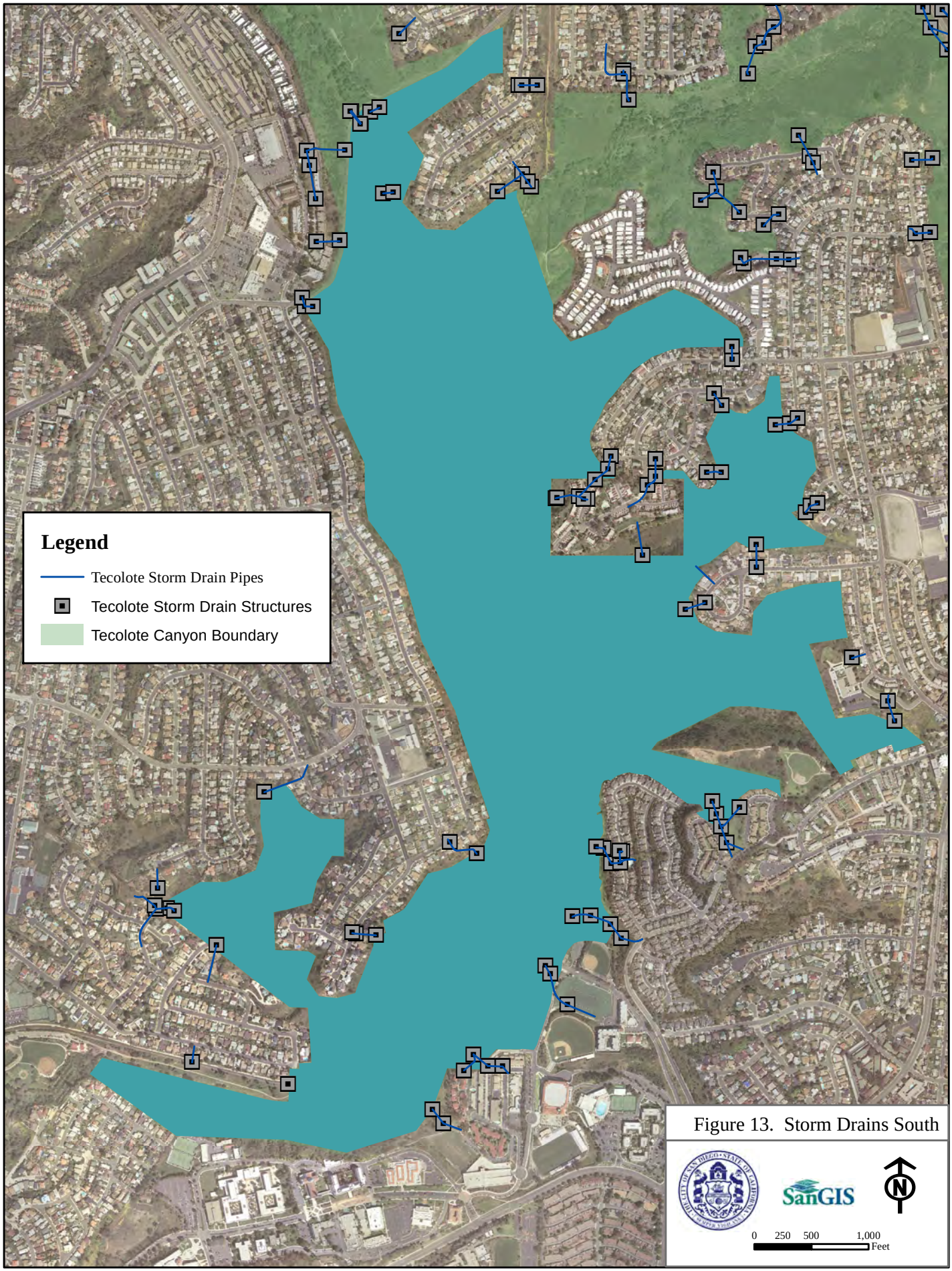


Figure 13. Storm Drains South

4.4 Biological Resources

Tecolote Canyon is a relatively natural coastal canyon with a high diversity of plant and animal species offering a unique opportunity for visitors to experience nature in urban San Diego. In general, wetland and riparian vegetation communities are located at the lowest elevation in the canyon, with chaparral and coastal sage scrub occurring on the slopes. Many vegetation mapping efforts have been completed, most related to emergency and non-emergency wastewater projects. These biological resource reports used the 1986 Holland vegetation classification system. In 2004, HELIX Environmental Planning, Inc (HELIX) conducted vegetation mapping for this NRMP again using "Preliminary Descriptions of Terrestrial Natural Communities of California" (Holland 1986). In 2011, the San Diego Association of Governments (SANDAG) and AECOM released the Vegetation Classification Manual for Western San Diego County (Sproul 2011), which in 2012 was applied for mapping of Western San Diego County (AECOM 2012a). Vegetation maps for Tecolote Canyon use the 2012 mapping data, are based on the 2011 classification (Figures 14-17), and were verified using the 2005 Helix data.

Sensitive plant and animal species reported in this NRMP are compiled from existing sources, including:

- Master Plan (TCCAC 1982)
- City MSCP Subarea Plan (City 1997)
- Biological Resources Report and Impact Assessment for the Manning Canyon Emergency Sewer Maintenance and Repair Project (Dudek & Associates, Inc. [Dudek] 2003a)
- Biological Resources Report and Impact Assessment for the Mt. Elbrus and Tecolote Canyon Emergency Sewer Repair Project (Dudek 2003b)
- Biological Resources Report for the Proposed Sewer Canyon Access Project -Tecolote Canyon (Earth Tech, Inc. 2003)
- California Natural Diversity Database (CNDDB 2012)
- Biological Resources Report and Impact Assessment for the East Clairemont Segment Tecolote Canyon Emergency Sewer Repairs (Tierra Environmental Services [Tierra] 2004)
- HELIX Environmental Planning, Inc. rare plant surveys, 2004
- Biological Resources Report for the Tecolote Canyon Natural Preserve Upland and Wetland Mitigation Sites. (Merkel & Associates 2005)
- Biological Resources Report for the Tecolote Canyon Long-Term Sewer Maintenance Access Project (Merkel & Associates 2006)
- California Gnatcatcher Surveys for Open Space Brush Management Program (City 2011)
- USFWS Cactus Wren Surveys (USFWS 2011)
- Lohstroh Biological Consulting, 45-Day Report for California Gnatcatcher Surveys at Tecolote Canyon Natural Park, 2012 (Lohstroh 2012)
- South Tecolote Canyon Riparian Bird Surveys (City 2013a)

- South Tecolote Canyon Riparian Bird Surveys (City 2014b)
- Riparian Bird Surveys for South and East Tecolote Canyon (City 2015)

SANDAG also coordinated collection of spatial data on non-native invasive plant species in Western San Diego County, which has been included in this report (AECOM 2012b). The other source for non-native invasive plant species is the 2004 vegetation studies conducted by Helix for this NRMP.

4.4.1 Vegetation Communities

Twenty-eight vegetation alliances were mapped within Tecolote Canyon (Table 2; Figures 14-17). The most common vegetation community was Artemisia californica – Eriogonum fasciculatum Alliance at 258 acres, followed by Artemisia californica – Salvia mellifera Alliance, and Quercus agrifolia Alliance.

Table 2. List of Vegetation Alliances in Tecolote Canyon
Sproul 2011 Vegetation Classification

Alliance	Area (ac)	Holland Code (1986)
Adenostoma fasciculatum Alliance	15	Chamise Chaparral: 37200
Artemisia californica – Eriogonum fasciculatum Alliance	258	Diegan Coastal Sage Scrub: 32500; Maritime Succulent Scrub: 32400
Artemisia californica – Salvia mellifera Alliance	195	Diegan Coastal Sage Scrub: 32500
Artemisia californica Alliance	25	Diegan Coastal Sage Scrub: 32500
Baccharis pilularis Alliance	1	Diegan Coastal Sage Scrub: Baccharis-Dominated: 32530
Bahiopsis lacinata Alliance	2	Diegan Coastal Sage Scrub: 2
Brassica (nigra) and Other Mustards – Semi-Natural Stands	4	Non-Native Grassland: Broadleaf-Dominated: 442210
Bromus (diandrus, hordeaceous) – Brachypodium distachyon Semi-Natural Stands	2	Non-Native Grassland: 42200
Carpobrotus edulis or Other Ice Plants – Semi-Natural Stands	4	Disturbed Habitat: 11300
Developed	17	Urban/Developed: 12000
Encelia californica Alliance	<1	Diegan Coastal Sage Scrub: 32500
Eriogonum fasciculatum Alliance	<1	Diegan Coastal Sage Scrub: 32500

Eroded bluff	<1	Unvegetated Habitat: 13000
Eucalyptus (globules, camaldulensis) Semi-Natural Stands	5	Eucalyptus Woodland: 79100
Glebionis coronaria Semi-Natural Stands	36	Disturbed Habitat: 11300
Lotus scoparius Alliance	<1	Coastal Scrub: 32000
Mediterranean California Naturalized Annual and Perennial Grassland Semi-Natural Stands	16	Non-Native Grassland: 42200
Nassella pulchra Alliance	<1	Native Grassland: 42100
Naturalized Warm-Temperate Riparian and Wetland Semi-Natural Stands	2	Non-Native Riparian: 65000
Ornamental	<1	Non-Native Vegetation: 11000
Platanus racemosa Alliance	53	Southern Riparian Forest: 61300
Populus fremontii Alliance	3	Southern Cottonwood-Willow Riparian Forest: 61330
Quercus (berberidifolia, xacutidens) – Adenostoma fasciculatum Alliance	24	Scrub Oak Chaparral: 37900
Quercus (berberidifolia, xacutidens) Alliance	27	Scrub Oak Chaparral: 37900
Quercus agrifolia Alliance	109	Southern Coast Live Oak Riparian Forest: 61310; Coast Live Oak Woodland: 71160
Quercus dumosa Alliance	20	Scrub Oak Chaparral: 37900
Rhus integrifolia Alliance	20	Diegan Coastal Sage Scrub: 32500
Salvia mellifera Alliance	26	Diegan Coastal Sage Scrub: 32500
Toxicodendron diversilobum Alliance	34	Coastal Scrub: 32000

Comparing vegetation mapping efforts from 1997 (the MSCP mapping), 2004 (Helix's vegetation mapping), and 2012 (AECOM) shows a shift in the riparian community from open scrub habitats to denser habitats. This suggests succession in a system without major threats such as fire and flood. The maps also indicate a reduction in non-native grassland and an increase in both chaparral and coastal sage scrub. A robust analysis of these trends over time was not conducted because methods for mapping and categorizing habitat types were not consistent for each of the three mapping periods.

Table 3. Comparison of Vegetation Classification in Tecolote Canyon

Habitat Type	Percentage of total habitat		
(General)	1997	2004	2012
Chaparral	6	8	9.5
Coastal Sage Scrub	48	59	61
Riparian Scrub	4.4	0.8	0
Riparian Forest	8.5	11	18
Non-Native Grassland	12.3	7.7	2.4
Disturbed	7.2	6.5	8.5
Developed	13	6	2

4.4.2 Vernal Pool

Vernal pools support unique and highly specialized flora and fauna. Vernal pools are associated with a subsurface hardpan or claypan and depressions or basins (the vernal pools) that pond water. Water collects in these depressions during the rainy season and completely dry out over the summer. Plant species that were found in the vernal pool community in the Park during the 2004 and 2005 surveys include slender woolly-heads (*Psilocarphus tenellus*), plantain (*Plantago elongata*), crassula (*Crassula aquatica*), long-stalk water-starwort (*Callitriche marginata*), toad-rush (*Juncus bufonius*) and fascicled tarplant (*Deinandra fasciculata*). Nine vernal pools occur in the Park (six in the finger canyon near Genesee Avenue and three in the central portion of the Park) (Figure 18). The size of the vernal pools varies from as small as 3 square feet to 448 square feet and are up to five or six inches deep. The total area of vernal pool basins in the Park is 0.4 acre, with additional watershed area.

4.4.3 Wildlife

A list of invertebrates, amphibians, reptiles, birds and mammals observed or detected in the Park since at least 1982 are provided in Appendix B. This list was assembled from lists compiled from biological reports and other technical documents.

4.4.4 Wildlife Corridors

Tecolote Canyon is considered an urban habitat area within the City's MHPA. Since Tecolote Canyon is surrounded by development, is crossed by roadways placed on fill material, and contains the Tecolote Canyon Golf Course, it is not conducive for use as a wildlife corridor by larger mammals such as mule deer and mountain lion that require bigger blocks of habitat. Tecolote

Canyon could, however, provide the services of a wildlife corridor to certain species capable of flight, such as birds, insects, and bats, and provides a stepping stone for migratory birds.

4.4.5 Wildlife Refugia

Habitat contained within Tecolote Canyon could be an important reservoir for sensitive species that might be heavily impacted by wildfires outside the Park (e.g. coastal sage scrub habitat for coastal California gnatcatcher). Additionally, displaced wildlife from areas impacted by large catastrophic wildlife could seek refuge in Tecolote Canyon, particularly beneficial to birds, bats, and other animals capable of moving from one open space area to another across an urban barrier.

4.4.6 Sensitive Species

Sensitive species include federally or state listed species, species that are candidates for listing, U.S. Fish and Wildlife Service species of concern, species that are on the California Native Plant Society's list of rare or endangered vascular plants, CDFW fully protected species, CDFW species of special concern, MSCP covered species and/or City narrow endemic species.

Twenty-two sensitive plant and animal species have been observed or detected within the Park (Table 4, Figures 19-20). According to the Management Strategic Plan for Conserved Lands in Western San Diego County (SDMMP 2013), none of the species have species-specific management goals or objectives for Tecolote Canyon.

Table 4. Sensitive Species Detected* within Tecolote Canyon Natural Park			
Scientific Name	**Common Name**	**Status****	**Record**
Plants			
Artemisia palmeri	San Diego sagewort	CNPS List 4	Current
Bahiopsis lacinata	San Diego sunflower	CNPS List 4	Current
Bloomeria clevelandii	San Diego golden star	MSCP	Historic (1940)
Brodiaea orcuttii	Orcutt's brodiaea	MSCP	Historic (1940)
Ceanothus verrucosus	Wart-stemmed ceanothus	MSCP	Current
Cistanthe maritima	Seaside calandrinia	CNPS List 4.2	Current
Ferocactus viridescens	San Diego barrel cactus	MSCP	Current
Juncus acutus	Southwestern spiny rush	CNPS List 4	Current
Pogogyne abramsii	San Diego mesa mint	MSCP	Historic (1938)
Quercus dumosa	Nuttall's scrub oak	CNPS List 1B	Current
Animals			
Accipiter cooperii	Cooper's hawk	MSCP,	Current
Aimophila ruficeps canescens	California rufous-crowned sparrow	MSCP	Current
Aspidoscelis hyperythra beldingi	Belding's orange-throated whiptail	MSCP, CSC	Current
Circus cyaneus	Northern harrier	MSCP	Current
Crotalus exsul	Red diamond rattlesnake	CSC	Current
Falco peregrinus anatum	American peregrine falcon	MSCP	Current
Icteria virens	Yellow-breasted chat	CSC	Current
Lanius ludovicianus	Loggerhead shrike	FSC, CSC	Current
Phrynosoma coronatum blainvillii	San Diego horned lizard	MSCP, CSC	Current
Polioptila californica californica	Coastal California gnatcatcher	FT, MSCP	Current
Setophaga petechia	Yellow warbler	CSC	Current
Vireo bellii pusillus	Least Bell's vireo	FE, CE, MSCP	Current

* Sensitive Species with the potential to occur within Tecolote Canyon listed in Appendix A

** FE = Federally Endangered, FT = Federally Threatened, CE = California Endangered, CSC = California Species of Special Concern, MSCP = Multiple Species Conservation Program, CNPS – California Native Plant Society.

Figure 14. Vegetation North

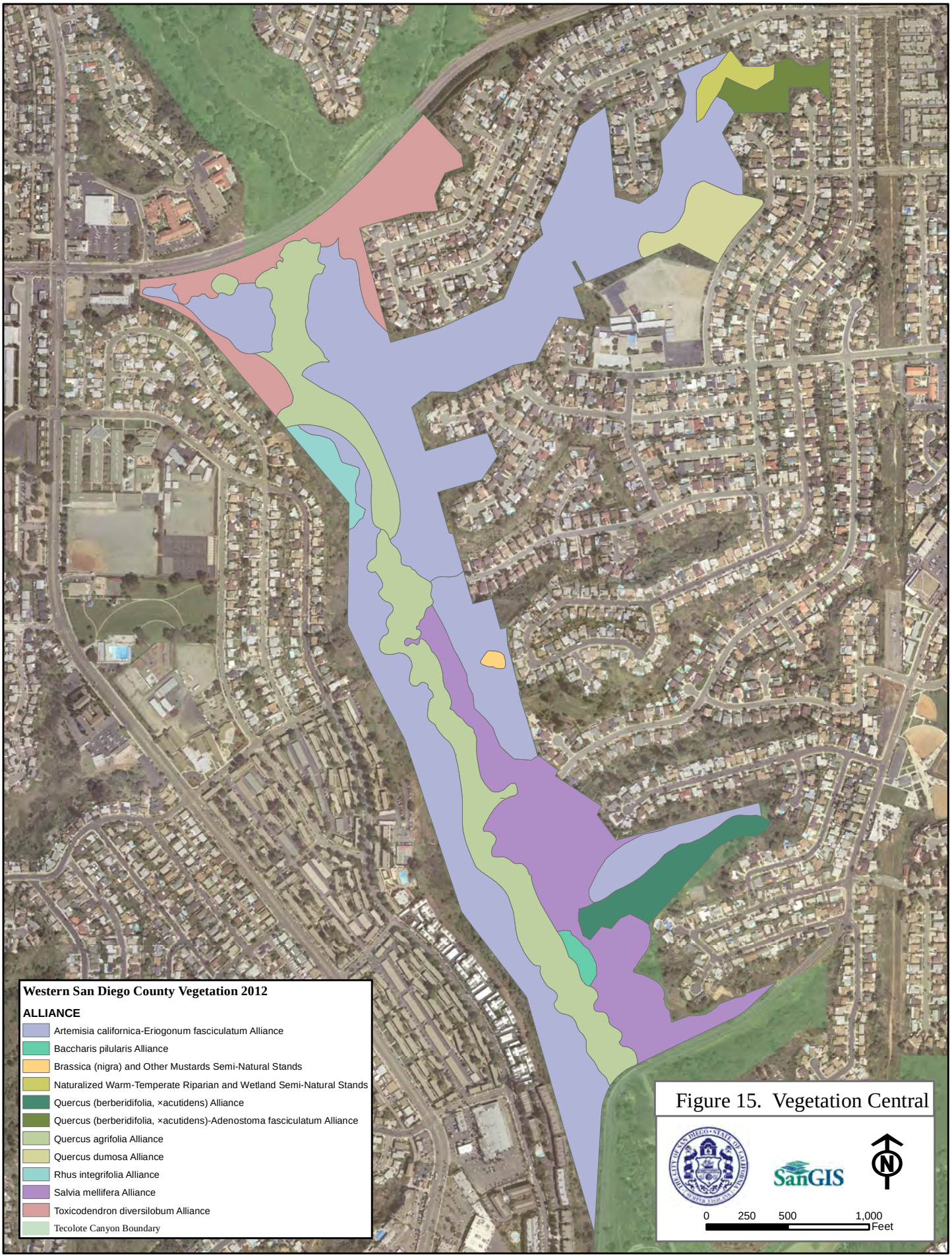


Figure 15. Vegetation Central

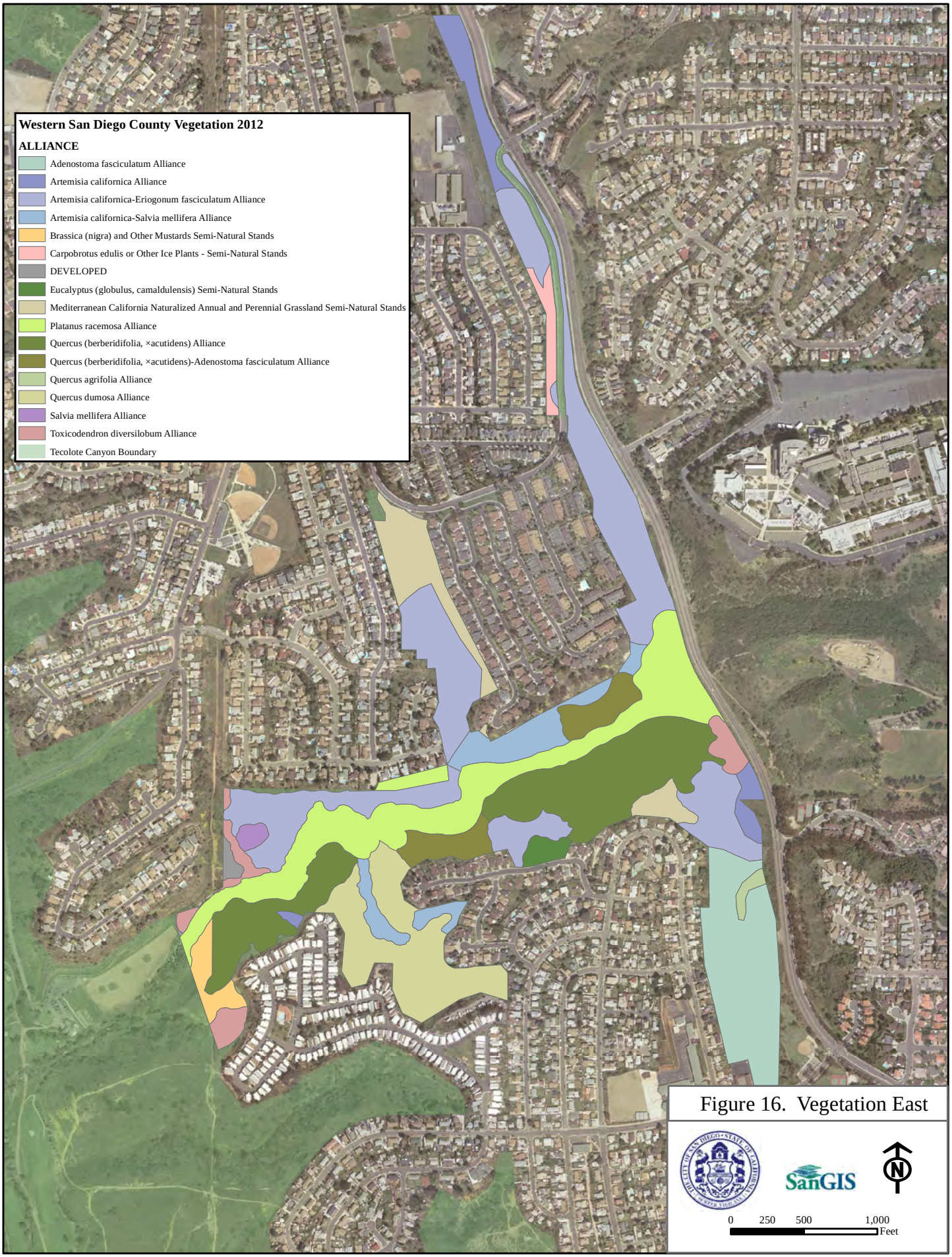


Figure 16. Vegetation East

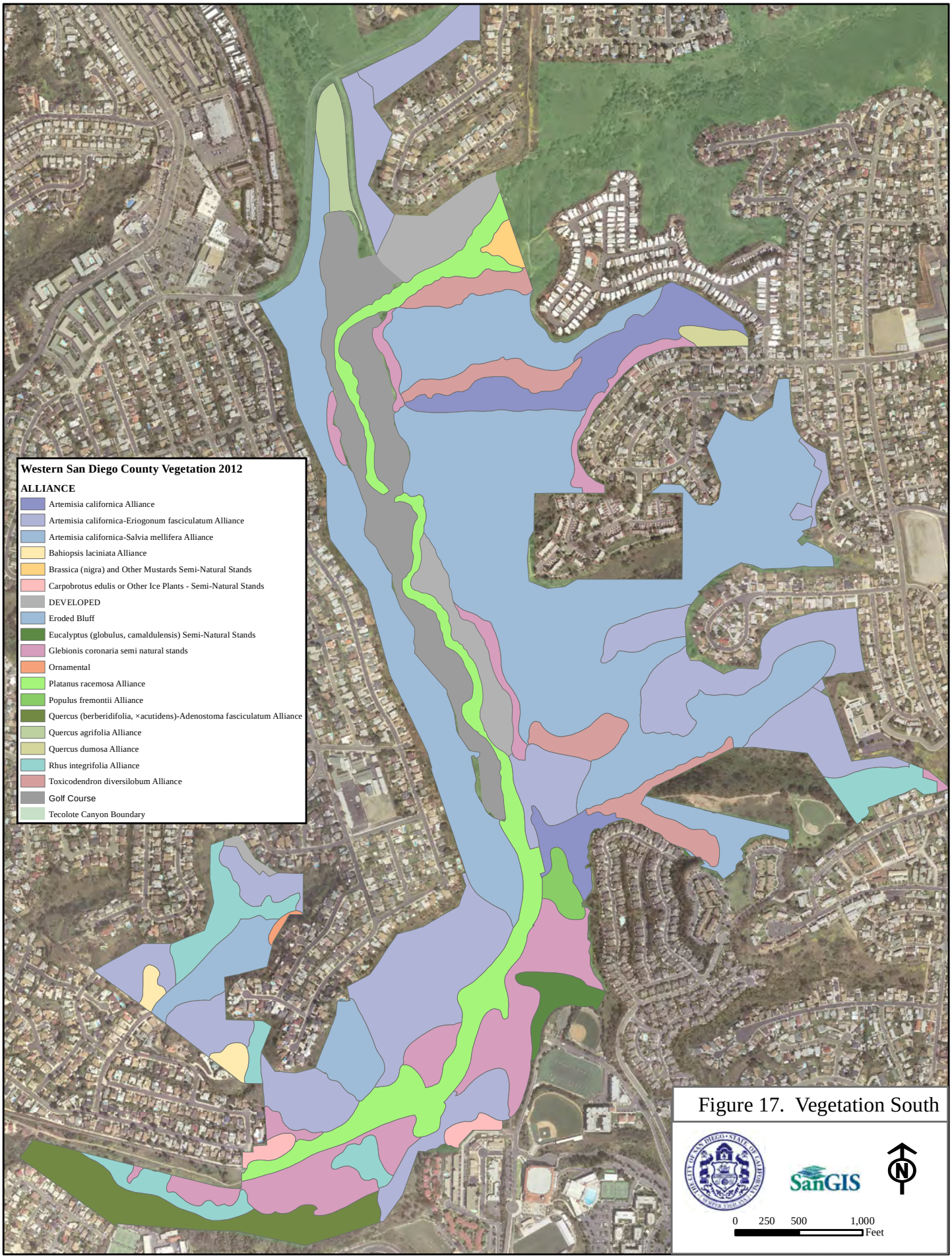


Figure 17. Vegetation South

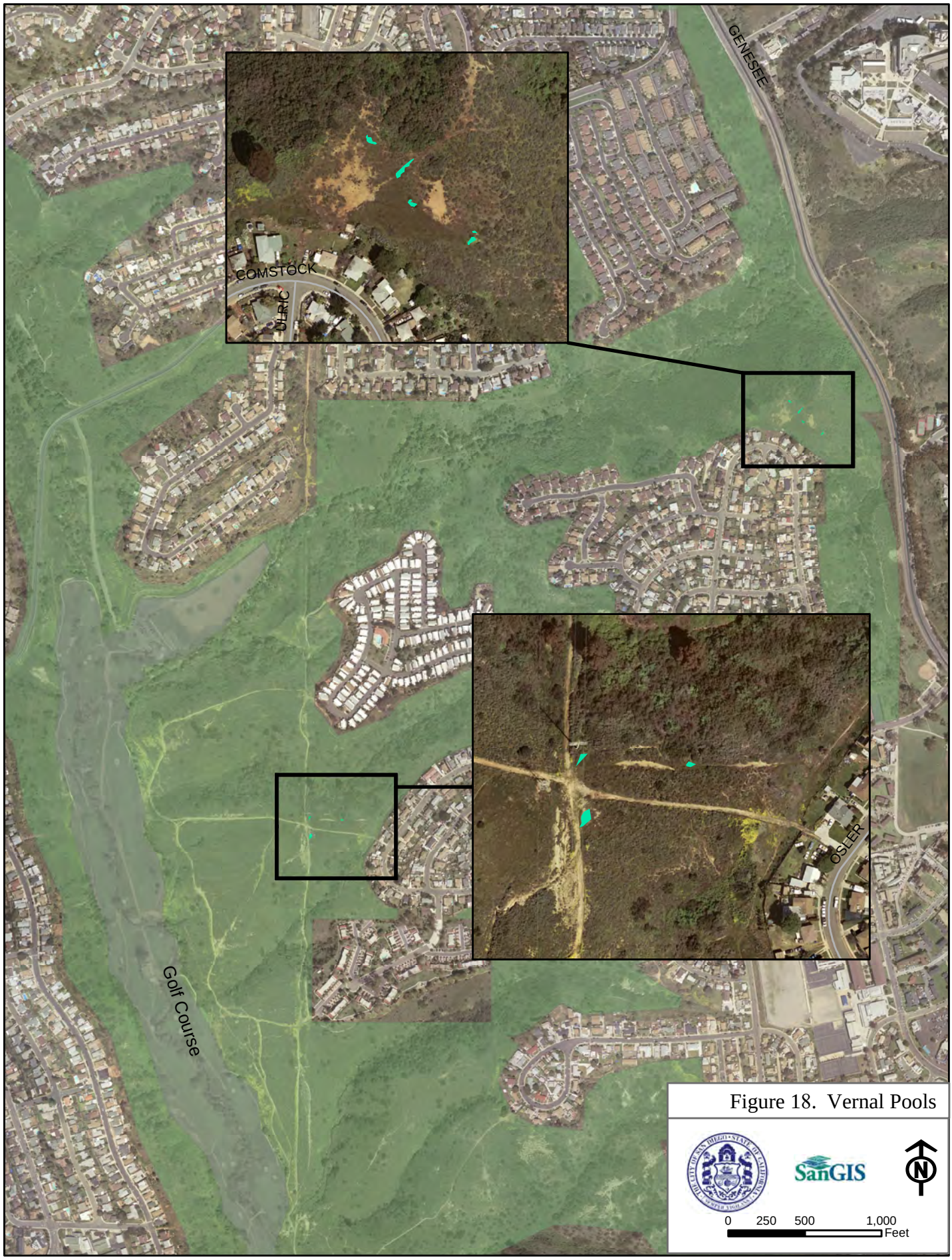


Figure 18. Vernal Pools

Figure 19. Sensitive Species Plants

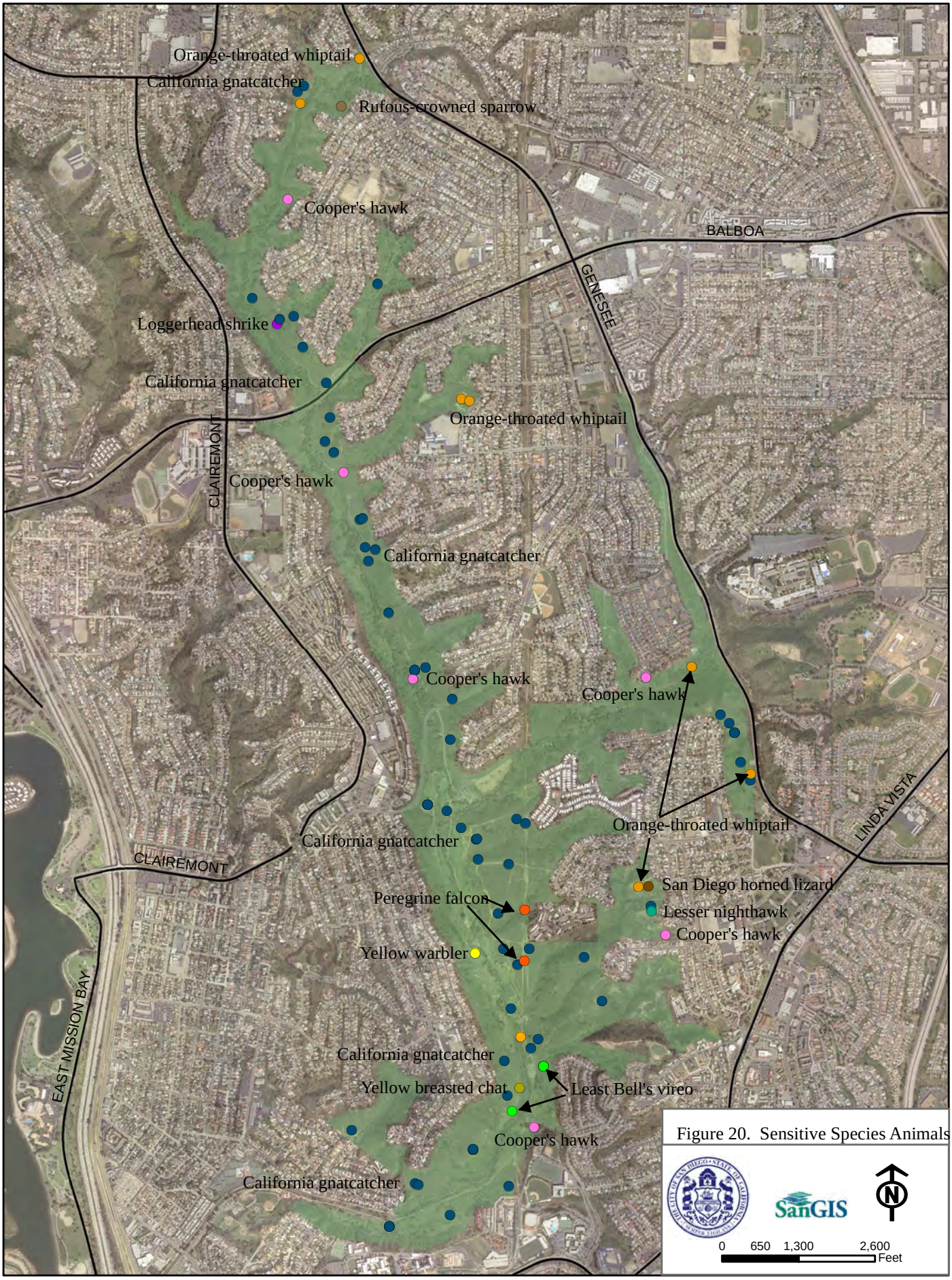


Figure 20. Sensitive Species Animals

5.0 THREATS TO NATURAL RESOURCES

Although direct habitat loss due to development is not a threat within the designated open space, habitat loss and degradation due to both natural and anthropogenic threats continue to affect native species and habitat in Tecolote Canyon.

5.1 Illegal Recreational Use

Trails bring people in close proximity to natural resources and inherently result in disturbance to those resources by habitat fragmentation, possible spread of invasive species, and disturbance to sensitive and secretive wildlife. These disturbances are generally mild, but can be elevated if recreational users don't abide by Park rules and restrictions. Illegal uses of the Park include off-trail activity (e.g. hiking, mountain biking, motorcycles, and ATVs), unleashed pets, and depositing trash and other waste in the Park.

Impacts associated with the illegal recreation uses include:

- Damage to soil crust leading to erosion and spread of invasive species
- Trampling or damaging plant material
- Disturbance to animals from off-trail use by humans
- Compacted soils which may inhibit root growth from adjacent vegetation and/or seedling recruitment
- Spread of invasive plant seeds on tread of shoes or bike wheels
- Disturbance to animals from dogs and other pets off-leash
- Impaired water quality from improper disposal of trash and pet waste

5.2 Urban Edge, Encroachment & Dumping

The Park's adjacency to residential areas results in edge effects, refuse dumping, and some backyard encroachment into the Park. Non-native landscape plants have invaded the Park from adjacent residential and commercial areas, as well as from development upstream of the Park. Residents adjacent to the Park often either intentionally or unintentionally extend their landscaping, building structures such as decks and pools, and/or dump trash and/or yard waste into publicly-owned open space adjacent to their property boundary. Excessive watering of landscaping can create mesic conditions within the open space where the natural state would be dry.

Domestic cats (*Felis catus*), including pets from adjacent residences and feral populations, pose significant threats to native fauna in open space areas. Cats hunt and influence populations of songbirds, small mammals, and reptiles. Studies have shown that due to a combination of their opportunistic predatory behavior and their occurrence in numbers exponentially higher than

native predators, cats can wipe out bird populations from otherwise suitable habitat (Dauphine and Cooper 2009).

5.3 Illegal Camping

According to the San Diego Municipal Code "it is unlawful to camp, lodge, sleep, or tarry overnight" in City Parks including Open Space Areas. Illegal camping can result in trampling or modification of vegetation, accumulation of trash, human and oftentimes canine excrement, and damage resulting from fire rings. There are several areas within the Park that have had fairly regular overnight occupancy, despite continuous efforts by Park Ranger and Police staff to patrol and issue citations.

5.4 Urban Runoff

Increased runoff from surrounding urban development and upstream water sources introduces sediments and pollutants (e.g. bacteria and heavy metals) which contribute to impacted water quality and degradation of the Park. Additionally, as a result of over watering of landscaping and washing personal vehicles on driveways and residential streets, drainages that would normally be seasonally dry have year-round flow, which alters the hydrologic regime impacting hydrohpytic vegetation and aquatic plant and animal communities.

During storm events, runoff from the impervious developed surfaces is concentrated into storm drains. These storm drains are emptied onto the City-owned property, where the high volume and velocity result in significant erosion. Bank erosion is an issue in several places along trails and in tributary canyons, resulting in damage to riparian habitat and hazards to public safety. Many creek crossings and areas around sewer manholes have significant erosion issues resulting from high concentrated flows from storm drain outfalls. Unstable banks, steep gullies, and exposed sewer facilities create many public health and safety issues.

Bridges and culverts, paver crossings, gabions, and other structures intended to stabilize the streambed have been installed in the canyon by various agencies (e.g. City of San Diego Public Utilities Department, SDGE). The conditions of these items depend on the amount of time they have been in place, the quality of engineering that went into designing the structures, and the impacts of high volume storm events.

City of San Diego Transportation & Storm Water Department has implemented some of the BMPs listed in the Comprehensive Load Reduction Plan (CLRP) for Tecolote Watershed to reduce pollutant load and volume of runoff entering the storm drains. One project installed bioretention cells and permeable pavement north of the North Clairemont Recreation Center (Entrance 6) (Tetra Tech 2011).

5.5 Invasive Species

Non-native and invasive species threaten natural resources through competition, predation/herbivory, habitat degradation, hybridization and reduction of genetic diversity, and introduction of disease.

Non-native invasive animal species detected within Tecolote Canyon include brown-headed cowbirds (*Molothrus ater),* African clawed frog (*Xenopus laevis*), Argentine ants (*Linepithema humile*), and gold-spotted oak borer (GSOB) (*Agrilus auroguttatus*).

Brown-headed cowbirds are nest parasites of more than 200 species, particularly sensitive songbirds such as least Bell's vireo, California gnatcatcher, and southwestern willow flycatcher. Brown-headed cowbird brood parasitism plays a secondary role (second to habitat fragmentation) in declines of populations of least Bell's vireo and southwestern willow flycatcher (Kus and Whitfield 2005). Cowbird trapping has been shown to reduce parasitism and associated failure of vireo nests (USGS 2011). Although cowbird females, which search through vegetation for host nests in which to lay their eggs, are highly mobile and adept at locating hosts, it is well documented that local occurrence of cowbirds is enhanced by proximity of agricultural land and grazing livestock, which provide ready food resources in the form of seeds and insects associated with or exposed by the movements of large animals.

African clawed frogs are voracious predators in aquatic systems, eating insect larvae, water insects, crustaceans, small fish, tadpoles, worms, and freshwater snails. This species was brought to the United States in the 1940s and 1950s for human pregnancy test experiments, and later for the pet trade (Lemm 2006).

GSOB is an invasive insect pest that causes mortality in mature coast live oak trees and was detected in Tecolote Canyon in 2013 (Figure 21). The beetle is native to southeastern Arizona, and was first identified in California in 2004, but wasn't linked to oak mortality in San Diego until 2008. The larvae feed beneath the bark of oaks trees, interrupting the transfer of nutrients and water. GSOB has killed an estimated 21,500 trees in San Diego County, mostly within the mountain communities of Julian and Descanso (California Board of Forestry and Fire 2012; Hishinuma et al. 2011).

The Argentine ant is a widespread invasive insect species that competitively displaces native ants throughout its introduced range (Holway 1999). This species has a unique colony structure with multiple queens and thousands of workers, and no intraspecific aggression. Though primarily a mesic species, the Argentine ant can move up to 200 meters away from available water into upland areas, thereby making much of the coastal sage scrub in the narrow Park susceptible to invasion (Holway 2005). Runoff from adjacent properties and golf courses also allows spread of the Argentine ant into the otherwise unsuitable coastal sage scrub habitat. Argentine ants directly

negatively impact two MSCP covered species: the San Diego horned lizard and the coast barrel cactus. The native harvester ant (*Pogonomyrmex subnitidus*) has been declining in areas that have been invaded by the Argentine ant, partly due to aggressive nest raids resulting in high harvester ant mortality (Zee and Holway 2006). A decline in the harvester ant population directly impacts the San Diego horned lizard which relies on the harvester ant primarily as a food source. In addition, recent research shows argentine ants negatively impacting the productivity of the coast barrel cactus by reducing the amount of time that native pollinators stay on a flower (LeVan et al. 2014).

Of the fifty invasive plant species that have been mapped within Tecolote Canyon (Table 5; Figures 22-25), 6 are included in the 2012 report Management Priorities for Invasive Non-native Plants (Dendra Inc 2012). One species categorized in the Level 2 –Eradication category (Dendra Inc 2012) has been documented at Tecolote Canyon: Canary Island St Johnswort (*Hypericum canariense*). A second species – red sesbania (*Sesbania punicea*) - has been documented in two locations at Tecolote Canyon (Calflora 2013). This species has recently been identified as a high priority for management, and is likely to be added to the Level 2 – Eradication category in the next revision to the report.

Ecosystem processes that can be affected by non-native plant species include nutrient cycling, fire frequency and intensity, hydrologic cycles, sediment deposition, and erosion (Bossard et al. 2000).

Table 5. Invasive Plant Species in Tecolote Canyon

Scientific Name	**Common Name**	**Management Level**	**CAL-IPC**
Hypericum canariense	Canary Island St. Johnswort	2	Moderate - Alert
Sesbania punicea	Red sesbania		High
Arundo donax	Giant Reed	3	High
Cortaderia selloana	Pampas Grass	3	High
Foeniculum vulgare	Fennel	4	High
Silybum marianum	Milk Thistle	4	Limited
Glebionis coronaria	Crown Daisy	5	
Acacia longifolia	Golden Wattle		
Agave americana	America Century Plant		
Asparagus asparagoides	African Asparagus Fern		Moderate-Alert
Asphodelus fistulosus	Onionweed		Moderate-Alert
Atriplex semibaccata	Australian Saltbush		Moderate
Bougainvillea spectabilis	Great Bougainvillea		
Brassica nigra	Black mustard		Moderate
Bromus diandrus	Ripgut Brome		Moderate

Bromus hordeaceus	Soft Chess	Limited
Bromus madritensis	Red Brome	
Carduus pycnocephalus	Italian Thistle	Moderate
Carpobrotus edulis	Hottentot Fig	High
Centaurea melitensis	Tocalote	Moderate
Cirsium vulgare	Bull Thistle	Moderate
Conium maculatum	Posion Hemlock	Moderate
Crassula ovata	Jade Plant	
Dipsacus sativus	Fuller's Teasel	Moderate
Eucalyptus sp.	Eucalyptus	
Eugenia aggregata	Cherry of the Rio Grande	
Festuca myuros	Rat-Tail Fescue	Moderate
Ficus sp.	Fig	
Fraxinus uhdei	Shamel Ash	
Geranium sp.	Geranium	
Hedera helix	English Ivy	High
Helminthotheca echioides	Bristly Ox-Tongue	Limited
Lactuca serriola	Prickly Wild Lettuce	
Malephora crocea	Coppery Mesemb	
Marrubium vulgare	Horehound	Limited
Mesembryanthemum crystallinum	Crystalline Ice Plant	Moderate-Alert
Myoporum laetum	Ngaio Tree	Moderate
Nicotiana glauca	Tree Tobacco	Moderate
Oenothera sinuosa	Wavy-leaved daura	
Olea europaea	Olive	Limited
Opuntia ficus-indica	Mission Cactus	
Pennisetum setaceum	Fountaingrass	Moderate
Phoenix canariensis	Canary Island Date Palm	Limited
Ricinus communis	Castor Bean	Limited
Robinia pseudoacacia	Black Locust	Limited
Salsola tragus	Russian Thistle	Limited
Schinus molle	Peruvian Pepper Tree	Limited
Schinus terebinthifolius	Brazilian Pepper Tree	Limited
Stipa miliacea	Smilo Grass	
Washingtonia robusta	Washington Fan Palm	Moderate-Alert
Yucca aloifolia	Spanish Bayonet	

5.6 Altered Fire Regime

Fire suppression in Tecolote Canyon has drastically altered the natural fire regime. The last large fire in Tecolote Canyon was in 1935; aside from small isolated brush fires, a majority of the vegetation in the Canyon has not burned in almost 8 decades (Figure 26). One impact associated with fire suppression is an accumulation of vegetative material that could potentially fuel large and extremely hot fires in the future. It is assumed that fire fighting would be rapid and efficient in putting out most fires in Tecolote Canyon because of its highly urbanized setting. Therefore fire as a threat in Tecolote Canyon is relatively minimal, though suppression of fire may impact certain species' ability to reproduce: some chaparral species such as *Ceanothus* sp. are obligate seeders whose seed require a fire cue (e.g. heat, smoke) to germinate.

5.6.1 Brush Management

Fire is a concern for property owners adjacent to Open Space. The City's Fire-Rescue Department recommends brush management be performed adjacent to habitable structures. Brush management shall continue to occur according to current Land Development Code Regulations; currently, brush management results in moderate impacts to habitat within 100 feet of habitable structures.

5.7 Utility Easements

Several utility easements traverse the Park, including electricity, natural gas, jet fuel, water, and sewer. Serious direct impacts to habitat and water quality could occur following a leak or spill including but not limited to pollutants entering the creek, erosion, and damage to vegetation and wetlands by heavy equipment associated with emergency repairs. Maintenance, repair, or replacement of sewer facilities including access paths and creek crossings could result in temporary impacts such as loss of habitat, noise, dust, lighting for night work, and closures of park trails. These activities could also result in indirect impacts such as the spread of non-native invasive species on tires of vehicles accessing the Park, establishment of non-native invasive species following disturbance to soils or native vegetation, and creation or exacerbation of erosion in areas near where utility structures were accessed, inspected, or repaired. Restoration and/or mitigation for these impacts are regulated by federal, state, and local permitting agencies as well as the planning documents and plans listed in Section 2.0.

5.8 Climate Change

Climate change may greatly affect biodiversity in San Diego's ecosystems. Climate predictions for the region include increased frequency and duration of extreme hot days, prolonged periods of drought, and higher variability in precipitation (e.g. more intense episodic rainfall resulting in flooding and droughts) (Messner et al. 2009). Direct impacts could include increased incidence of desiccation of herbaceous species and hydrophytic vegetation not adapted to high heat and

drought. Climate change has also been predicted to increase indirect impacts by exacerbating current threats to species and communities, such as invasive species and diseases.

Different species will adapt to the changing climate in different ways: a warmer climate might trigger migrations of bird species at an earlier date than what is typically expected (Marra et al. 2005). If appropriate food and nesting material are not available at nesting habitat when the birds arrive, then some bird species might suffer from greatly reduced reproductive capacity. Individual species and communities might migrate to more favorable conditions, such as by climbing elevation. Since Tecolote Canyon is relatively small, does not offer much varied topography, and is entirely surrounded by developed land, this adaptation strategy will likely not be possible except on very small scales. Within Tecolote Canyon, chaparral communities (typically occurring on cooler north-facing slopes) might be reduced in size, while the more drought-tolerant coastal sage scrub communities (typically found on the exposed south-facing slopes) may expand.

Species and communities will not respond in the same manner or within the same time scale, thus resulting in communities with a mix of species that might not have been documented before. Though most species have persisted many thousands of years adapting to various changes and shifts in climate, the accelerated pace of anthropogenic-induced climate change may render some species unable to adapt in time. Sensitive species that are already imperiled with low populations from one or more threats and stressors are at highest risk of disappearing from the Park.

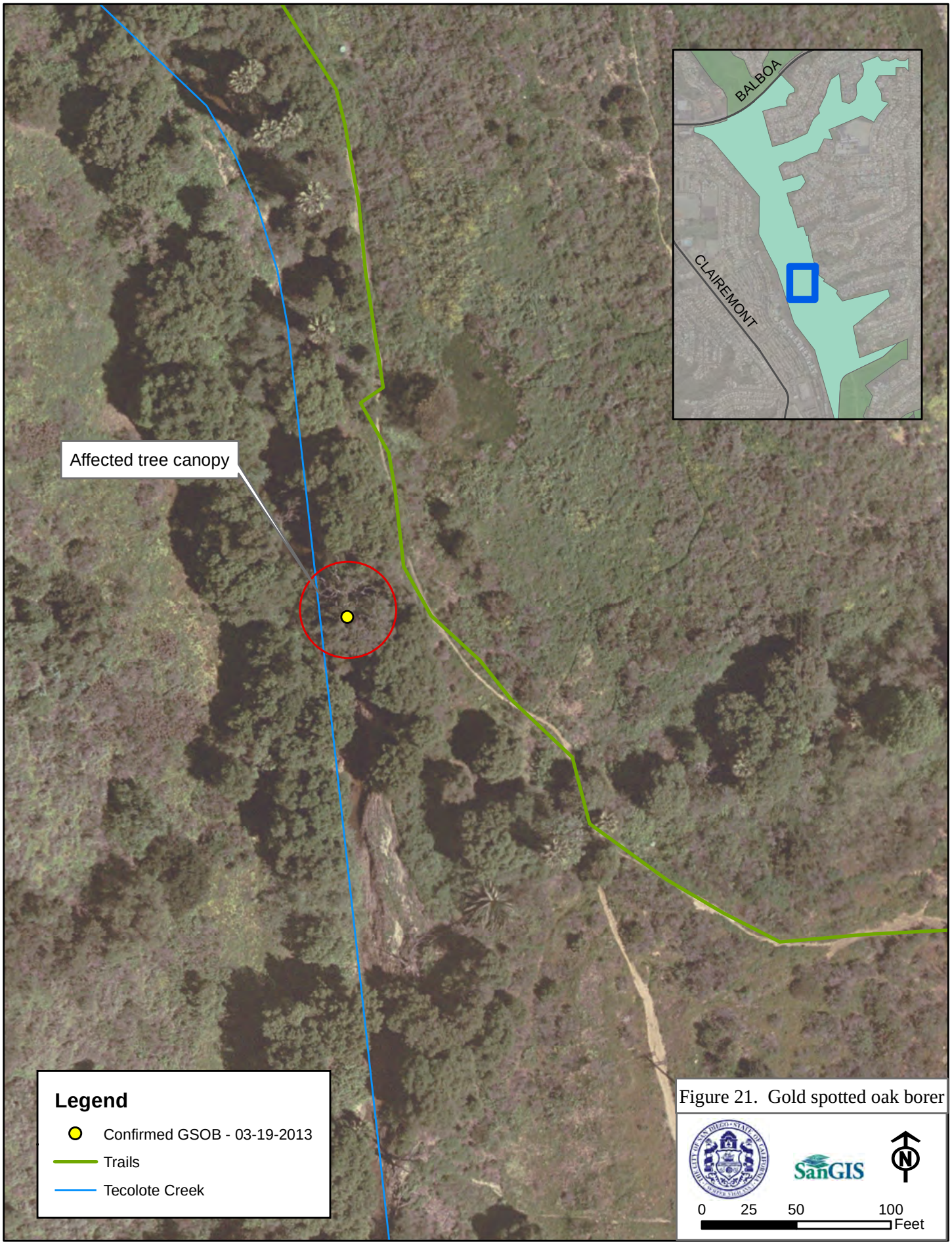
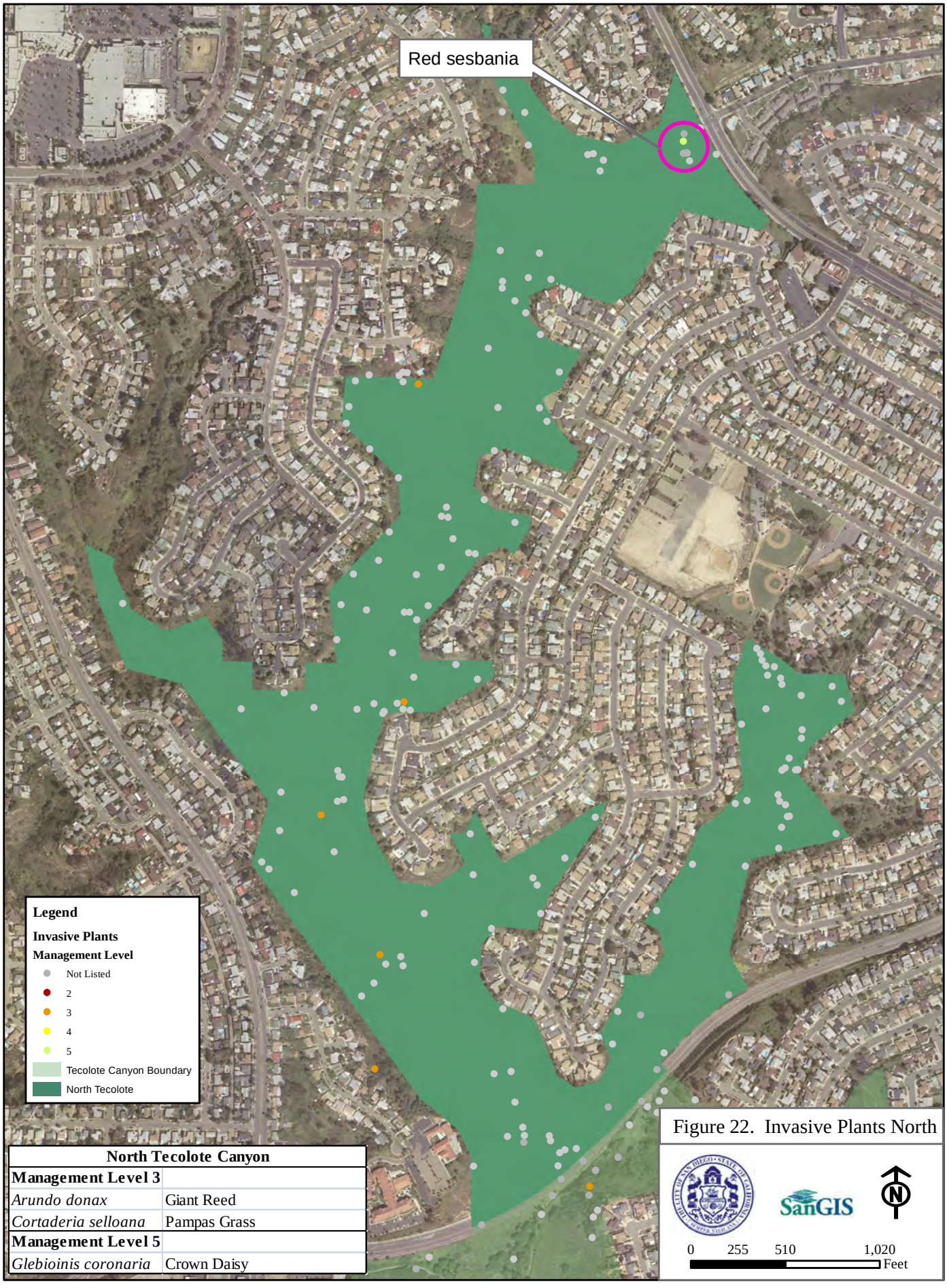
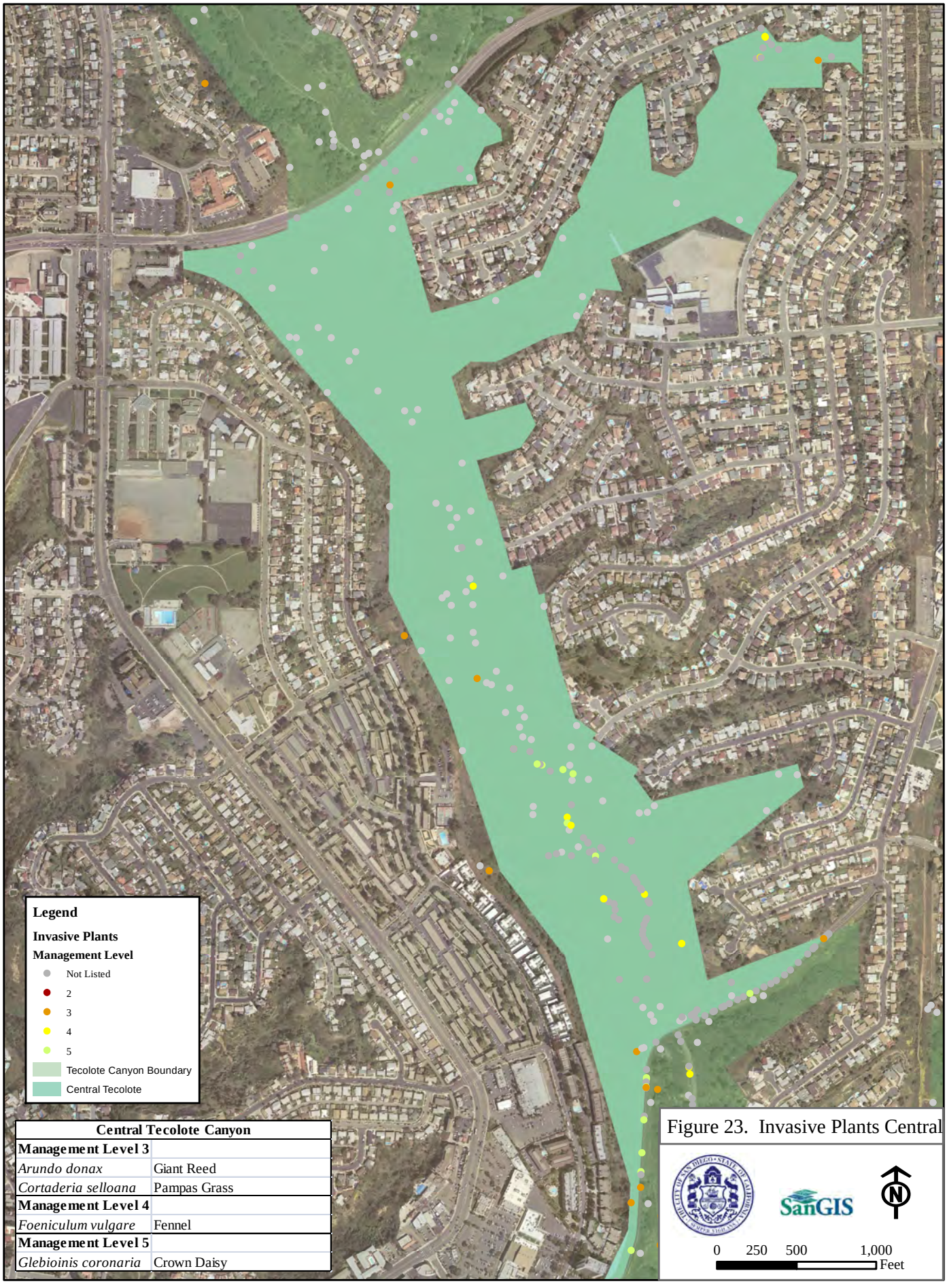


Figure 21. Gold spotted oak borer



North Tecolote Canyon	
Management Level 3	
Arundo donax	Giant Reed
Cortaderia selloana	Pampas Grass
Management Level 5	
Glebioinis coronaria	Crown Daisy

Figure 22. Invasive Plants North

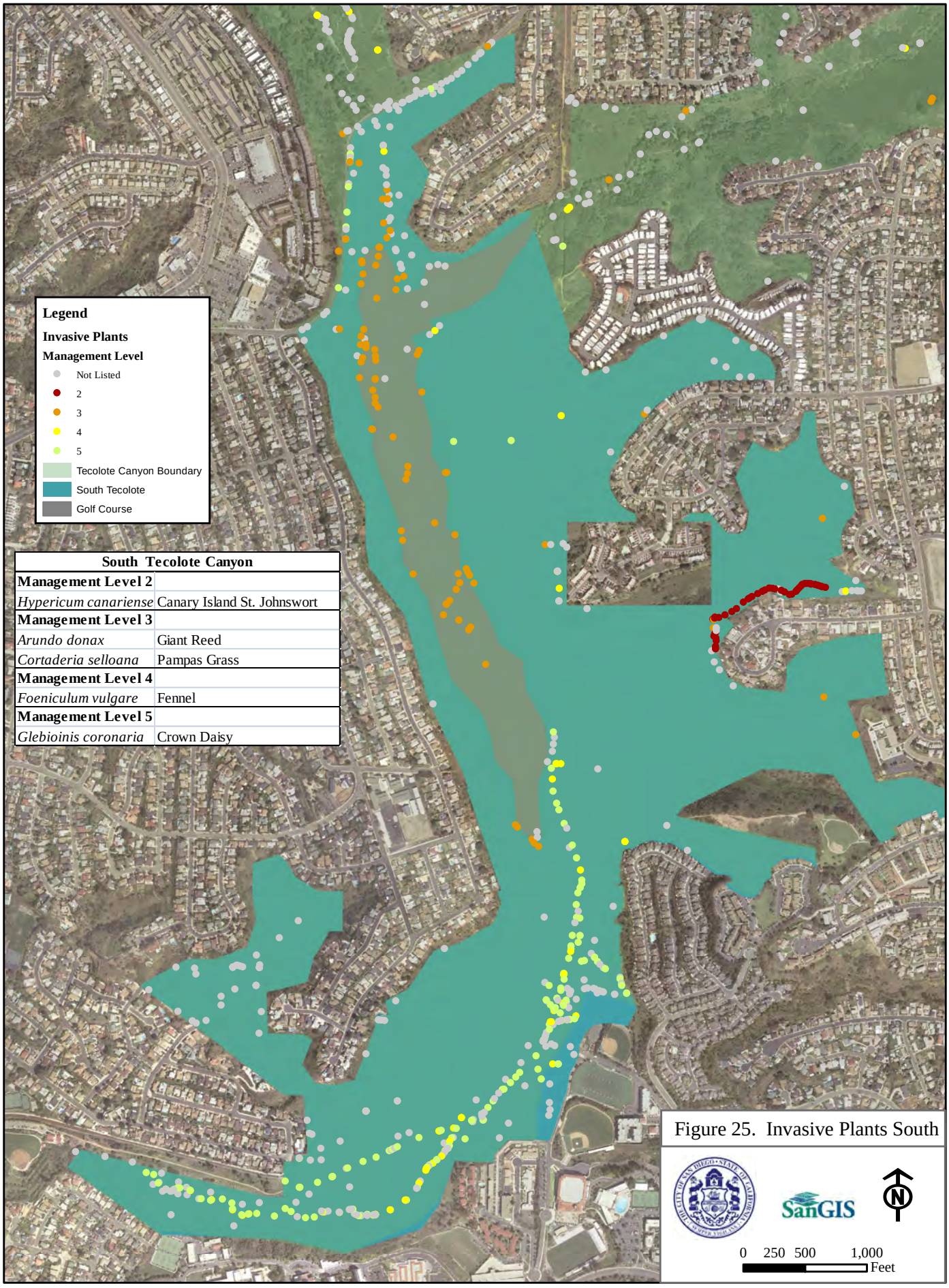


Central Tecolote Canyon	
Management Level 3	
Arundo donax	Giant Reed
Cortaderia selloana	Pampas Grass
Management Level 4	
Foeniculum vulgare	Fennel
Management Level 5	
Glebioinis coronaria	Crown Daisy

Figure 23. Invasive Plants Central

East Tecolote Canyon	
Management Level 3	
Arundo donax	Giant Reed
Cortaderia selloana	Pampas Grass
Management Level 4	
Foeniculum vulgare	Fennel
Management Level 5	
Glebioinis coronaria	Crown Daisy

Figure 24. Invasive Plants East



South Tecolote Canyon	
Management Level 2	
Hypericum canariense	Canary Island St. Johnswort
Management Level 3	
Arundo donax	Giant Reed
Cortaderia selloana	Pampas Grass
Management Level 4	
Foeniculum vulgare	Fennel
Management Level 5	
Glebioinis coronaria	Crown Daisy

Figure 25. Invasive Plants South

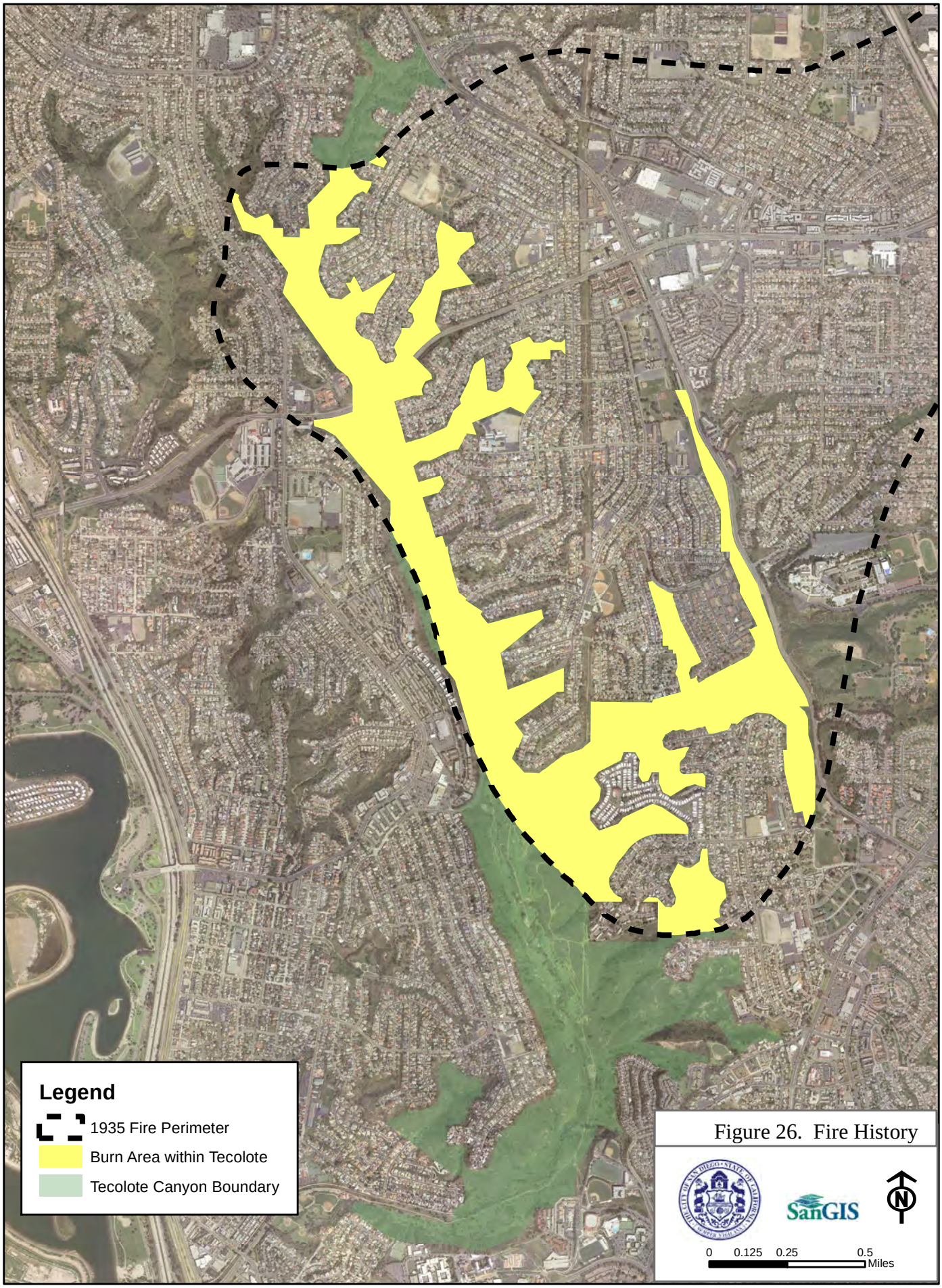


Figure 26. Fire History

6.0 GENERAL MANAGEMENT

As stated in Section 2.1, the day-to-day management of Tecolote Canyon is the responsibility of the Park and Recreation Department, and is carried out by Park Rangers and volunteers. Park Rangers patrol Tecolote Canyon to identify and control vandalism, off-trail activity, dumping, encroachments, and other activities in violation of Park Rules (Section 3.1) and other City Ordinances.

6.1 Trail System Maintenance

In order to ensure Park visitors are well informed of permissible trail use, approved trails as shown in the Master Plan Amendment once approved will be clearly marked with signs. Wherever needed, fencing shall be installed to help direct visitors on appropriate paths. At major Park Entrances, Park Rules (Section 3.1) will be posted prominently.

Trail closures should be instituted to: allow native vegetation to recover; protect archaeological sites and/or biological sensitive species or areas; allow added protection for sensitive species during breeding season; provide erosion control; ensure public safety; and allow for trail maintenance. Such closures may be temporary or permanent depending on the need.

Additionally, the City Park and Recreation Department, Open Space Division staff reserves the right to restrict the use of and/or close any public trail or access point in Tecolote Canyon to protect the public health, safety, and welfare. An example of such conditions would include, but is not limited to, restrictions/closure during inclement weather, trail overuse, landform deterioration, or other adverse conditions.

Permanently closed trails will be blocked off with fencing where appropriate, and/or restored using physical deconstruction of berms, jumps, or other built features, trail brushing with locally acquired material, seeding with a native seed mix, and/or planting with container plants. Seed and container plants shall be locally sourced and shall be consistent with the species, composition, and distribution of surrounding habitat within Tecolote Canyon.

SDG&E typically maintains its existing access roads on an annual maintenance schedule. These roads may be subject to periodic closure while utility construction or maintenance activities are occurring.

6.2 Encroachments

Unauthorized encroachments on City property are discovered every year, many of which occur on the boundary with Tecolote Canyon. Reports of possible unauthorized encroachments originate

from four primary sources: 1) brush management crew (Park and Recreation Department), 2) Park Ranger and volunteer patrols (Park and Recreation Department), 3) concerned citizens, and 4) incidental discoveries by City staff (all Departments). City Council Policy 700-06 (Encroachments on City Property, May 24, 1999) outlines the specific policies and procedures for responding to reports of encroachments and protecting City property.

6.3 Utilities

Maintenance activities are allowed within the Park to ensure the safety of the community and to prevent harmful spills and other emergencies. Public Utilities Department is responsible for maintaining sewer and water infrastructure including access roads in accordance with their Canyon Sewer Cleaning Program and Long-term Canyon Sewer Maintenance Program (Section 2.4). Similarly, San Diego Gas and Electric is responsible to maintaining their roads and utilities located on SDGE property and on easements in accordance with their Subregional Natural Community Conservation Plan (NCCP) (Section 2.5). Both entities are required to coordinate all activities with City of San Diego Park and Recreation Park Rangers.

6.4 Brush Management

Brush management occurs along the urban/open space boundary at Tecolote within 100 feet of habitable structures. Brush management follows Land Development Code Regulations which list restrictions of brush management where sensitive species occur (e.g. in areas with occupied California gnatcatcher, no brush management is allowed from March 1 to August 15), and prioritizes thinning to target dead material and invasive plants over native plants, and protecting sensitive species and wetlands.

7.0 STRATEGY FOR PRIORITY MANAGEMENT

7.1 Management for Species and Habitat Communities

A prioritization system for management actions was developed for species and habitat at Tecolote Canyon using survey data, information gleaned from a thorough literature review, and the combined knowledge of City biologists and rangers. Of the currently recorded MSCP-covered species in Tecolote Canyon, none have species-specific management goals or objectives for specifically for Tecolote Canyon (SDMMP 2013). Management objectives have therefore been identified for groups of species, or communities, rather than for individual species. This model is consistent with the Management Strategic Plan (SDMMP 2013) and the California State Wildlife Action Plan (SWAP) (CDFW 2015).

Communities to receive priority management at Tecolote (detailed in Section 8):

1. Riparian scrub and woodlands
2. Coastal sage scrub
3. Aquatic communities

Other communities that will not receive priority management at Tecolote:

Vernal Pools

Vernal pools have been mapped within Tecolote Canyon (Figure 25). Records for sensitive species within the vernal pools are from 1940 and earlier; no current populations of sensitive species are known to occur within these vernal pools. No priority management has been identified for vernal pools in Tecolote Canyon (SDMMP 2013). Because of the historical occurrence of orcutt's brodiaea, vernal pools within Tecolote Canyon are candidates for restoration and/or enhancement.

Chaparral

Approximately 86 acres of chaparral habitat exists in Tecolote Canyon, including chamise chaparral and scrub oak chaparral. Some portions of the canyon contain very old growth stands of chaparral. These communities will not receive priority management because stands of chaparral are stable and do not support many sensitive species.

7.2 Management for Climate Change

One of the goals of this NRMP is to integrate management actions with climate-smart conservation in order to address impacts that threaten natural resources within the Park now and in the future. Climate-smart conservation is defined as "the intentional and deliberate consideration of climate change in natural resource management, realized through adopting forward-looking goals and explicitly linking strategies to key climate impacts and vulnerabilities" (Stein et al. 2014). Integration

of management actions with climate smart conservation maximizes beneficial outcomes while promoting efficient use of funding.

A separate exercise listing and evaluating possible management actions specifically targeting the threat of climate change for species and communities in Tecolote Canyon was completed using a modified approach based on a process detailed in Climate-Smart Conservation: Putting Adaptation Principles into Practice (Stein et al. 2014) (Appendix D). The climate smart conservation strategies were ranked based on their feasibility, compatibility with other management actions, and impact on improving climate resilience. Then the highest ranked actions were integrated into the selection and prioritization of management options for Tecolote Canyon, and are included in the following sections as "Climate-Smart Conservation Strategies."

7.3 Adaptive Management

Adaptive management has been defined in a number of different ways, but is essentially a systematic approach for improving natural resource management that requires assessing management actions for effectiveness and making improvements for ongoing management. As in the Climate-Smart Conservation Cycle, a step is needed following management to track the effectiveness of the management actions and make adjustments as needed. The recommended monitoring in the following section provides this critical step in the adaptive management process. Information from the monitoring can be used to adjust management actions as needed consistent with the principles of adaptive management.

The NRMP is scheduled for revision on an anticipated 10-year cycle, which allows for lessons learned from previous management to be incorporated into revised editions of the NRMP. In addition, the most up-to-date science and best management practices will be incorporated into future editions of the NRMP in accordance the adaptive management process.

8.0 PRIORITY MANAGEMENT OBJECTIVES

Priority management strategies were developed in accordance with area-specific management directives in the City of San Diego's MSCP Subarea Plan, as well as other local and regional documents that contain conservation or management objectives relevant to Tecolote Canyon, including the City's General Plan (City 2008), Management Strategic Plan (SDMMP 2013), Climate-Smart Conservation (Appendix D), and the Draft Mission Bay Watershed Management Area Water Quality Improvement Plan (Amec 2014). Additional input was received from City of San Diego park rangers and open space staff.

The Draft California State Wildlife Action Plan (SWAP) was released for public comment in February 2015 (CDFW 2015), and the priority management strategies in this NRMP that align with the conservation strategies identified in the SWAP are shown below (identified by a check mark under the appropriate management objective).

8.1 Riparian Scrub and Woodlands

A majority of the wetland habitat in Tecolote Canyon is mapped as *Quercus agrifolia* alliance (109 acres; Table 3). This area contains a mature and dense canopy of coast live oaks (*Q. agrifolia*). Other habitat types include *Platanus racemosa* alliance, characterized by the presence of the tall western sycamore (*Platanus racemosa*), and *Populus fremontii* alliance, a denser habitat with cottonwood (*Populus fremontii*) and willows (*Salix* spp.).

This community is habitat for four MSCP-covered species: least Bell's vireo (*Vireo bellii pusillus*) (Federally and State Endangered), southwestern willow flycatcher (*Empidonax traillii extimus*) (Federal and State Endangered), cooper's hawk (*Accipiter cooperii*), and orange-throated whiptail (*Aspidoscelis hyperythra beldingi*). Least Bell's vireo has been detected in 1991 (CNDDB), in 2004 (Helix), and in 2013 (City). All sightings were in the southern portion of Tecolote Canyon. Southwestern willow flycatcher has not been detected within Tecolote Canyon (CNDDB; Unitt 2004). Cooper's hawks could nest in riparian woodlands, and have been detected throughout the park (Dudek 2003b; Helix 2004; Tierra 2004; Merkel 2006; City 2013a). Orange-throated whiptail has been documented in 2004 (Helix) and in 2006 (Merkel).

Table 6. MSCP Conditions of Coverage for Riparian Scrub and Woodland Species		
Least Bell's Vireo	*Vireo bellii pusillus*	Area-specific management directives must include measures to provide appropriate successional habitat, upland buffers for all known populations, cowbird control, and specific measures to protect against detrimental edge effects. Any clearing of occupied habitat must occur between September 15 and March 15.
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	Area specific management directives must include measures to provide appropriate successional habitat, upland buffers for all known populations, cowbird control, and specific measures to protect against detrimental edge effects to the species. Any clearing of occupied habitat must occur between September 1 and May 1.
Cooper's Hawk	*Accipiter cooperii*	Area specific management directives must include 300-foot impact avoidance areas around active nests and minimization of disturbance in oak woodlands and oak riparian forests.
Orange-throated whiptail	*Aspidoscelis hyperythra beldingi*	The area specific management directives must address edge effects.

8.1.1 Primary Threats

Invasive Plant Species

Of the fifty mapped invasive plant species at Tecolote Canyon, the species that are the biggest threat to riparian systems are red sesbania (*Sesbania punicea,)* giant reed (*Arundo donax*), pampas grass (*Cortaderia* spp.), Canary island date palm (*Phoenix canariensis*), and Mexican fan palm (*Washingtonia robusta*). These species can become established in undisturbed habitats and can displace native vegetation: they have the capacity to significantly alter the hydrology and the vegetative structure and composition of riparian systems. Giant reed, for example, replaces native vegetation and reduces habitat and food supply, particularly insect populations for avian species (Frandsen and Jackson 1994).

Red sesbania (Family Fabaceae) has been documented in North Tecolote Canyon, just below Genessee Road, and near the southern end of the Canyon (Calflora 2013). Red sesbania is a deciduous shrub or small tree found primarily in riparian areas. Its thick clusters can limit access, displace native plants, and contribute to bank erosion and flooding (Cal-IPC 2013). One very large red sesbania was removed by City ranger staff and volunteers in 2012 (Figure 31); management since then has focused on seedlings, using both manual removal and herbicide application (J. Lavallee pers. comm.).

GSOB

In 2013, gold-spotted oak borer (GSOB) (*Agrilus auroguttatus*) was reported in Central Tecolote Canyon. As of 2013, only one tree had confirmed GSOB. The pest is spread through the distribution of firewood.

Domestic Cats

Domestic cats, including both pets from adjacent residential areas as well as feral populations, pose a significant threat to riparian animal species within Tecolote Canyon.

Brown-headed Cowbirds

Brown-headed cowbirds tend to occur in areas adjacent to agriculture and range lands with cattle and/or horses. Since these conditions do not occur in Tecolote, the threat from cowbirds is moderate. In addition, during two years of surveying the riparian habitat of the southern portion of Tecolote Canyon (City 2013a; 2014b), no cowbirds have been detected.

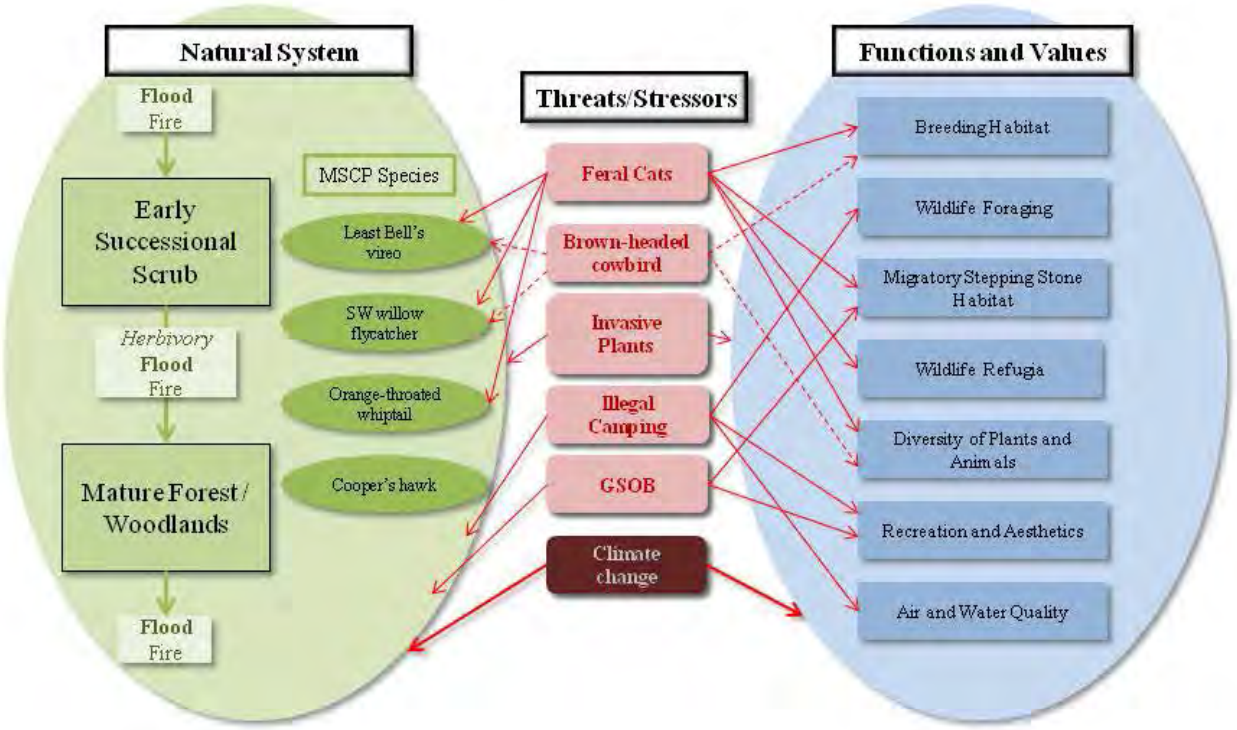


Figure 27. Conceptual model for Riparian Scrub and Woodland. *Riparian scrub and woodlands undergo a natural succession that is dependent on flood, herbivory, and, to a lesser extent, fire. MSCP-covered species occupy both types of habitats. Both riparian scrub and woodland provide a number of essential functions and values, including providing breeding and foraging habitat for wildlife, providing a stepping stone for migratory bird species, providing essential water and air filtration, among other things. Invasive plants threaten all species and all functions and values. Feral cats specifically are a threat to nesting songbirds and native reptiles and mammals. Brown-headed cowbirds, if found in significant numbers within the canyon, could threaten nesting songbirds and least Bell's vireo and southwestern willow flycatcher in particular. Illegal camping has a variety of impacts on wildlife, recreation, and water quality. Impacts associated with climate change are likely to influence the natural system by changing the flood and fire regime, as well as impacting the functions and values of riparian scrub and woodlands, from alteration of timing of migration of songbirds to range shifts of certain plants and animals.*

8.1.2 Monitoring

Regular biological monitoring provides valuable information regarding current threats and the extent and distribution of priority species. Monitoring also provides critical information regarding the effectiveness of the management actions listed below, and can be used to adjust management actions as needed consistent with the principles of adaptive management. Recommend timing and frequency of surveys are provided below, and are dependent upon staffing and budget allocations for the Canyon.

Table 7. Monitoring in Riparian Scrub and Woodlands

Survey Type	**Recommended Frequency**	**Comments**
Least Bell's Vireo and Southwestern Willow Flycatcher	Annually - Spring	Modified USFWS survey protocol. Summarize results in an annual report. If both least Bell's vireo and/or southwestern willow flycatcher and brown-headed cowbird are detected at the beginning of the breeding season (e.g April 10), then develop a Management Plan within one year of detection to reduce the threat of brood parasitism.
Survey for GSOB within Oak Woodland	Every 3 years	Use materials and reporting procedures from the University of California Cooperative Extension
Level 2 Invasive Species Survey	Annually – early Spring	Focus on Level 2 species as defined in Management Priorities for Invasive Non-Native Plants Strategy Report (Dendra Inc 2012).
General Invasive Species Survey and Mapping	Every 5 years	Map occurrences of invasive species. Provide information to regional database as appropriate.

8.1.3 Management Objectives

Objective 1. Prioritize restoration, revegetation and/or mitigation projects to enhance, expand and/or create potential breeding habitat for least Bell's vireo and/or southwestern willow flycatcher using results from annual survey and general invasive species survey.

- ✓ Meets ASMDs for least Bell's vireo and southwestern willow flycatcher
- ✓ Addresses Threat: Invasive Plant Species
- ✓ Climate-Smart Conservation Strategy (Appendix D)

Recent or Current Efforts Implementing this Objective: Invasive palms and other exotic plant species were removed and native species were planted within the central portion of Tecolote Canyon in 2011 as part of the City of San Diego Public Utilities Department's Central Tecolote Enhancement Mitigation Project.

Objective 2. Use best management practices for management of red sesbania in areas of known previous occurrences

- ✓ Addresses Threat: Invasive Plant Species
- ✓ Climate-Smart Conservation Strategy (Appendix D)

Recent or Current Efforts Implementing this Objective: Red sesbania was removed from the north portion of Tecolote Canon in 2012, and the site has been monitored yearly by park staff and volunteers.

Objective 3. Use best management practices for management of gold-spotted oak borer and protection of healthy mature oak trees as they become available for portions of the canyon with mature oak trees and/or areas of known infestations

- ✓ Meets ASMDs for Cooper's hawk
- ✓ Addresses Threat: Gold-spotted oak borer
- ✓ Climate-Smart Conservation Strategy (Appendix D)

Recent or Current Efforts Implementing this Objective: The City is in the process of developing a Management Plan specifically focused on GSOB in Tecolote Canyon.

Objective 4. Annually distribute educational materials to residents around Tecolote Canyon informing them about GSOB and how to prevent further spread of the pest species

- ✓ Addresses Threat: Gold-spotted oak borer

Recent or Current Efforts Implementing this Objective: The City participates in the gold-spotted oak borer education and outreach group through the University of California Cooperative Extension,

and will continue to use educational materials and other outreach programs and events as available through this collaborative effort.

Objective 5. Improve Golf Course compatibility with protection of natural resources

Before lease expiration, encourage voluntary treatment and removal of non-native invasive plant species found on the golf course. When the lease expires (2022), incorporate plan for invasive species found on the golf course on lease renewal. The plan should include details for treatment and removal of mature individuals, inspection, monitoring, and treatment new recruits or for regrowth of previously treated specimens. City shall monitor for spread of invasive plants from Golf Course and treat appropriately to prevent infestation within the Park.

- ✓ Addresses Threat: Invasive Plant Species
- ✓ Climate Smart Conservation Strategy (Appendix D)

Objective 6. Enhance education and outreach regarding pet responsibilities.

Provide multiple opportunities for education and outreach regarding the threats that feral and domestic cats present to native songbirds in the Park. Opportunities for outreach include but are not limited to guided walks, interpretive kiosks, brochures and pamphlets, and community meetings.

- ✓ Addresses Threat: Domestic cats
- ✓ Meets ASMDs for least Bell's vireo, southwestern willow flycatcher, and orange-throated whiptail

8.2 Coastal Sage Scrub

By far the most extensive habitat types mapped in Tecolote Canyon are categorized as coastal sage scrub, with 258 acres mapped as *Artemisia californica – Eriogonum fasciculatum* alliance, and, 195 acres mapped as *Artemisia californica – Salvia mellifera* alliance.

This community is habitat for five MSCP-covered species: San Diego barrel cactus (*Ferocactus viridescens*), orange-throated whiptail (*Aspidoscelis hyperythra beldingi*), San Diego horned lizard (*Phrynosoma coronatum blainvillii*), coastal California gnatcatcher (*Polioptila californica californica*) (Federally Threatened), and southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*). San Diego barrel cactus has been observed throughout the Park (Figures 25-28; HELIX 2004, Merkel 2006). Orange-throated whiptail has been documented in 2004 (Helix) and in 2006 (Merkel). The coast horned lizard was observed in the past (Dudek 2003); no recent focused surveys for this species have been performed, but it is assumed this species is still present within the Park. Coastal California gnatcatcher have been observed in many locations throughout the park (Dudek 2003, Helix 2004, Tierra 2004, Merkel 2006); in 2012, Lohstroh Biological documented 11 occupied territories in the South Tecolote Canyon alone. Southern California rufous-crowned sparrow was documented in 2003 (Dudek).

Coastal cactus wren (*Campylorhynchus brunneicapillus couesi*) (MSCP covered species) surveys were performed by the U.S. Fish and Wildlife Service in 2009 and U.S. Geological Survey (USGS) in 2012 and 2014 and will continue to be surveyed per regional standards. In 2012, 56 sites where surveyed twice during the breeding season, and all surveys were negative for cactus wren. The City is coordinating with USGS, San Diego Management and Monitoring Program (SDMMP), and the Institute for Conservation Research (ICR) on regional cactus wren prioritization and restoration efforts, which currently focus on areas with declining populations of cactus wren or areas linking two critical populations of cactus wren. Tecolote Canyon is not currently included in the regional prioritization. As such, management activities focus on the MSCP species that are currently documented in the Canyon where appropriate habitat occurs. If conditions change or the regional prioritization shifts to include Tecolote Canyon then appropriate management activities will be added to future revisions of the NRMP to reflect those changed conditions.

Table 8. MSCP Conditions of Coverage for Coastal Sage Scrub Species		
San Diego barrel cactus	*Ferocactus viridescens*	The area specific management directives must include measures to protect this species from edge effects, unauthorized collection, and include appropriate fire management/control practices to protect against a too frequent fire cycle.
Orange-throated whiptail	*Aspidoscelis hyperythra beldingi*	The area specific management directives must address edge effects.
San Diego horned lizard	*Phrynosoma coronatum blainvillii*	The area specific management directives must address edge effects.
Coastal California gnatcatcher	*Polioptila californica californica*	Area specific management directives must include measures to reduce edge effects and minimize disturbance during the nesting period, fire protection measures to reduce the potential for habitat degradation due to unplanned fire, and management measures to maintain or improve habitat quality including vegetation structure. No clearing of occupied habitat within the City's MHPA may occur between March 1 and August 15.
Southern California rufous-crowned sparrow	*Aimophila ruficeps canescens*	Area specific management directives must include maintenance of dynamic processes, such as fire, to perpetuate some open phases of coastal sage scrub with herbaceous components.

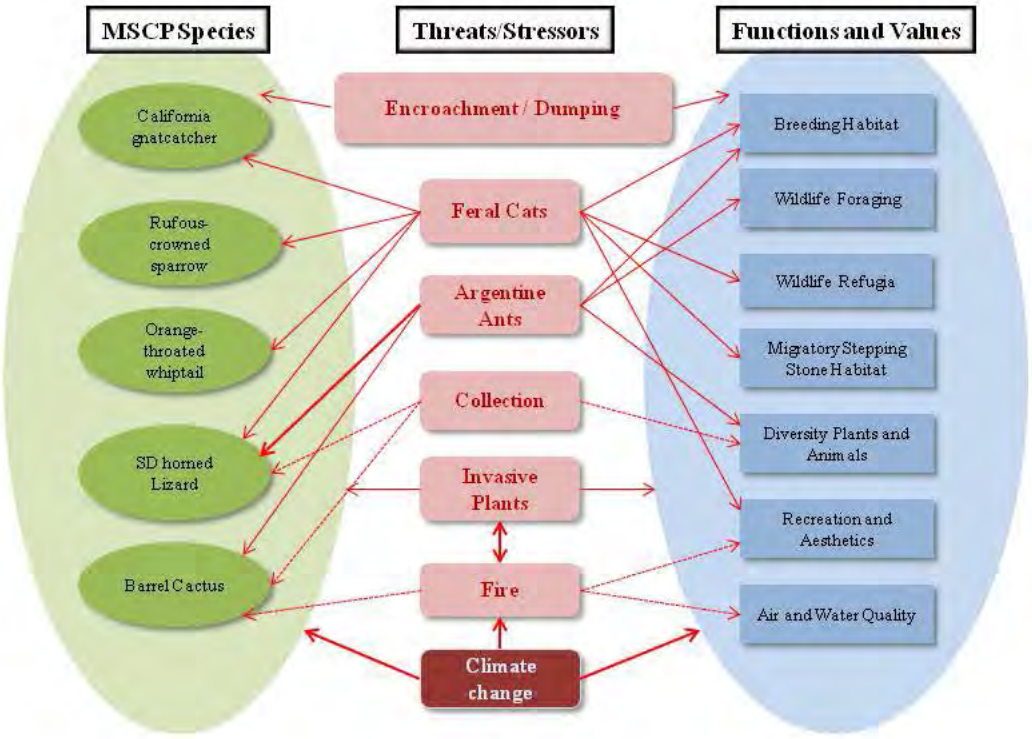


Figure 28. Conceptual Model for Coastal Sage Scrub. *Coastal sage scrub is a very common habitat type in Tecolote Canyon that provides a number of important functions, including providing breeding and foraging habitat for wildlife, providing a migratory stepping stone for birds, and potentially providing reservoir of sensitive species and/or a refugia for birds and other animals during large fire events. Both invasive plants and encroachment / dumping are major threats that impact all species and functions and values of the community. Argentine ants are of particular concern because they displace the food source for the San Diego horned lizard; they have also been linked to lower reproductive output of the coast barrel cactus. Though the fire regime has been limited to small spot fires only due to elevated fire response, it still has the potential to impact invasive species and could directly impact barrel cactus. Climate change could alter the fire regime, increase the spread of invasive plant and animal species, and impact species and functions directly.*

8.2.1 Primary Threats

Encroachment and Dumping

There is no buffer between the Park boundary and adjacent residential communities and commercial areas on the canyon rim. Coastal sage scrub occurring high on the slopes of the canyon is particularly susceptible to impacts resulting from encroachment and dumping.

Landscape plants and irrigation that extend beyond private property boundaries, and dumping of trash and landscape cuttings can crush, displace, or provide a enhanced risk of invasive species.

Argentine Ants

Argentine ants pose a threat to San Diego horned lizard by displacing the native ant populations and thus eliminating the food source for the horned lizard. It has also been recently documented that Argentine ants reduce reproductive capacity in San Diego barrel cactus by reducing pollinator visitation.

Domestic Cats

Feral and free-ranging house cats are skilled predators of small mammals, birds, and reptiles, and can pose a significant threat to native fauna in Tecolote Canyon.

Invasive Plant Species

Non-native plant species threatening coastal sage scrub include but are not limited to Canary Island St. Johnswort (*Hypericum canariense*) (Management Level 2), crown daisy (*Glebionis coronaria*) (Management Level 5), hottentot fig (*Carpobrotus* sp.), mustards (*Brassica nigra; Hisrchfelda incana*), sweet fennel (*Foeniculum vulgare*), and grasses (*Bromus* sp., *Festuca* sp., *Avena* sp.). These species tend to invade along the edges of habitat, spreading into coastal sage scrub from adjacent properties, trails, and roads. Runoff from storm drains and landscape irrigation facilitates can make conditions more suitable for some invasive species, such as hottentot fig and other iceplants.

A large population of Canary Island St. Johnswort has been mapped along the eastern edge of the Park in South Tecolote Canyon (Figure 34). Canary Island St. Johnswort occurs in disturbed areas especially in coastal sage scrub and grassland habitats (Cal-IPC 2013). It can form dense stands that exclude native species and can increase threat of fire. The population at Tecolote Canyon is approximately 5 acres and has approximately 5,000 – 10,000 plants in coastal sage scrub habitat along (Dendra Inc 2012). Treatment options include manual removal by cutting the stump, and herbicide. Management of this population in Tecolote Canyon began in May 2014 (Section 8.1.5).

8.2.2 Monitoring

Table 9. Monitoring in Coastal Sage Scrub		
Survey Type	**Recommended Frequency**	**Comments**
Level 2 Invasive Species Survey	Annually – early Spring	Focus on Level 2 species as defined in Management Priorities for Invasive Non-Native Plants Strategy Report (Dendra Inc 2012).
General Invasive Species Survey and Mapping	Every 5 years	Map occurrences of invasive species. Provide information to regional database as appropriate.
Herpetofaunal Survey – MSCP Species	Within 5 years of adoption of NRMP	Focus on MSCP-covered species and invasive aquatic species to inform management.
California Gnatcatcher Survey	Consistent with MSCP and regional monitoring	Consistent with MSCP and regional monitoring

8.2.3 Management Objectives

Objective 1. Prioritize restoration, revegetation and/or mitigation projects to enhance, expand and/or create potential breeding habitat for California gnatcatcher using results from regional monitoring and/or surveys and general invasive species survey.

- ✓ Meets ASMDs for California gnatcatcher
- ✓ Addresses Threat: Invasive Plant Species
- ✓ Climate-Smart Conservation Strategy (Appendix D)

Objective 2. Perform intense and aggressive treatment of known population of Canary Island St. Johnswort no more than 1 year following adoption of the NRMP

Treat the Canary Island St. Johnswort using the best available treatment methods; currently, this includes herbicide applied directly to mature individuals before seasonal maturity and senescence of the leaves and flowers. Following herbicide application, treated individuals can be cut and removed. Any flowering or seed-producing parts of the plant shall be carefully bagged before removal so as to prevent release of seeds into the soil. Another available method is "Cut Stump"

which involves cutting the plants using hand-held tools such as a lopper for young individuals and a chainsaw for larger individuals, followed by application of herbicide (M. Kelly pers. comm.).

Collaborate with owner of private property adjacent to the infested site where Canary Island St. Johnswort either currently exists or has the potential to infest to discuss access for treatment.

Collaborate with the City of San Diego's Brush Management program for timing and enhanced efforts for removing Canary Island St. Johnswort within the brush management zone, as defined in San Diego Municipal Code §142.0412.

- ✓ Meets ASMDs for California gnatcatcher, San Diego rufous-crowned sparrow, and San Diego barrel cactus
- ✓ Addresses Threats: Invasive Plant Species
- ✓ Climate-Smart Conservation Strategy (Appendix D)

Recent or Current Efforts Implementing this Objective: Initial treatment (herbicide spray) of the CISJW occurred in May 2014, with removal of the dead biomass in September 2014.

Objective 3. Continue management of Canary Island St. Johnswort at least annually in the spring for 7 years following initial treatment of known population

This plant is capable of producing a large quantity of seed that is viable for up to 5 years; as a result, control of the seed bank and re-sprouting adults will require an effort greater than 5 years (Dendra Inc 2012). The population should be managed at least annually during the early spring to treat any remaining, resprouting, or new seedlings that occur on the treated site. Control methods shall follow the above referenced methods, or shall implement new techniques or herbicide treatment as available based on current scientific research. In addition, the site shall be inspected and managed for other invasive plant species which may populate the area with the removal of the St. Johnswort.

- ✓ Meets ASMDs for California gnatcatcher, San Diego rufous-crowned sparrow, and San Diego barrel cactus
- ✓ Addresses Threats: Invasive Plant Species
- ✓ Climate-Smart Conservation Strategy (Appendix D)

Objective 4. Implement restoration during the 7-year monitoring period for Canary Island St. Johnswort

Restoration shall be implemented during the 7-year period described in Objective 2 at a point when the following conditions have been met: 1) invasive plant cover is less than 10%, and 2) no treated stumps of Canary Island St. Johnswort are resprouting. Restoration shall include container plants and/or seed mix appropriate for the area and matching the surrounding chaparral and

coastal sage scrub. Supplemental irrigation shall be included to help establishment of native plants. Weeding, including treatment of any seedlings or resprouts of Canary Island St. Johnswort, shall also be included.

- ✓ Meets ASMDs for California gnatcatcher, San Diego rufous-crowned sparrow, and San Diego barrel cactus
- ✓ Addresses Threats: Invasive Plant Species
- ✓ Climate-Smart Conservation Strategy (Appendix D)

Objective 5. Enhance education and outreach regarding owning property adjacent to Park

The Tecolote Nature Center at the Park's southern entrance provides opportunities for visitors to learn about the natural and cultural resources within the Park. Information regarding threats to the natural and cultural resources, and ways for the public to participate in protecting those resources should be incorporated into the Nature Center's educational opportunities. Some examples could include reducing landscape irrigation overflow into the canyon, keeping pets and pet food inside, and encourage planting native plants that won't invade in open space areas. Kiosks and interpretive signs at key trailheads could also provide similar information, combining natural history with conservation opportunities for homeowners.

- ✓ Meets ASMDs for San Diego barrel cactus, San Diego horned lizard, orange-throated whiptail
- ✓ Addresses Threats: Encroachment and Dumping, Argentine Ants, Domestic Cats, Invasive Plant Species

8.3 Aquatic Communities

Though no MSCP-listed species have been documented to occur within Tecolote Creek, aquatic communities have been identified as a priority for management because of the impaired status of the creek which empties into Mission Bay, an area highly valued for recreational actives including water sports. Mission Bay has also been globally recognized as an Important Bird Area (Cooper 2004). Potential sources of pollution are listed as unspecified point, nonpoint, and urban runoff. Tecolote Creek is listed as impaired under Section 303(d) of the Clean Water Act (CWA), based on elevated levels of contaminants including bacterial indicators, cadmium, copper, lead, zinc, selenium, nitrogen, phosphorous, toxicity, and turbidity. Mission Bay near Tecolote Creek is also listed on the basis of eutrophic conditions, enterococcus and coliform counts (pathogens), and lead.

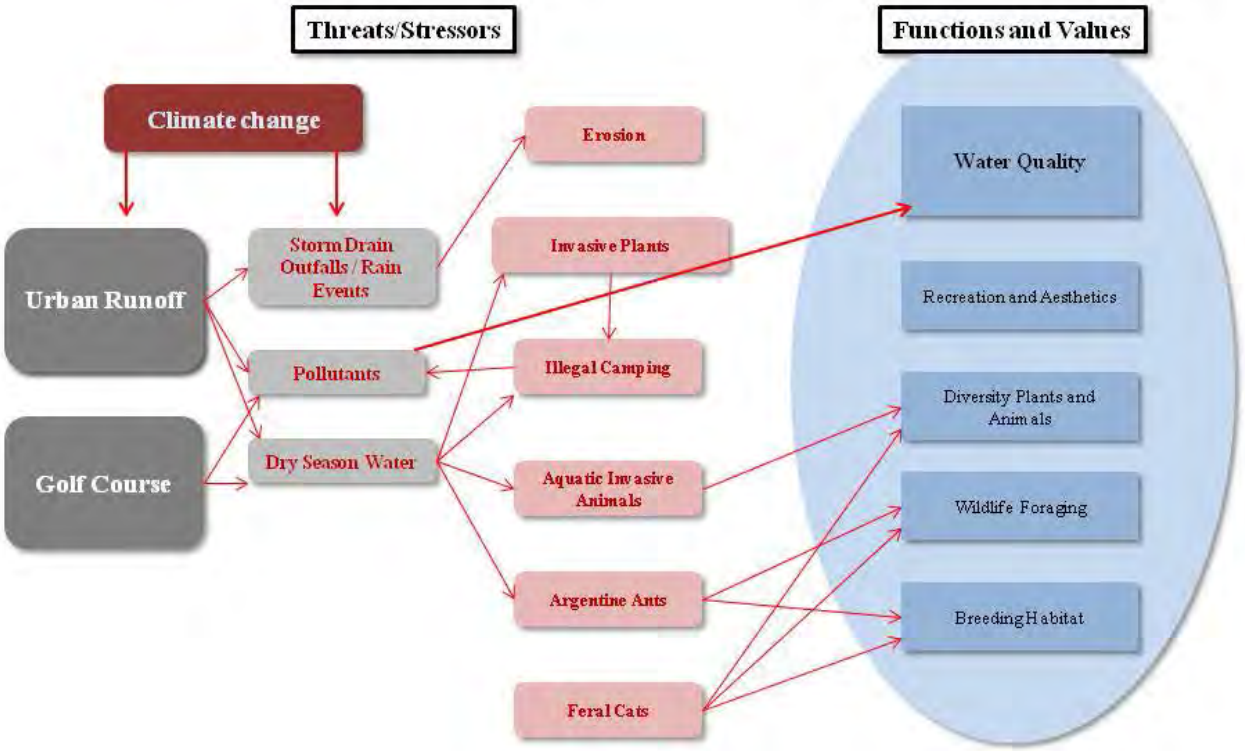


Figure 29. Conceptual Model for Aquatic Communities. *No MSCP-covered species are specifically associated with the creek, though many occur along the riparian corridor. This conceptual model specifically targets Tecolote Creek, and the functions and values of the aquatic and freshwater community in relation to the various threats and stressors. Urban runoff is a major threat to the aquatic and freshwater communities. During rain events, concentrated flows of runoff entering the canyon at storm drain outfalls create major issues with erosion. Runoff also contains a variety of pollutants, and has contributed to the listing of Tecolote Creek as an impaired water body. The*

presence of dry season runoff from landscaping and car washes allows a variety of invasive plant and animal species to thrive in areas where water would otherwise be a limiting factor. The golf course contributes to the dry season runoff and adds pollutants to the system.

8.3.1 Primary Threats

Urban Runoff

The area around Tecolote Canyon is heavily urbanized. Runoff from large areas of impervious surfaces such as streets and sidewalks are directed to one of 95 storm drains that empty into the canyon. This creates accelerated flow at the egress points of the storm drains; the high velocity and increased volume of water running through the Park's many small finger canyons has resulted in heavy erosion. Deep gullies cut across trails and access paths creating unsafe conditions for Park users as well as preventing maintenance vehicles from accessing utility lines within the Park. Within the main creek channel, water is present most of the year in a stream that would otherwise be dry during the summer months. This is linked to higher degrees of invasion from both exotic plants and animals such as Argentine ants and bullfrogs. Runoff from surrounding urban development and upstream water sources also contain elevated levels of nutrients, sediments and pollutants (e.g. oil and heavy metals) which contribute to impacted water quality and degradation of the Park.

Golf Course

Maintaining large areas of manicured green grass for the golf course requires lots of water, fertilizers, and treatment of weeds. These activities are not contained within the boundaries of the golf course, and as a result, the creek below the golf course receives an elevated amount of water, nutrients, and chemicals, which impact water quality within the Park, and influence water quality in Mission Bay.

Invasive Aquatic Species

Invasive aquatic species are a serious threat to native amphibians and fish in aquatic systems. Urban runoff has increased the amount of water present in the creek during the dry season, allowing for establishment of exotic species that typically require more water. No comprehensive survey has been completed of the fauna in Tecolote Creek; the only invasive aquatic species documented in Tecolote Creek is the African clawed frog. Other potential exotic species include, but are not limited to, American bullfrog (*Rana catesbeiana)*, crawfish (*Procambarus clarkii*), and red-eared slider (*Trachemys scripta elegans*). These would compete for food and/or directly prey upon native aquatic species.

Argentine Ants

The Argentine ant is a widespread invasive species that competitively displaces native ants throughout its introduced range, and is most commonly found in mesic habitat adjacent to urban areas where urban runoff supports the species in the dry season and during droughts.

8.3.2 Monitoring

Table 10. Monitoring in Aquatic Communities		
Survey Type	**Frequency**	**Comments**
Herpetofaunal Survey – Invasive Aquatic Species	Within 5 years of adoption of NRMP	Focus on MSCP-covered species and invasive aquatic species to inform management.

8.3.3 Management Objectives

Objective 1: Continue to implement both nonstructural and structural BMPs as identified in the Tecolote Watershed Comprehensive Load Reduction Plan, and the Mission Bay Watershed Management Area Water Quality Improvement Plan once it is finalized, particularly focusing on BMPs that are effective and feasible.

- ✓ Addresses Threats: Urban Runoff, Invasive Aquatic Species, Argentine Ants
- ✓ Climate-Smart Conservation Strategy

Recent or Current Efforts Implementing this Objective: Transportation & Stormwater Department implemented the Bannock Avenue Neighborhood Streetscape Enhancements and Bacteria Treatment for Tecolote Creek Watershed Protection in 2011

Objective 2: Improve Golf Course compatibility with protection of natural resources

The current lease on the Golf course expires in 2022. Before lease expiration, encourage voluntary improvements in discharges of herbicides and pesticides into Tecolote Creek. Park and Recreation staff should coordinate with golf course operators to encourage them to adapt techniques that would serve to minimize both the impacts of the course on surrounding habitat and increase the value of the golf course as habitat. When the lease expires, incorporate improvements for water quality protection, trails, and habitat improvements in the lease agreement.

Possible activities could include:

- Designate no-spray zones for chemicals adjacent to Tecolote Creek

- Establish an integrated pest management program (including but not limited to mowing and irrigation practices, thatch control, traffic control, and alternative pest management practices) to minimize the use of chemicals
- Reduce the need for irrigation through altering horticultural practices (e.g cutting height, aeration), reducing turf stress, and expanding the use of drought-tolerant plants and mulch

✓ Addresses Threats: Golf Course

9.0 IMPLEMENTATION

9.1 Projects

This section lists a number of known projects at the time of this NRMP. Other projects may occur within Tecolote Canyon Natural Park in the future that are not listed here.

9.1.1 Tecolote Canyon Trunk Sewer Replacement

Public Utilities Department plans to replace the trunk sewer in Tecolote Canyon from the Nature Center to Genesee (Figures 4-5,7). The project is still in the planning stage but would result in significant temporary impacts to natural resources. Work related to the proposed improvements shall adhere to the City of San Diego's Multiple Species Conservation Program (MSCP) Subarea Plan, the City's Biological Guidelines, and City's Environmentally Sensitive Lands Ordinance, as well as all applicable permits from federal and state agencies (e.g. U.S. Fish and Wildlife Service, California Department of Fish and Wildlife, Army Corps of Engineers, Regional and State Water Quality Control Board). During construction, Public Utilities shall coordinate with Tri-Canyon Park Ranger staff for park closures and public safety.

9.1.2 Teolote Canyon Long-Term Access Project for East Tecolote and Mt. Elbrus

Public Utilities Department is required to develop Long-Term Maintenance and Emergency Access Plans for wastewater facilities within Tecolote Canyon. Stream crossings are a major impediment to providing long-term access within Tecolote Canyon, and Public Utilities is in the process of evaluating and designing stream crossings to ensure long-term access to sewer infrastructure in Tecolote Canyon. East Tecolote Canyon and Mt. Elbrus Canyon (in North Tecolote Canyon) were first to be reviewed; implementation is expected in 2016 following completion of design and permitting. Long-Term Access projects for the remaining portions of the canyon (North, Central, South) are to be included in the Trunk Sewer Replacement Project (9.1.2).

9.1.3 Sewer Main Replacement Manning Canyon Sewer

Pursuant to Council policy 400-14, the City of San Diego Public Utilities Department evaluated the sewer lines to determine feasibility of redirecting sewage flow out of canyons and other environmentally sensitive lands, as a way to prevent spills from occurring and impacting sensitive biological resources. Based on the Sewer Main Replacement Manning Canyon Planning Report (City 2003b), the sewer line and associated infrastructure will be abandoned in Manning Canyon, a finger canyon located in south Tecolote Canyon. Associated sewer access paths will be revegetated where they do not co-occur with public trails proposed in this NRMP.

9.1.4 Manning Canyon Treatment of Canary Island St. Johnswort

Treatment for the Canary Island St. Johnswort located in Manning Canyon along the properties on Lanston Street was started in May 2014, with application of herbicide directly to mature individuals. In the fall following the initial herbicide application, the dead standing biomass was removed in a collaborative effort with City of San Diego and San Diego Association of Governments TransNet Environmental Mitigation Program through contracts with the County of San Diego and Urban Corps. Repsrouting individuals are monitored and treated by City of San Diego Open Space staff.

9.2 Potential Funding Sources

The City's General Fund and volunteer labor (including a variety of individuals and organizations) provide the resources necessary for day-to-day operations of the Park, including many relatively small- scale restoration, enhancement and environmental education efforts. Additional sources of funding may, however, be necessary to implement some of the larger-scale efforts recommended in this NRMP.

Numerous grants are available from federal agencies, state agencies and private foundations to provide assistance with habitat restoration/enhancement, environmental education, water quality improvement and trails construction/restoration.

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