City of Patterson

2010 General Plan Background Report

PART 2

July, 2010

IX. HEALTH & SAFETY

Introduction

When planning for urban development, a wide range of environmental hazards must be taken into account in order to protect the wellbeing of the City's residents. Some of these hazards are natural, such as seismic shaking; some are purely man-made, such as noise; and others are natural hazards exacerbated by man, such as development in areas sensitive to erosion or liquefaction. Many of these hazards can be avoided in the development process through siting decisions, while other hazards can be tolerated or minimized by including mitigation measures in the planning and land use regulation process.

This chapter inventories and assesses the major hazards confronting Patterson, including seismic and geologic hazards, wild land and urban fires, flooding, and noise.

Seismic and Geologic Hazards

The information in this section provides a preliminary indication of the degree of potential hazard or risk that may exist within various geologic or seismic zones. There are limits on the use of this information. The maps and text should be used as general guides to identifying the possible presence of geologic-related constraints, but should not be used as the sole basis for project approval or denial.

Seismic Hazards

Although there are several faults in and around Stanislaus County, faults within the County have not experienced major seismic activity since 1881.[1] Activity in major faults outside Stanislaus County, however, suggests that the Patterson area could be subjected to the affects of a seismic event in the future.

The Richter Scale is used to measure the magnitude (or strength) of an earthquake, while the Mercalli Scale is used to measure the intensity. Table IX-1 describes the effects of the 12 levels of the Mercalli Scale.

[1] According to the California Geological Survey, the last major earthquake to have an epicenter in Stanislaus County was a magnitude 6.3 that occurred on 04/10/1881, at the western edge of the county.

Table IX-1
Relationship of Earthquake Magnitude to Earthquake Intensity

Richter Scale Magnitude	Typical Maximum Modified Mercalli Intensity	Modified Mercalli Intensity Scale Description
1.0 - 3.0	I	I. Not felt except by a very few under especially favorable conditions.
3.0 - 3.9	II - III	II. Felt only by a few persons at rest, especially on upper floors of buildings. III. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
4.0 - 4.9	IV - V	IV. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably. V. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
5.0 - 5.9	VI - VII	VI. Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight. VII. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
6.0 - 6.9	VII - IX	VIII. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
7.0 and higher	VIII or higher	X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent. XI. Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly. XII. Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Faults

Faults are indications of past seismic activity. It is assumed that those that have been active recently are the most likely to be active in the future, although even inactive faults may not be "dead." The recency of seismic activity is measured in geologic terms. Geologically recent is within the past two million years (the Quaternary period). All faults believed to have been active during Quaternary time are considered "potentially active." Those that have exhibited activity within the past 11,000 years are considered "active."

Figure IX-1 illustrates the general location of faults in the vicinity of Patterson. Seismic activity on these faults has the greatest potential for causing damage in the Study Area. Seismic activity in other parts of the state can also affect the Study Area, but the potential impacts are not as great.

San Andreas Fault Zone

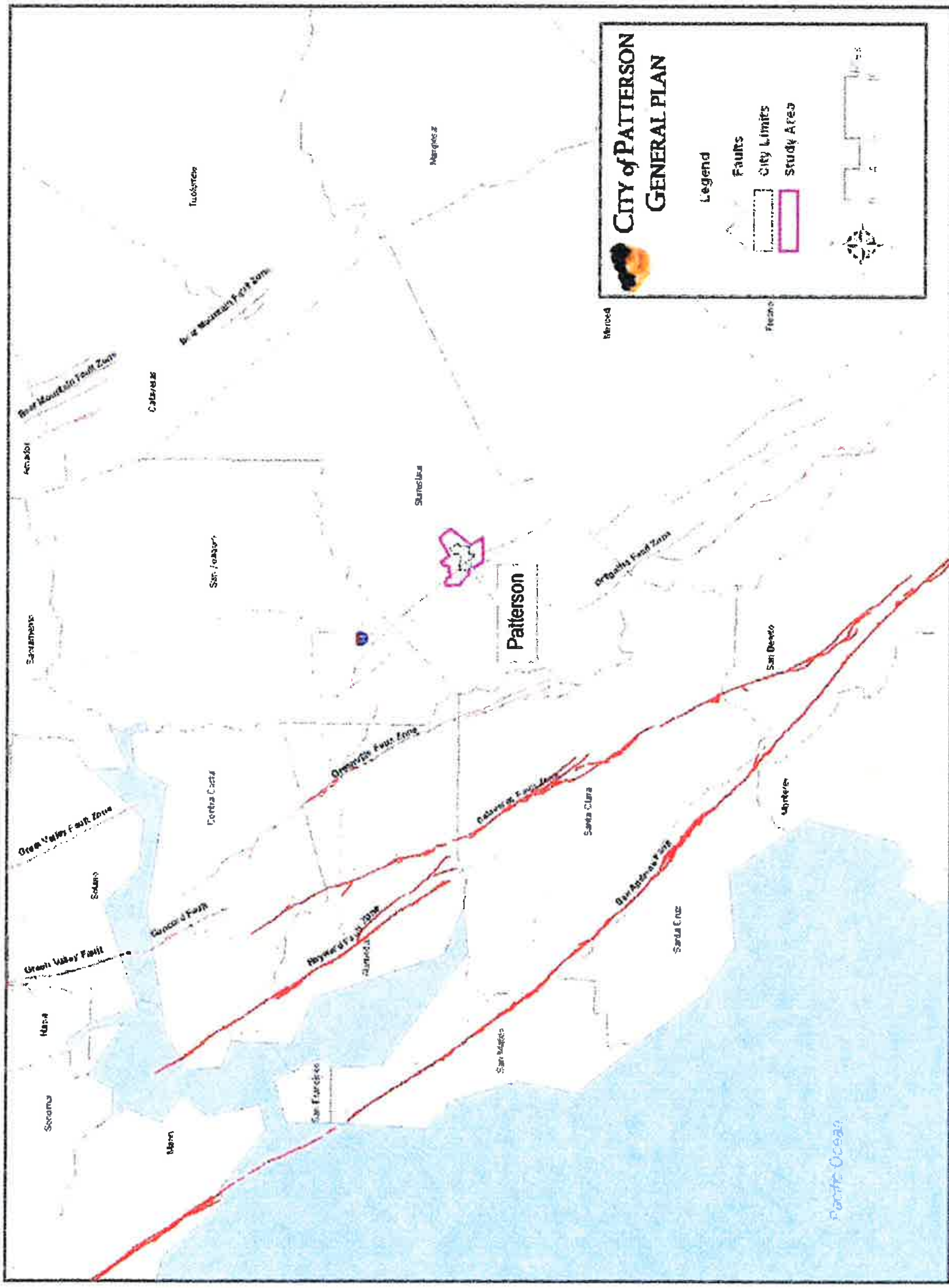
The San Andreas Fault is one of the longest (approximately 800 miles long), most thoroughly studied, and most active faults in the world. Some sections in the Central Coast Ranges are creeping at rates as great as 3.7 centimeters per year. Other segments, north and south of the creep areas, exhibit no detectable movement. The fault in those areas appears to be temporarily "locked." It is generally agreed that a "locked" condition allows stresses to accumulate more rapidly, thus shortening the time between major earthquakes.

There is presently movement along some of the fault's length, and numerous smaller earthquakes are recorded from the fault zone. It is generally accepted that moderate to great earthquakes will take place along the San Andreas Fault in the foreseeable future. An earthquake along this fault could cause serious damage in Stanislaus County. The October 1989 earthquake (6.9 magnitude on the Richter Scale) occurred along the San Andreas Fault, with the epicenter located near Hollister.

Hayward Fault.

The Hayward Fault is located east of San Francisco Bay and extends southeast to where it probably merges with the Calaveras Fault north of Hollister. A review of the recent history of this fault shows two major earthquakes (1836 and 1868), each with an estimated Richter Scale magnitude of 6.5 to 7.5. Current measurements indicate creeping at rates up to one centimeter per year in places. Numerous small earthquakes (Richter Scale magnitude of 3 to 5) have occurred along this fault in recent years.

Figure IX-1: Faults



Source: USGS Earthquake Hazards Program - Quaternary Fault and Fold Database. Accessed 06/07/07
Note: San Joaquin Fault Zone location obtained from California Geological Survey - "Simplified Fault Activity Map of California"

San Joaquin Fault Zone

The San Joaquin Fault runs northwest to southeast, and generally follows a path through the western portion of Patterson. The fault is generally concealed underground, which requires its location to be inferred. The USGS lists the fault as being Late Quaternary, and estimates its most recent movement at 10,000 to 700,000 years ago. This time period indicates that the fault could be potentially active. Because of the fault's age, no additional information could be obtained.

Calaveras Fault

The Calaveras Fault borders the eastern flank of the Berkeley-Hayward Hills, and extends to the southeast. Epicenters of recent earthquakes of Richter Magnitude of 4.5 have been located along or near this fault. In 1868, an earthquake of unknown magnitude caused ground breakage near Danville. Several centimeters of creep have been measured in Hollister, where a Calaveras Fault trace-cuts through a residential area.

Green Valley -Concord Faults

This fault zone, extending from Walnut Creek to west of Fairfield, has experienced displacement along most of its length within recent geologic time. An earthquake of 5.4 magnitude occurred in 1955 along part of this fault near Concord. There is currently evidence of some movement along the fault near Concord. The greatest probable earthquake generated by this fault is not expected to exceed a magnitude of 7.0 on the Richter Scale.

Midland Fault

The Midland Fault, buried under recent alluvium, extends north from Bethel Island in the Delta to east of Lake Berryessa. Its activity is not as well documented as the faults discussed previously. There is evidence, however, that fault displacement has occurred during recent geologic time. The State Division of Mines and Geology believes that the Midland Fault is a possible source of a major earthquake centered in Vacaville in 1892. The maximum probable earthquake on this fault is estimated to be 7.0 on the Richter Scale .

Patterson Pass Fault

The Patterson Pass Fault runs northwest from the Alameda/San Joaquin County boundary toward Livermore. Its location is imprecise and the nature of movement, if any, is uncertain. The fault is cited because of one well-located epicenter generating a 4.5 magnitude earthquake in 1946.

Tesla -Ortigalita Faults

Within the Diablo Mountain Range, the most recent movements along this fault were approximately five million years ago, although earthquake activity without surface fracturing or faulting is still common. Active seismicity has been identified along some segments of the fault zone. A Richter magnitude 5 earthquake in 1926, a magnitude 3.7 in 1981, and smaller earthquakes monitored from 1969 to 1980 occurred in the vicinity of this fault zone. According to a report produced by the California Division of Mines and Geology (now the California Geological Survey) at the end of 1991, the Tesla-Ortigalita fault zone was determined to have no known damaging earthquakes. The fault zone is considered capable of generating earthquakes of Richter magnitude 6.5 to 6.75. The recurrence of earthquakes resulting in surface rupture is on the order of 5,000 to 10,000 years for the entire fault zone.

An Alquist-Priolo Special Studies Zone is located along the Ortigalita Fault in the Diablo Range and extends into Stanislaus County about seven miles at its southwest edge; however, "sufficient evidence of recent fault rupture on this segment has not been identified to warrant zoning under the Alquist-Priolo Act" (Hart 1990). The lower portion of the fault range, the Tesla Fault has been interpreted as being a remnant of an older, inactive fault system.

Bear Mountain Fault

The Bear Mountain Fault Zone is located east of Stanislaus County. Traces of the fault are present in Amador, Calaveras, and Tuolumne Counties. The fault is classified as pre-quaternary, and considered to be inactive due to its age and last believed movement.

Assessment of Potential Seismic Hazards

The California Geological Survey has produced an earthquake hazard map which shows Patterson in the moderate severity zone. The moderate zone classification indicates that Patterson is in a region near major, active faults that have the potential to cause moderate to severe damage.

Groundshaking

The most serious direct earthquake hazard is the damage or collapse of buildings and other structures caused by groundshaking which is the vibration which radiates from the epicenter of an earthquake. Damage to structures from groundshaking is caused by the transmission of earthquake vibrations from the ground into the structure. The intensity of the vibration or shaking and its potential impact on buildings and other urban development is determined by several factors:

- The nature of the underlying materials, including rock and soil;
- The structural characteristics of a building;
- The quality of workmanship and materials used in its construction;
- The location of the epicenter and the magnitude of the earthquake; and
- The duration and character of the ground motion.

The effects of groundshaking can be damaging well beyond the fault trace that generates the shaking. For example, the segment of the San Andreas Fault which caused the great damage and destruction in San Francisco in 1906 was offshore, beyond the Golden Gate.

Most of Patterson is located on alluvium deposits of varying depths, which can increase the potential from groundshaking damage. As earthquake waves pass from more dense rock to less dense alluvial or water-saturated materials, they tend to reduce in velocity, and increase in amplitude. Ground motion lasts longer on loose, water-saturated materials than on solid rock. As a result, structures located on these types of materials suffer greater damage than those located on solid rock. "Poor ground" can be a greater hazard for structures than close proximity to the fault or epicenter.

Older buildings constructed before building codes were in effect, and even newer buildings constructed before earthquake resistance provisions were included in the current building codes, are the most likely to suffer damage in an earthquake. Most of Patterson's buildings are one or two stories high and are of wood frame construction, which is considered the most structurally resistant to earthquake damage.

Older masonry buildings without earthquake-resistant reinforcement are the most susceptible to the sort of structural failure which causes the greatest loss of lives. The susceptibility of a structure to damage from earthquake groundshaking is also related to the foundation material underlying the structure. A foundation of rock or very firm material intensifies short period motions, which affect the low-ridged buildings more than tall, flexible ones. A deep layer of water-logged soft alluvium may cushion low-ridged buildings, but accentuate the motion in tall buildings. The amplified motion resulting from softer alluvium soils can also severely damage older masonry buildings.

Other potentially dangerous conditions include building projections which are not firmly anchored, such as parapets and cornices. These projections could collapse during periods of strong and/or sustained groundshaking.

Fire is often the major form of damage resulting from groundshaking effects. Ninety percent of the destruction in the 1906 San Francisco earthquake was caused by fire. This devastation resulted largely from the great number of buildings constructed of combustible materials, damage to much of the city's fire fighting facilities, and the rupture of water mains.

Most earthquake-induced fires start because of ruptured power lines, damage to wood, gas, or electrical stoves, and damage to other gas or electrical equipment. This points out the need for greater emphasis on non-combustible material and on special construction techniques so that water mains will remain unbroken during large earthquakes. Critical facilities, such as hospitals and fire stations, should be sited, designed, and constructed to withstand severe groundshaking.

Ground Failure

In addition to structural damage caused by groundshaking, there are other ground effects caused by the shaking. These are known as ground failure effects and include liquefaction, settlement, lateral spreading, lurch cracking, and earthquake induced landslides.

Liquefaction is the loss of soil strength due to seismic forces acting on water-saturated granular soils. This loss of strength leads to a "quicksand" condition which causes many types of ground failure. When the liquefied granular layer occurs at the surface, objects can either sink or float depending on their density. The evaluation of potential for liquefaction is complex and must consider soil type, soil density, groundwater table, and the duration and intensity of shaking. Liquefaction is most likely to occur in deposits of weak saturated alluvium or similar deposits of artificial fill.

Liquefaction potential within Patterson exists in low-lying areas composed of unconsolidated, saturated, clay-free sands and silts.

Patterson is theoretically subject to liquefaction resulting from earthquakes on several faults. The expected degree of earthquake-caused shaking is, however, relatively low, and it is unlikely that significant liquefaction would occur. Further study is needed to identify specific areas within the city limits that are susceptible to liquefaction.

Settlement is the compaction of soils and alluvium caused by groundshaking. It occurs irregularly and may be partly controlled by bedrock surfaces, and old lake, slough, swamp, and stream beds. The amount of compaction may range from a few inches to several feet. Irregular compaction is most widespread and extreme in major earthquakes. It may occur as much as 75 to 80 miles from the epicenter and may amount to several feet even at that distance. Compaction is most likely to occur in areas, such as Patterson, which are underlain by soft water-saturated low density alluvial material.

Lurch cracking refers to fractures, cracks, and fissures produced by groundshaking, settling, compaction of soil, and sliding and may occur many miles from the epicenter of an earthquake. These effects are characteristic of earthquakes large enough for significant ground motion to occur; the larger the earthquake magnitude, the more extensive the effects. Thus, a major earthquake may damage streets, curbs, sewer, gas, and water lines.

Lateral spreading is the horizontal movement or spreading of soil toward an open face such as a stream bank, the open side of fill embankments, or the sides of levees. Artificial fill areas which are improperly engineered or which have steep, unstable banks are most likely to be affected.

The potential for lurch cracking and lateral spreading is highest in areas where there is a high ground-water table, relatively soft and recent alluvium deposits, and where creek banks are relatively high. Fracture patterns from lurch cracking and lateral spreading may be controlled by the configuration of shallow bedrock structures, by highway surfacing, by the margins of fill, and engineering structures.

Earthquakes can also cause landsliding and slumping. Patterson is mostly level, so landsliding and slumping should not be problems, except in the Diablo Mountains west of Interstate 5, which are prone to landsliding.

Seiches

Seiches are earthquake-generated waves within enclosed or restricted bodies of water. Major and even moderate earthquakes miles away from Patterson have the potential to produce oscillations or waves in local bodies of water which could overtop and damage levees, causing water to inundate surrounding areas.

The bodies of water most susceptible to seiches in or near Patterson are the San Joaquin River, California Aqueduct, and the Delta-Mendota Canal. The danger of seiches during seismic events is limited to those periods when the river and canals are full during the flood season. Overtopping of levees during this period could cause a limited amount of flooding.

Landslide and Erosion Hazards

Historically, a number of major slides have occurred throughout the Diablo Range in Stanislaus County. The steep slopes and unstable geology of the area presents a limitation to building, and the hazards would be exacerbated by earthquakes. Because most of Patterson is level, landslides are not a problem except for potential slumping along the levees.

According to the U.S. Soil Conservation Service, the erosion hazard exhibited by surface soils is considered low. The essentially level topography of the Patterson area means that erosion will not present a significant problem.

Soils

Stanislaus County occupies a portion of the northern San Joaquin Valley, extending from the foothills of the Sierra Nevada to the ridge of the Diablo Range. The County can be geologically divided into what is commonly referred to as the eastside (approximately two-thirds of the county) and the westside (approximately one-third of the county). This division is based on the two predominant types of soils. The San Joaquin River forms a natural divider between these two types of soils. All of the soils on the west side are of recent alluviums: loams, clay loams, and clays washed out from the coastal range of mountains. These soils are different from eastside soils because the parent material is fine-grained sandstones and shales. As a result, these soils tend to be fine textured as opposed to the coarser soils of the eastside.[2]

All soils have certain engineering properties and characteristics such as erosion potential, shrink-swell behavior, and permeability, which determine their suitability and constraints for building sites, loads, grading, and drainage systems.

The soils in Patterson have been mapped by the Natural Resources Conservation Service (Figure IX-2). The geologic units in the San Joaquin River basin include the Tulare Formation, terrace deposits, alluvium, and flood-basin deposits. The Tulare Formation consists of soil beds, lenses, and tongues of clay, sand, and gravel. Terrace deposits are composed of yellow, tan, and light-to-dark brown silt, sand. According to the NRCS, the soils underlying the Study Area are well drained to moderately well drained

2 Stanislaus County, General Plan, Agricultural Element, Appendix A, p. A-3, 1992.

(USDA 2009). A summary of the soil types present within the Study Area, and their associated limitations for the construction of dwellings, is provided in Table IX-2, below.

As seen in Table IX-2, the most common soil types within the Study Area are Capay Clay, followed by Vernalis loam and Stomar clay loam. The descriptions of the soils provided in Table IX-2 suggest that almost all of the soils within the Study Area exhibit a degree of expansiveness (shrink-swell) that requires remediation in the form of soil preparation and/or special design of building foundations as would be required by applicable sections of the Uniform Building Code. In addition, soils west of Interstate 5 within the foothills of the Diablo Range, which include the Wisflat-Arburua-San Timoteo and Calla-Carbona Complex, are characterized as having steep slopes (greater than 15%), expansiveness, and shallow bedrock (< 20"). According to the NRCS, these soils pose the greatest limitations for the construction of dwellings within the Study Area.

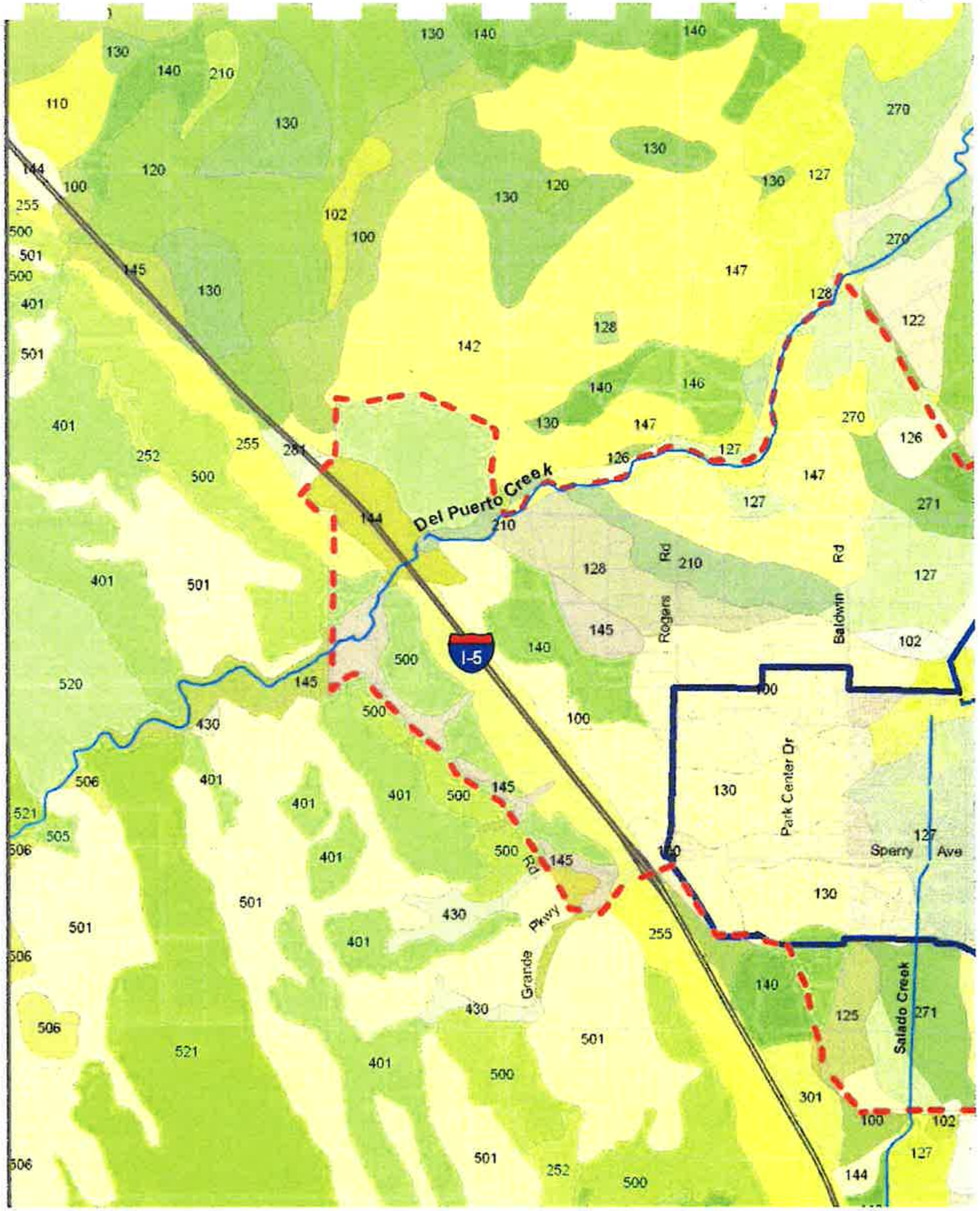
Table IX-2: Soils Within the General Plan Study Area

Soil Type	NRCS Map Symbol[1]	Development Limitations[2]	Severity Of Limitations[3]	Acres	Percent of Study Area
›ay Clay	100	Shrink-swell	1.0	1,970	15.43
apay Clay wet	101	Shrink-swell	1.0	1,359	10.64
⁻ɔay Clay, loamy substratum	102	Shrink-swell	1.0	271	2.12
ɔay Clay, 0- 2% slope, rarely flooded	106	Shrink-swell rarely flooded	1.0 1.0	805	6.30
Soylyo silty clay loam	116	Shrink-swell, rarely flooded	1.0 1.0	293	2.29
nalis-Zacharias complex, 0-2% slopes	120	Shrink-swell	0.5	304	2.38
ernalis loam, 0 - 2% slope	122	Shrink-swell	0.5	204	1.60
nalis clay loam, wet	123	Shrink-swell	0.5	12	0.09
ernalis clay loam, 0 - 2% slope	125	Shrink-swell	0.5	794	6.22
ernalis Zacharias complex, 0-2% rarely ›ded	126	Shrink-swell	0.5	387	3.03
nalis loam, rarely flooded	127	Shrink-swell	0.5	1,173	9.19
:omar clay loam	130	Shrink-swell	1.0	1,095	8.58
harias clay loam, 0-2% slope	140	Shrink-swell	1.0	470	3.68
acharias gravelly clay loam	142	Shrink-swell	0.5	327	2.56
⁻⁻harias gravelly clay loam 2-5% slope	144	Shrink-swell	0.5	194	1.52
harias clay loam, 2 - 5% slope	145	Shrink-swell	0.5	278	2.18
acharias clay loam, 0 - 2% slopes rarely ⁻ɔded	146	Shrink-swell	0.5	404	3.16
harias gravelly clay loam, rarely flooded, _%	147	Shrink-swell	0.5	499	3.91
ortina gravelly sandy loam	210	Flooding >= rare	1.0	283	2.22
la-Carbona complex	255	Slopes > 15%, Shrink-Swell	1.0 1.0	419	3.28
lsalado loam	270	Flooding >= rare	1.0	240	1.88
ılado loam, rarely flooded	271	Flooding >= rare	1.0	389	3.05
ılado loam, 0-2% slopes	274	Flooding >= rare	1.0	292	2.29
⁻ısflat-Arburura-San Timoteo complex, 20-ɔ slopes	500	Soft bedrock <20" Hard Bedrock < 20" Slopes >15%	1.0, 1.0 1.0	306	2.40
Total:				12,768	100.00

rce: US Department Agriculture, Natural Resource Conservation Service, Web Soil Survey, 2010

Notes for TableIX-2:

1. See Figure IX-2.
2. The limitations for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. The properties that affect ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or cemented pan, and the amount and size of rock fragments.
3. Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0,01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation.



Del Puerto Creek
I-5
Rogers Rd
Baldwin Rd
Park Center Dr
Sperry Ave
Grande Pkwy
Rd
Salado Creek

Land Subsidence

Subsidence of the land surface can result from extraction of groundwater, gas, oil, and geothermal energy. Hydrocompaction, peat oxidation, and fault rupture are also potential causes of subsidence. Groundwater withdrawal subsidence is the most extensive type in California. This type of subsidence has been observed only in valley areas underlain by alluvium.

Subsidence can cause a change in gradients affecting the carrying capacities of canals, drains, and sewers. Compaction of sediments at depth has caused extensive damage to water wells in areas where subsidence has been substantial. The magnitude of subsidence depends primarily on the following five factors:

- The magnitude of water level decline.
- The thickness of the alluvium tapped by wells.
- The individual and combined thicknesses and compressibility of the silt and clay layers within vertical sections tapped by wells.
- The lengths of time during which water level declines are maintained.
- The number of occurrences of heavy withdrawals of water in any single area.

Patterson is within the San Joaquin groundwater basin. This basin has been identified by the California Department of Water Resources as experiencing overdraft. The Patterson area experienced some overdraft during the 1976-77 drought. Wells are monitored by the U.S. Soil Conservation Service to identify potential overdraft problems.

Water Pollution

The City's potable water is supplied by wells. The local groundwater meets federal drinking water standards, but its quality has diminished over the years due to pollution and contamination. The City has had to chlorinate its water on a few occasions when new water hookups led to increased salinity in the water, and with the expected additional growth of Patterson, it may become necessary for groundwater to be mixed with higher quality surface water in order to continue meeting drinking water standards.

Water quality in the San Joaquin River and the irrigation canals is degraded by runoff and discharges into the San Joaquin River. The river's water quality is discussed in Chapter VIII, "Natural Resource s."

Flooding Hazards

Based on the Federal Emergency Management Agency's (FEMA) 1989 Flood Insurance Study for Stanislaus County, flooding reportedly occurred in the Patterson/Newman area in 1954, 1955, 1957, 1958, 1959, 1963, 1968, 1969, 1978, 1980, 1983, and 1986. Since that report was published, flooding has occurred on Salado Creek several times in the 1990s, including 1995 and 1998.

Based on the Flood Insurance Rate Map (FIRM), a substantial portion of the Study Area is located within the 100-year special flood hazard area (Zone AO) (Figure IX-3) (Map of FEMA Special Flood Hazard Areas, City of Patterson and Adjacent Areas, Stanislaus County, California)[3].[4] Zone AO is defined as "areas of shallow flooding where depths are between one (1) and three (3) feet..." The northern and eastern portions of the site are located within the FEMA-designated Zone B. Zone B is defined as "areas between limits of the 100-year and 500-year flood; or certain areas subject to 100-year flooding with an average depth less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood." In this case, the Zone B designation is for "areas subject to 100-year flooding with an average depth less than one (1) foot." The FIRM indicates that as the Zone AO flood waters move through the project site, they would be expected to spread out and the depth of flooding would decrease (to less than one foot) and at that location the designation changes from Zone AO to Zone B.

The rate at which water is delivered to the Salado Creek channel is controlled by the amount of water that passes through the overchute at the Delta Mendota Canal (DMC). The overchute on, and the levee system upstream of, the DMC limit the peak discharge downstream of the DMC to 710 cubic feet per second (cfs)[5]. Salado Creek between the DMC and Sperry Avenue is capable of conveying 300 cfs (Stoddard, 2001). The disparity between the conveyance capacity of Salado Creek downstream of the DMC (300 cfs) and the conveyance capacity of the DMC overchute (710 cfs) is the reason that the FIRM shows a broad "Zone B" flood hazard area north of the DMC. Zone B is defined as "areas between limits of the 100-year and 500-year flood; or certain areas subject to 100-year flooding with an average depth less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood." The FIRM indicates that the creek overtops the channel banks just north of the DMC during the 100-year event, and therefore it is concluded that the Zone B designation is for "areas subject to 100-year flooding with an average depth less than one (1) foot."

In addition to the regulatory floodplain mapping conducted by FEMA's National Flood Insurance Program (NFIP), DWR has prepared Awareness Floodplain Maps which display the 100-year flood hazard areas. These maps provide an additional resource to evaluate the flood hazards within the Study Area. Since these maps were prepared by using approximate assessment procedures to determine the flood prone areas, areas displayed as flood prone do not include any flooding specific depths or hazards. The intent of the Awareness Floodplain Mapping project is to identify all pertinent flood hazard areas by 2015 for areas that are not mapped under the FEMA NFIP and to provide the community and residents an additional tool in understanding potential flood hazards currently not mapped as a

[3] Federal Emergency Management Agency, Flood Insurance Rate Map for Stanislaus County, California, Community Panel Number 060384 0685B and 060384 0705C, September 29, 1989.
[4] Federal Emergency Management Agency, Flood Insurance Rate Map for City of Patterson Community Panel Number 060390 0001D, 1990.
[5] FEMA, 1989

regulated floodplain. These maps are not FEMA regulatory floodplain maps. However, at the request of the community FEMA would include this data on their maps.

It is notable that most of the Study Area generally east of Baldwin Road or north of Zacharias Road is shown on the Floodplain Awareness Map as at risk or prone to flooding. Additionally, there are areas along the upper reaches of Black Gulch Creek and Del Puerto Creek that are shown as flood prone, though not identified on the FEMA Flood Insurance Maps. This appears to indicate that there may be some flood risks in these areas not formally identified and included in the Flood Insurance Maps yet, that may need to be considered during future development in those areas. The DWR Awareness Floodplain Map is presented in Figure IX-4.

Another source of flood information is the Best Available Flood Information maps provided by the California Department of Water Resources. In accordance with Senate Bill 5, DWR developed preliminary maps for the 100 and 200-year floodplains located within the Sacramento-San Joaquin Valley watershed that are to provide best available information on flood protection to cities and counties in the watershed for:

Areas protected by State-Federal project levees, and
Areas outside the protection of project levees.

These maps were developed based on the best information currently available. These floodplain maps are subject to change and may be updated periodically. These maps include the regulatory mapping and other available sources to delineate flood hazards. The mapping of flood hazard areas within the Study Area appears to correspond with those identified in the other maps, with much of the Study Area around the creeks in the west side being indicated as prone to flooding, and the majority of the Study Area east of Rogers Road also at risk for flooding. The DWR Best Available Map of flood information for the Study Area is presented in Figure IX-5.

In addition to the flood area maps developed by DWR and FEMA, DWR also prepares maps to delineate the Levee Flood Protection Zones for the major levees along the Sacramento and San Joaquin Rivers where flood risk may be incurred due to the potential for a levee break along these rivers. The Study Area lies west of and outside of the mapped Levee Flood Protection Zone along the San Joaquin River[6].

Based on previous studies, the published flood maps and data mentioned above it appears that the Del Puerto Creek, Black Gulch Creeks and Salado Creek Drainage systems are at or exceed capacity during the 100-year flood event. While some discharge to these stream systems might be viable, additional study would be required to evaluate the risk of inducing greater flood risks downstream of where discharges might occur and to make possible recommendations to specifically address mitigation for induced flood hazards.

[6] DWR, 2009

It is important to note that two infrastructure projects had been completed before the latest FIRM was published (September, 2008) that reduced flood hazards in the City. These include: 1) the Salado Creek diversion structures at the DMC, and 2) the improvement of Salado Creek conveyance capacity from Sperry Avenue to the San Joaquin River.

Salado Creek Diversion at the Delta Mendota Canal

In 1998, three 60-inch diameter concrete culverts were installed through the levee that separates Salado Creek from the DMC. The culverts allow storm water to flow from Salado Creek into the DMC during moderate to large storm events. This diversion reduces the maximum peak flow through the DMC overchute and in Salado Creek north of the DMC. Prior to the installation of the diversion structures, the overchute had a calculated conveyance capacity of 710 cfs (during the 100-year event). The anticipated conveyance through the overchute during the 100-year event with the diversion structure in-place has not been calculated, but would be expected to be substantially less than 710 cfs.

Flooding can also occur as a result of catastrophic dam failure and the release of waters contained in upstream reservoirs. Figure IX-6 shows the general limits of dam inundation associated with the San Luis Reservoir.[7]

[7] Stanislaus County Multi-Jurisdictional Hazard Mitigation Plan, Volume One, 2005

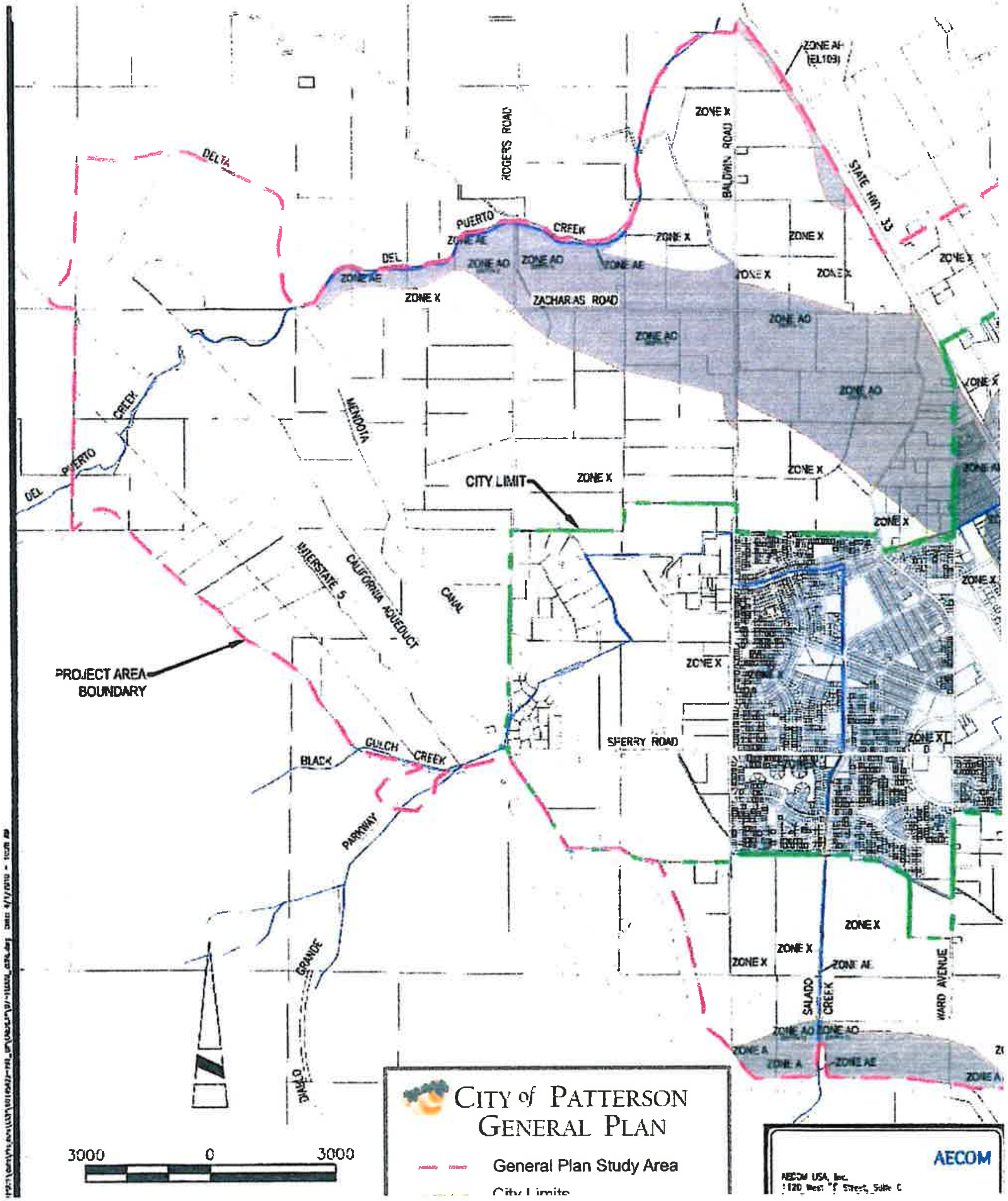

CITY of PATTERSON
GENERAL PLAN
General Plan Study Area
AECOM
STATE HWY. 33
ROGERS ROAD
BALDWIN ROAD
ZACHARIAS ROAD
PUERTO CREEK
DEL PUERTO CREEK
DELTA
MENDOTA
CITY LIMIT
INTERSTATE 5
CALIFORNIA AQUEDUCT
CANAL
PROJECT AREA BOUNDARY
SPERRY ROAD
BLACK GULCH CREEK
PARKWAY
GRANDE
DIABLO
SALADO CREEK
WARD AVENUE
ZONE X
ZONE AE
ZONE AO
ZONE A
ZONE AH (EL103)
3000
0
3000

Figure IX-4: Department of Water Resources Awareness Floodplain Map

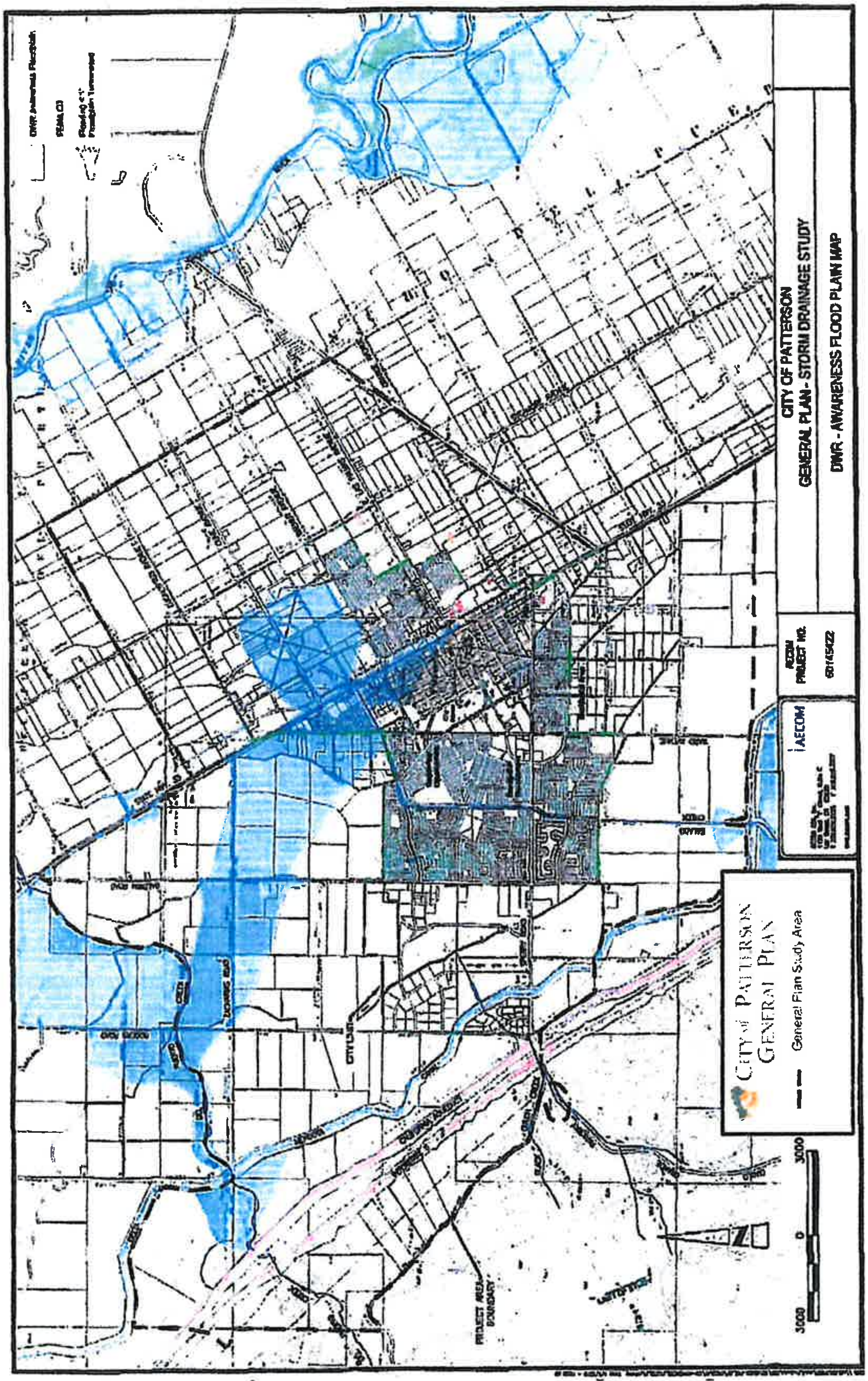


Figure IX-5: Department of Water Resources Best Available Flood Map

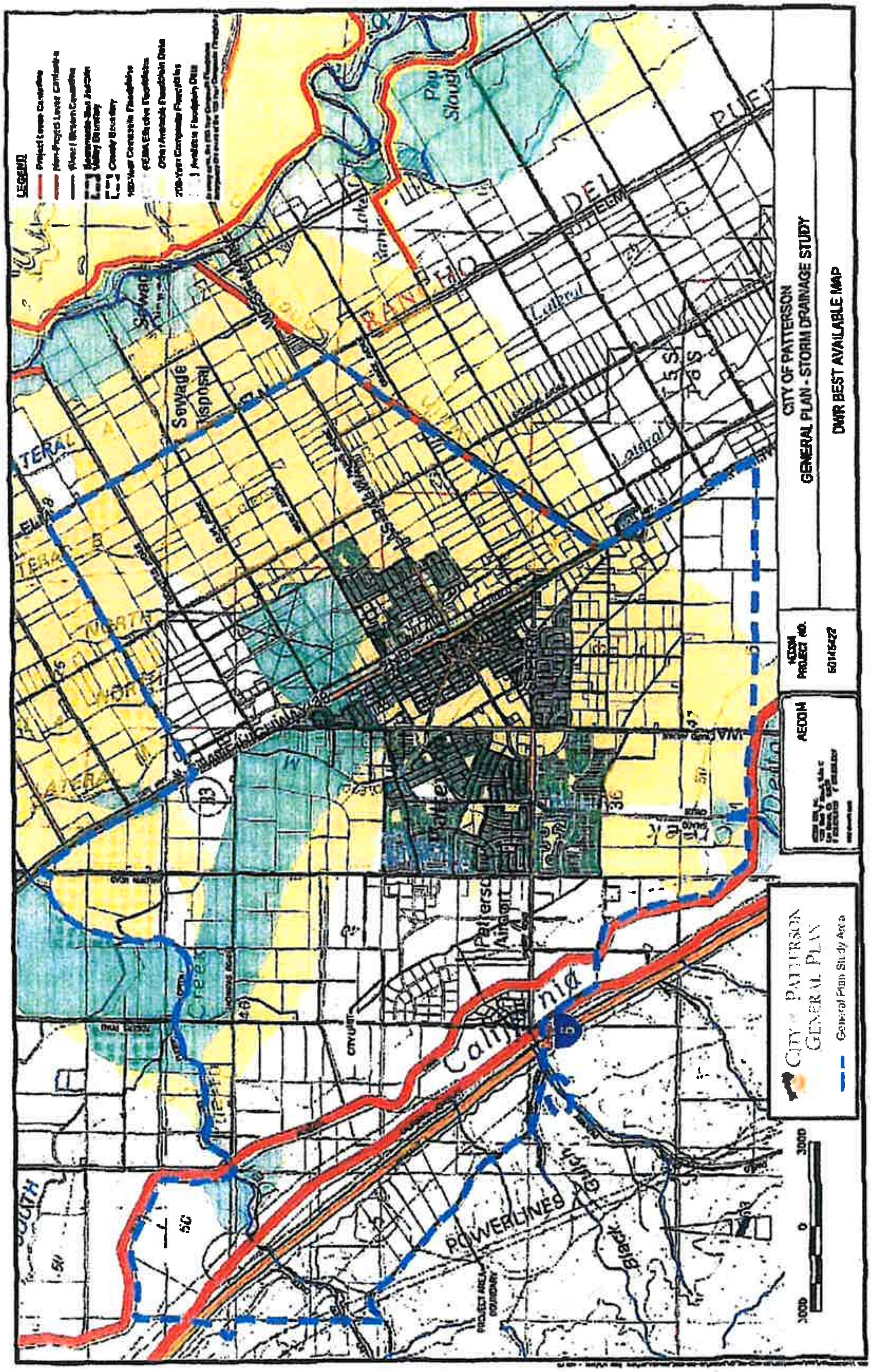
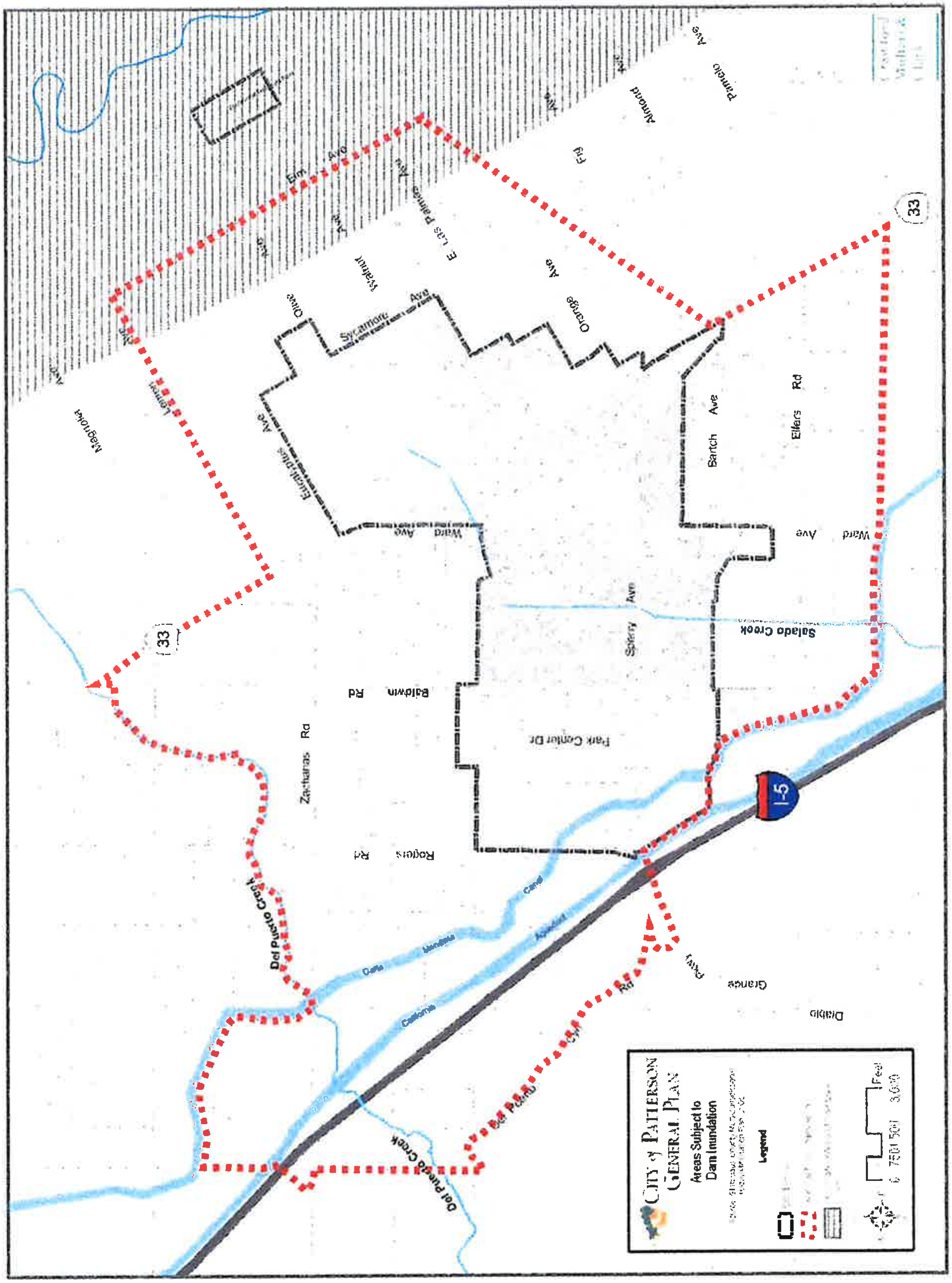


Figure IX-6: Potential Inundation Area for San Luis Dam



Fire Hazards

Both structural and wildland fire hazards pose a risk to life and property within Patterson. Wildland fires resulting from both human-made and natural causes occur in forest, brush, or grasslands, primarily in sparsely developed or existing open space lands. Structures and urban development may also be threatened or destroyed in the area of wildland fires. Structural fires usually result from human-made causes and threaten many residential and commercial structures, especially those built before building and fire codes were established and/or updated. These substandard structures represent the highest potential for injury, death, or loss of property.

Structural Fire Hazards

Structural fire hazards are primarily associated with residential, commercial, and industrial structures and activities. Urban fires can start for a wide variety of reasons, including electrical shorts, industrial accidents, carelessness, and arson. In general, however, fire hazards are greatest in buildings and structures which are old or substandard. Older structures in Patterson are generally in the original neighborhoods and in some other areas.

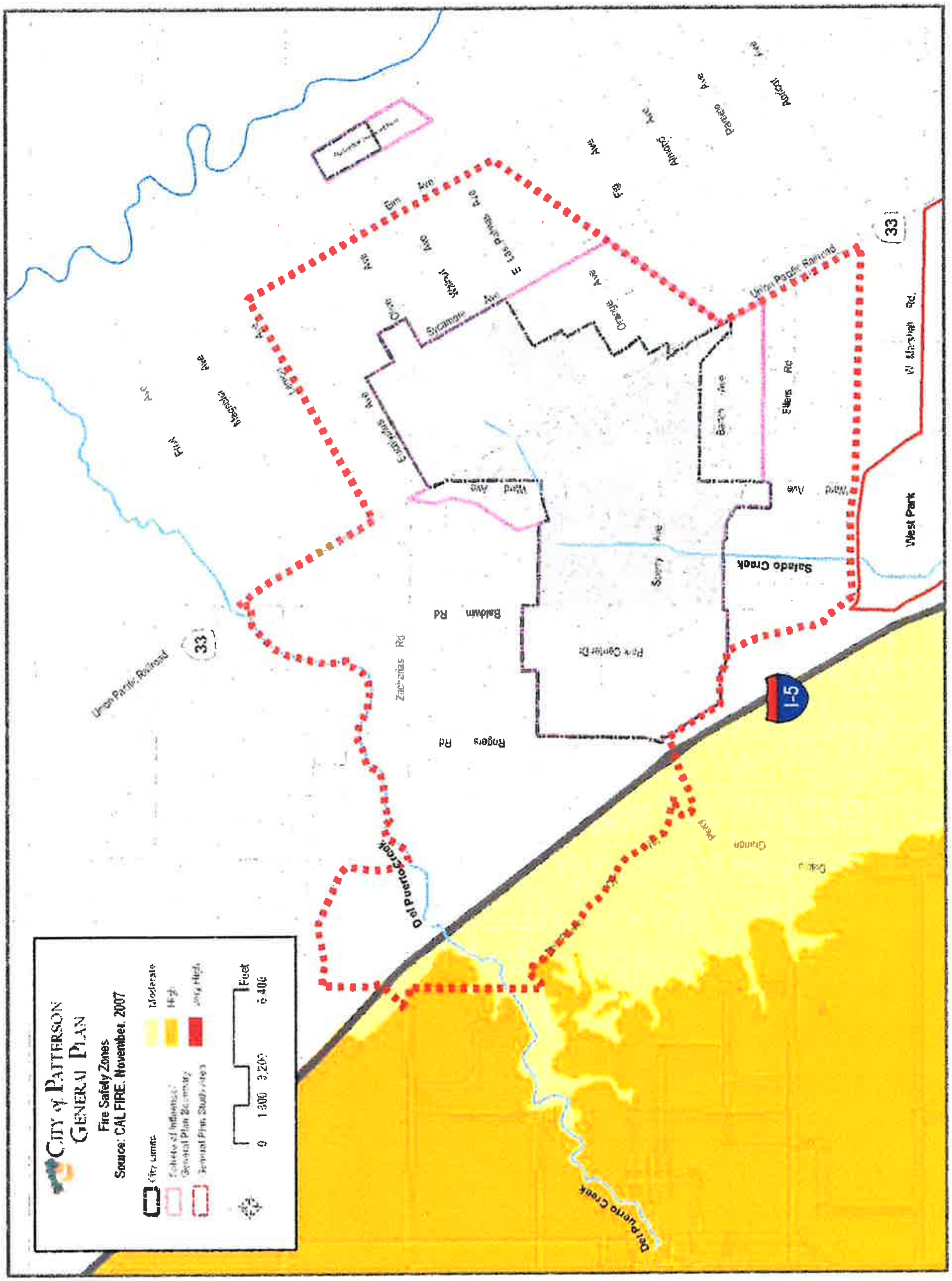
Fire hazards are also the result of inadequate water flows in some of the older areas of the city served by undersized mains. The primary areas of concern are the downtown circle and the strip along First Street. As of 2007, the City was planning on upgrading water mains to serve the areas outlying the circle.

Wildland Fire Hazards

The outbreak and spread of wildland fires in the Study Area is a potential danger, particularly during the summer months. The buildup of understory brush, which under natural conditions would be periodically burned off, creates conditions conducive to larger and more intensive fires. Variable conditions such as humidity, drought, rainfall, wind velocity, type and presence of vegetation, and fuel buildup are the main determinants to the start, spread, and control of wildland fires. The annual drought season (May to October) gives rise to the most hazardous fire conditions, especially in the latter months. It should be noted that most wildland fires in California are the result of either arson or simple human carelessness.

Portions of the Study Area most susceptible to wildland fires are the dense brush along the river, and brush in the western portion of the Study Area west of Interstate 5. Cal Fire rates these areas as moderate to high Fire Hazard Severity Zones. Figure IX-7 indicates the general areas of structural and wildland fire hazards.

Figure IX-7: Fire Hazard Zones



Toxic/Hazardous Materials

Patterson has some industries and activities which transport, store, or use toxic or hazardous chemicals posing potential safety hazards. The most prevalent hazardous materials in Patterson are stored pesticides and herbicides used for agricultural purposes. In addition to the stored pesticides, there are also various sites in the Study Area that contain, or have contained, above- and under-ground storage tanks containing hazardous materials such as gasoline and diesel fuel. The County Agricultural Office on First Street is listed as a hazardous waste facility because it is used as a temporary storage facility for hazardous waste. The waste is moved to a permanent disposal facility when sufficient quantities have accumulated to make movement effective.

The State of California Hazardous Waste and Substances Site List (also known as the "Cortese List") is a planning document used by state and local agencies and developers to comply with the siting requirements prescribed by federal State and local regulations relating to hazardous materials sites. California Government Code Section 65962.5 requires the California Environmental Protection Agency (Cal-EPA) to annually update the Cortese List. The Department of Toxic Substances Control (DTSC) is responsible for preparing a portion of the information that comprises the Cortese List. Other state and local government agencies are required to provide additional hazardous material release information that is part of the complete list. DTSC's Site Mitigation and Brownfields Reuse Program EnviroStor database provides DTSC's component of Cortese List data by identifying State Response and/or Federal Superfund and backlog sites listed under Health and Safety Code Section 25356. In addition, DTSC's Cortese List includes Certified with Operation and Maintenance sites. A search of the Cortese database conducted in March, 2010 for sites within the Study Area produced the following active sites:

Table IX-3: Hazardous Materials Sites Identified Within the Study Area

Site Name	Address	Facility Type	Cleanup Status
PRC Patterson, Inc	13331 N. HWY 33	Corrective Action	Active
PRC Patterson, Inc	13331 N. HWY 33	Hazardous Waste Undergoing Closure	Active
Special Education and Alternative Education School Site	513 Walnut Avenue and 673 Walnut Avenue	School Cleanup	Active

Source: Department of Toxic Substances Control Envirostor, March, 2010.

In addition to EnviroStor, the CAL-SITES Abandoned Sites Information System (ASPIS) database, compiled by Cal-EPA, can also be used to identify and track potential hazardous waste sites. This database is regularly uploaded to the State's Geographic Environmental Information Management System (GEIMS) so that agencies and the general public can access information regarding a specific site. GEIMS, a data warehouse which tracks regulatory data regarding leaking underground fuel tanks (LUFTs), other contaminant release sites, water quality information, water use information, and infrastructure data, can be used to identify properties that are known or have had contaminant spills. GeoTracker, the interface to GEIMS, uses commercially available software to allow users to access data from GEIMS over the Internet. Sites listed, as of March 2010, are summarized in Table IX-4.

The National Priorities List (NPL) is maintained by the U.S. Environmental Protection Agency (EPA) and lists the most severe hazardous waste sites as identified by Superfund. Sites are put on the NPL after they have been scored using the Hazard Ranking System, as well as having been subjected to public comment. Any site on the NPL is eligible for cleanup using Superfund Trust money. The NPL is primarily an informational resource that identifies sites that may warrant cleanup. As of March 2010, there were no NPL sites in the Study Area.

Table IX-4: Hazardous Waste Sites Within the General Plan Study Area			
Site Name	**Cleanup Status**	**Type**	**Address**
Old Ranch Headquarters	Open - Inactive	Other Cleanup	999 Balfour Rd.
Patterson Flying Service	Open - Inactive	Surface Disposal	P.O.Box 692
Chevron, Dmsi, Patterson	Open - Verification Monitoring	Other Cleanup	800 S. Hwy 33
Chevron, Thompson Chevrolet, Patterson	Open - Site Assessment	Other Cleanup	Hwy 33
Pg&E Substation, Np- 1166	Open - Inactive	Other Cleanup	Canal Road
Tosco- Patterson Pump Station Np139	Open - Inactive	Other Cleanup	Oak Flat Road
A.L. Castle, Inc. (Pac Veg Inc.)	Open - Inactive	Other Cleanup	1607 West Marshal Rd
Vieira Petroleum Co Patterson Facility	Open - Verification Monitoring	Other Cleanup	341 S. 1st Street
Campbell Ranch	Open - Inactive	Other Cleanup	16513, 16521 Ward Avenue
Chevron Pipeline Co - Former Standard Oil Pipeline	Open - Inactive	Other Cleanup	Highway 33
Karl Herger Inventory Farm	Open - Inactive	Other Cleanup	1266 Almond Avenue
Westside Cleaners & Laundry	Open - Inactive	Other Cleanup	101 Del Puerto Avenue
Mid Valley Agriculture (Former Pacoast Inc.)	Open - Remediation	Other Cleanup	105 North 1st Street
Patterson Flying Service Corporation	Open - Remediation	Other Cleanup	2549 Sperry Ave
Thorkelson Ranch	Open - Inactive	Other Cleanup	13218 Elm Avenue
Ez Serve Store	Completed - Case Closed	Leaking underground tank	115 Del Puerto
Musson's Sporting Goods	Completed - Case Closed	Leaking underground tank	103 Second
Jem Electric	Completed - Case Closed	Leaking underground tank	118 Second
Westside Laundry	Open - Inactive	Other	420 Del Puerto Rd
Harris Property Fmr Chem Away Inc	Open - Site Assessment	Leaking underground tank	113 Third
Patterson Ford Mercury	Completed - Case Closed	Leaking underground tank	250 El Circulo
T And M Market	Completed - Case Closed	Leaking underground tank	107 Second
John's Mini Mart	Open - Remediation	Leaking underground tank	320 Second
De Lash Enterprises Inc	Completed - Case Closed	Leaking underground tank	16561 Hwy 33
Campbell Ranch	Open - Remediation	Other Cleanup	16521 Ward
Paul Oil Company Inc	Open - Remediation	Leaking underground tank	511 Second
Castle A L, Inc.	Open - Inactive	Other Cleanup	1607 W. Marshal Rd
Gibson Refinery Service	Open - Inactive	Other Cleanup	13331 Highway 33
California Realty Exchange	Open - Inactive	Other Cleanup	136 S. Sixth
Stanislaus Bombing Target Range	Former bombing range - may contain unexploded ordnance	FUDS	West of I-5, north of Oak Flat Road

Source: CAL-SITES Abandoned Sites Information System, March 2010, and Environmental Data Resources, Inc., EDR Radius Map Report, March 18, 2010.

Landfills and other solid waste disposal facilities can also be sources of groundwater contamination. The California Integrated Waste Management Board (CIWMB) lists 14 such sites in Stanislaus County, including landfills (open and closed) and other solid waste disposal facilities. However, there are no sites identified within Stanislaus County with waste constituents above hazardous waste levels outside the waste management unit.[8] There are no landfills or abandoned landfills within the Study Area.

Known and Unknown Large Hazardous Material Issues in the Study Area

Pesticides

Pesticides are also a major source of groundwater pollution that frequently contaminate drinking water and irrigation wells. Pesticide properties include both physical and chemical characteristics such as solubility, adsorption, volatility, and the potential for degradation. Pesticide chemicals that dissolve readily in water are highly soluble, thus making them available for transport with the water flow. Such pesticides have a tendency to leach from the soil into groundwater. However, many pesticides do not leach because they are adsorbed into soil particles or organic matter, even though they may have a relatively high solubility. Highly volatile chemicals are easily lost to the atmosphere and are less likely to leach into the groundwater, unless they are also highly soluble and collected in water systems. Degradation affects the potential for a pesticide to reach groundwater, and the persistence of the pesticide influences the potential for long-term contamination. The longer the compound lasts before it is broken down, the longer it is subject to the forces of leaching. However, many highly persistent pesticides (e.g., chlorinated hydrocarbons) have not been found in groundwater because of their low solubility and strong adsorption to soil particles. On the other hand, some pesticides of low persistence (e.g., aldicarb) have been found in groundwater.

Soil properties that affect pesticide movement include texture, permeability, and organic matter content. Management practices, or the methods used to apply pesticides, are another factor determining leaching potential. Injection or incorporation into the soil, as in the case of nematicides, makes the pesticide most readily available for leaching. Most of the pesticides that have been detected in groundwater have been incorporated into the soil rather than sprayed onto growing crops. It is important to remember that pesticide and groundwater relationships are site-specific, and even minor changes in the soil-crop-environment-pesticide relationship can change the potential for groundwater contamination.

Other Sources

Dry cleaning operations and historical operation of tanneries have led to soil and groundwater contamination by solvents, including perchloroethylene (PCE), tetrachloroethene (TCE), and chromium. The Central Valley Regional Water Quality Control Board (RWQCB) is currently the oversight agency for contaminated sites of this type in the Study Area.

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[8] Source: California Environmental Protection Agency, Cortese List. Available at: http://www.calepa.ca.gov/SiteCleanup/CorteseList/CurrentList.pdf

Aircraft Overflight

The General Plan Study Area contains two airports, the Patterson Airport and the Crows Landing Airfield. Patterson Airport is not currently in use; however, airport operations could be resumed at any time. The Crows Landing Airfield, located approximately 2.5 miles south of Patterson, was formerly owned and operated by the military and is now owned by Stanislaus County. The Airfield ceased aircraft operations in 1998 and is slated to undergo redevelopment as an industrial mixed-use project under the auspices of the County. Although the Airfield is not currently being used by aircraft, aircraft operations could resume in the future.

The County Airport Land Use Commission (ALUC) has adopted a land use plan that establishes safety zones around each airport to protect the public from potential noise and safety impacts associated with aircraft overflights. The Plan also designates allowable and conditionally allowable land uses for the different safety zones. The Airport Land Use Plan is discussed in greater detail in Chapter I Land Use.

Emergency Response

Emergency response organization and responsibilities in Patterson are governed by the City's Emergency Response Plan. The Plan was most recently updated in 2004, and outlines emergency response procedures and evacuation routes.

City of Patterson Emergency Operations Plan

The City of Patterson's Emergency Operations Plan (EOP) was adopted in June, 2009, and addresses the planned response to extraordinary emergency situations associated with natural or human caused disasters, technological incidents, and national security emergencies in or affecting the City of Patterson.

The EOP is based on the National Incident Management System and its component parts. The foundation of NIMS is based on the California Standardized Emergency Management System (SEMS) including the five functional areas of incident or event management, operational coordination, planning and intelligence, logistical support, and finance/administration support. The EOP serves as the basis for response as well as recovery efforts and activities within the City of Patterson. Th EOP accomplishes the following:

- Uses as its foundation, the Standardized Emergency Management System (SEMS) as its functional components and concepts.
- Complies with and integrates the National Incident Management System (NIMS) concepts related to local government emergency management, including coordination with Federal, State and Local agencies and jurisdictions as well as non-governmental entities.
- Establishes the emergency management organization required to mitigate any significant emergency or disaster affecting the City of Patterson.
- Identifies the policies, responsibilities and procedures required to protect the health and safety of the City of Patterson, public and private property and the environmental effects of natural and technological emergencies and disasters.
- Establishes the operational concepts and procedures associated with initial response operations (field response) to emergencies, the expanded response operations (City Emergency Operations Center (EOC) activities) and the recovery process.

The City of Patterson, with its mix of urban and rural areas, and rapidly growing population, is subject to a variety of negative impacts from various hazards and threats. The EOP addresses three broad categories of hazards that threaten natural, technological and domestic security threats:

Natural Hazards	Technological Hazards	Domestic Security Threats
earthquakes floods extreme weather/storm wildland fires	dam failure hazardous material transportation emergencies train accident	civil unrest

Noise

Noise is often defined simply as unwanted sound, and thus is a subjective reaction to characteristics of a physical phenomenon. Researchers for many years have grappled with the problem of translating objective measurements of sound into directly correlatable measures of public reaction to noise. The descriptors of community noise in current use are the results of these efforts and represent simplified, practical, measurement tools to gauge community response.

Noise has often been cited as a health problem, not so much in terms of actual physiological damage, such as hearing impairment, but more in terms of reducing general well-being and contributing to undue stress and annoyance. Interference with human activities such as sleep, speech, recreation, and tasks demanding concentration or coordination, are the principal cause of noise-induced health problems and stress.

As part of the state-mandated noise element, state law and guidelines prepared by the State Office of Noise Control (ONC) require that certain noise sources and areas containing noise-sensitive land uses be identified and quantified by preparing generalized noise exposure contours for current and projected conditions within a community. Noise contours may be prepared in terms of the community noise equivalent level (CNEL) or day-night average level (Ldn), both of which are descriptors of total noise exposure at a given location for an annual average day. This noise exposure information may be used as a guide for establishing a pattern of land uses that minimizes the exposure of community residents to excessive noise.

The ONC guidelines require that the following major noise sources be considered in preparing a noise element:

- Highways and freeways.
- Primary arterials and major local streets.
- Passenger and freight on-line railroad operations and ground rapid transit systems.
- Commercial, general aviation, heliport, helistop, and military airport operations, aircraft overflights, jet engine test stands, and all other ground facilities and maintenance functions related to airport operation.

- Local industrial plants, including, but not limited to, railroad classification yards.
- Other ground stationary noise sources identified by local agencies as contributing to the community noise environment.

Based on research regarding potential major noise sources, it was determined that there are several potentially significant primary sources of community noise within Patterson. These sources include traffic on major roadways and highways, railroad operations, and agricultural and industrial activities.

There are several potentially significant primary sources of community noise within Patterson. These sources include traffic on major roadways and highways, railroad operations, and agricultural and industrial activities.

A community noise survey was conducted to document existing background (ambient) noise levels at four representative locations within the City. The monitoring site locations were located in both residential and commercial areas of the City. Noise measurements were conducted concurrently at the sites, beginning at midnight on March 25, 2010. The monitoring sites are shown in Figure IX-8.

Noise measurements were conducted continuously for a 24-hour period using Larson-Davis Laboratories Model 820 sound level analyzers equipped with Bruel & Kjaer (B&K) Type 4176 ½ inch microphones. The equipment was calibrated with a B&K Type 4230 acoustic calibrator to ensure the accuracy of the measurements and complies with applicable standards of the American National Standards Institute (ANSI) for Type 1 sound level meters. Microphones were located on tripods at approximately five feet above the ground.

Community noise survey findings are summarized graphically in Appendix 5.8. Shown are the measured hourly noise levels during the survey period, as defined by the L_{max}, L_{eq} and L_{90} descriptors. The L_{max} represents the highest noise level measured during each hour of the sample period and the L_{90} represents the noise level exceeded 90% of the time during each hour of the sample period. The L_{90} describes the residual (or background) noise level in the absence of identifiable noise events such as those caused by vehicle or train pass-bys. As previously noted, the L_{eq} is the energy average noise level during the hour. The measured DNL values for the 24-hour measurement period are also noted.

Site 1 was located at a self storage facility on North 1st Street between M Street and Olive Avenue. The site is a commercial area with mixed residential uses to the west and agriculture and rural residential uses to the east. The microphone was located approximately 150 feet east of State Route 33 (SR-33) and approximately 230 feet west of North 1st Street. The California Northern Railroad (CFNR) track is located approximately 80 feet to the west, and lies between SR-33 and the site. Measured hourly maximum noise levels ranged from 61-91 dBA during the sample period, and were likely caused by passing vehicles and trains. Background (L_{90}) noise levels ranged from about 50-55 dBA during the morning and afternoon commute hours to about 45-50 dBA during the middle of the afternoon, evening and night time hours. The measured DNL was 62.4 dB.

Site 2 was located at a City water storage facility approximately 475 feet northwest of the intersection of Orange Avenue and Locust Avenue. There are commercial uses located to the west of the site, and agricultural uses to the north, east and south. There are a few existing single-family homes located to the south of the monitoring site. Measured hourly maximum noise levels ranged from 55-86 dBA during the sample period and were likely caused by passing vehicles and trains. Background (L_{90}) noise levels were relatively constant throughout the sample period, and ranged from 53-55 dBA. The predominant background noise source measured at Site 2 was exhaust fans from the Sierra Pacific facility. The measured DNL was 62.1 dB.

Site 3 was located at a City fire station at 1950 Keystone Pacific Parkway. The microphone was located approximately 325 feet east of Park Center Drive and approximately 350 feet south of Keystone Pacific Parkway. The site is surrounded by existing commercial uses and open land. There are existing single-family homes located approximately 1,500 feet east of the monitoring site. Measured hourly maximum noise levels ranged from 55-80 dBA during the sample period and were likely caused by passing trucks. Background (L_{90}) noise levels ranged from below 40 dBA during the late night and early morning hours to about 47 dBA during the morning commute hours. The measured DNL was 55.4 dB.

Site 4 was located in a vacant lot on Peach Blossom Lane between Plumeria Drive and Garden Patch Way. The meter was located in a residential area surrounded by single-family homes. Measured hourly maximum noise levels ranged from 48-73 dBA during the sample period and were likely caused by passing vehicles. Background (L_{90}) noise levels ranged from below 40 dBA during the late night and early morning hours to about 47 dBA late afternoon and early evening hours. The measured DNL was 50.6 dB.

Stationary Noise Sources

Major existing stationary noise sources within the City of Patterson include the central core commercial/industrial area along SR-33, the CFNR tracks and the CVS Pharmacy and Kohls distribution centers on the west side of town. There are also various smaller sources located within the Study Area.

Central Core Commercial/Industrial Area. This commercial/industrial area represents the area east of SR-33 extending from approximately Las Palmas Avenue to Orange Avenue. This area includes Patterson Vegetable, Sierra Pacific, Trinidad Benham, Traina Foods, George Lowry Petroleum, and other agricultural- and industrial- related facilities. Noise levels generated within this area were measured at multiple short-term locations on March 25-26, 2010, as noted in Figure IX-8.

Table IX-5 documents the measured noise levels and locations of the short-term monitoring sites. Noise levels varied widely throughout the area, with the loudest areas being to the north along Las Palmas Avenue in the vicinity of Patterson Vegetable, as well as in the southern portion along 2nd Street near Trinidad Benham. The closest residential uses are the Las Palmas trailer park to the east. Noise measurements were obtained at two locations within the trailer park (Enrique Way/El Camino Drive and Shirlinda Way/Pasa Felix Drive). Noise levels at these locations ranged from approximately 46-52 dBA.

Figure IX-8: Stationary Source Monitoring Sites

Table IX-5: Measured Noise Levels (Dba) Central Core Commercial/Industrial Area March 25-26, 2010		
Location	**Range (dBA)**	**Primary Source**
Enrique Way and El Camino Drive	50-52	Patterson Vegetable
Las Palmas Avenue and 1st Street	69-71	Patterson Vegetable
110 E Las Palmas Avenue	73-74	Patterson Vegetable
495 S. 2nd Street	66-67	Trinidad Benham
341 S. 1st Street	60-65	Trinidad Benham
Orange Avenue and Locust Avenue	48-51	Traina Foods
Shirlinda Way and Pasa Felix Drive	46-47	Patterson Vegetable
2nd Street and Las Palmas Avenue	64-67	Patterson Vegetable
Salado Avenue and El Circulo Avenue	64-66	Patterson Vegetable
Orange Avenue and 1st Street	54-57	Sierra Pacific
261 Orange Avenue	49-52	Sierra Pacific
Source: Brown-Buntin Associates, Inc.		

CVS Pharmacy Distribution Center. CVS Pharmacy operates a distribution center southwest of the intersection of Keystone Pacific Parkway and Park Center Drive. Noise sources include trucks entering and exiting the facility, rooftop fans, occasional outdoor forklift movements, and back-up warning beepers. Short term noise measurements were obtained at a distance of approximately 500 feet from the east side of the facility as noted in Figure IX-8. Measured noise levels at that site ranged from 42-45 dBA. Long term monitoring Site 3 was also located east of the distribution center, and background noise levels measured for the 24-hour period ranged from approximately 33-48 dBA. Truck traffic along Keystone Pacific Parkway and Rogers Road was observed to represent a greater noise source than activities at the distribution center.

Kohl's Distribution Center. Kohl's Department Store operates a distribution center along the north side of Keystone Pacific Parkway, approximately 1,300 feet northeast of the CVS Pharmacy Distribution Center. Noise sources include trucks entering and exiting the facility, occasional fork lift movements, and back-up warning beepers. Short term noise measurements were obtained at a distance of approximately 800 feet from the south side of the facility as noted in Figure IX-8. Facility-related noise levels at that site ranged from approximately 44-46 dBA. As was the case with the CVS Pharmacy distribution center, activities related to the Kohl's facility were often inaudible above other ambient noise sources, namely roadway vehicle traffic. Truck traffic along Keystone Pacific Parkway and Rogers Road was observed to represent a greater noise source than activities at the distribution center.

Various Commercial/Industrial-related Industries. Observations on March 25, 2010 indicated that there are a number of commercial/industrial-related uses located north of Las Palmas Avenue generally between North 1st Street and SR-33. There are existing residential uses along the east side of North 1st Street in close proximity. Noise levels were measured in front of a residence along North 1st Street at a distance of approximately 60 feet from Peck & Hiller Concrete, and noise levels ranged from approximately 53-61 dBA. Noise sources included welding, cutting, and grinding activities, and truck movements. Additionally, noise measurements were obtained near Designed Mobile Systems, a manufacturer of modular buildings, located west of SR-33 and north of Poppy Avenue. Noise levels were obtained at a nearby residence at 349 Poppy Avenue, and were measured to be in the range of 49-51 dBA. Noise sources included forklift movements and back-up warning beepers. Short-term noise monitoring sites are noted in Figure IX-8.

Roadways

Automobile traffic on roadways is one of the primary sources of noise within the Study Area. The eastern portion of the Study Area is most affected by noise generated by State Route 33, with the existing baseline ranging from 67-69 dB. Additional roadways within the eastern portion of the Study Area which generate significant levels of noise consist of Walnut, Sycamore, and Eucalyptus Avenues; however, these roadways do not generate baseline noise levels in excess of 56 dB.

Within the western portion of the Study Area, a substantial amount of vehicular noise is generated by Interstate-5. Approximately 25,000 vehicles per day travel the I-5 corridor through the Study Area[9], with approximately 25 percent of these vehicles classified as heavy-duty or lighter trucks[10]. Additional roadways within the western portion of the Study Area expected to generate moderate noise levels are Sperry Avenue, Baldwin Road, and Ward Avenue. These roads are rural or transitional connector streets that may have occasionally fast-moving traffic, but are not heavily-traveled at night, causing only moderate levels of noise during the day. It is estimated that noise levels beyond about 65 feet of the centerline of Sperry Avenue are below 60 dBA.

The Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD-77-108) was used to develop DNL contours for I-5, SR-33, and major local roadways. The FHWA Model is an analytical method favored by most state and local agencies, including Caltrans, for highway traffic noise prediction. The FHWA Model is based upon reference energy emission levels for automobiles, medium trucks (2 axles) and heavy trucks (3 or more axles), with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. The FHWA Model was developed to predict hourly L_{eq} values for free-flowing traffic conditions, and is generally considered to be accurate to within ±1.5 dB. To determine DNL values, it is

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[9] TJKM Transportation Consultants Traffic Study for the City of Patterson General Plan, 2010

[10] State of California Department of Transportation, 2006 Annual Average Daily Truck Traffic on the California State Highway System

necessary to estimate the day/night distribution of traffic so that an hourly equivalent traffic volume may be calculated. The FHWA Model assumes a clear view of traffic with no shielding at the receiver location.

Average Daily Traffic (ADT) volumes and speeds used for noise modeling were provided by TJKM Transportation Consultants, the project traffic engineers (the reader is referred to section 5.6 Transportation and Circulation). The day/night distribution of traffic was estimated by BBA based upon studies along similar roadways. The percentage of trucks on I-5 and SR-33 were obtained from Caltrans. The percentage of trucks on major local streets was estimated by BBA based upon studies along similar roadways. It was assumed that Rogers Road north of Sperry Avenue is a truck route with higher percentages of trucks than other major local streets. Appendix 5.8 summarizes the noise modeling assumptions used to calculate traffic noise exposure for existing conditions along I-5, SR-33 and major local streets.

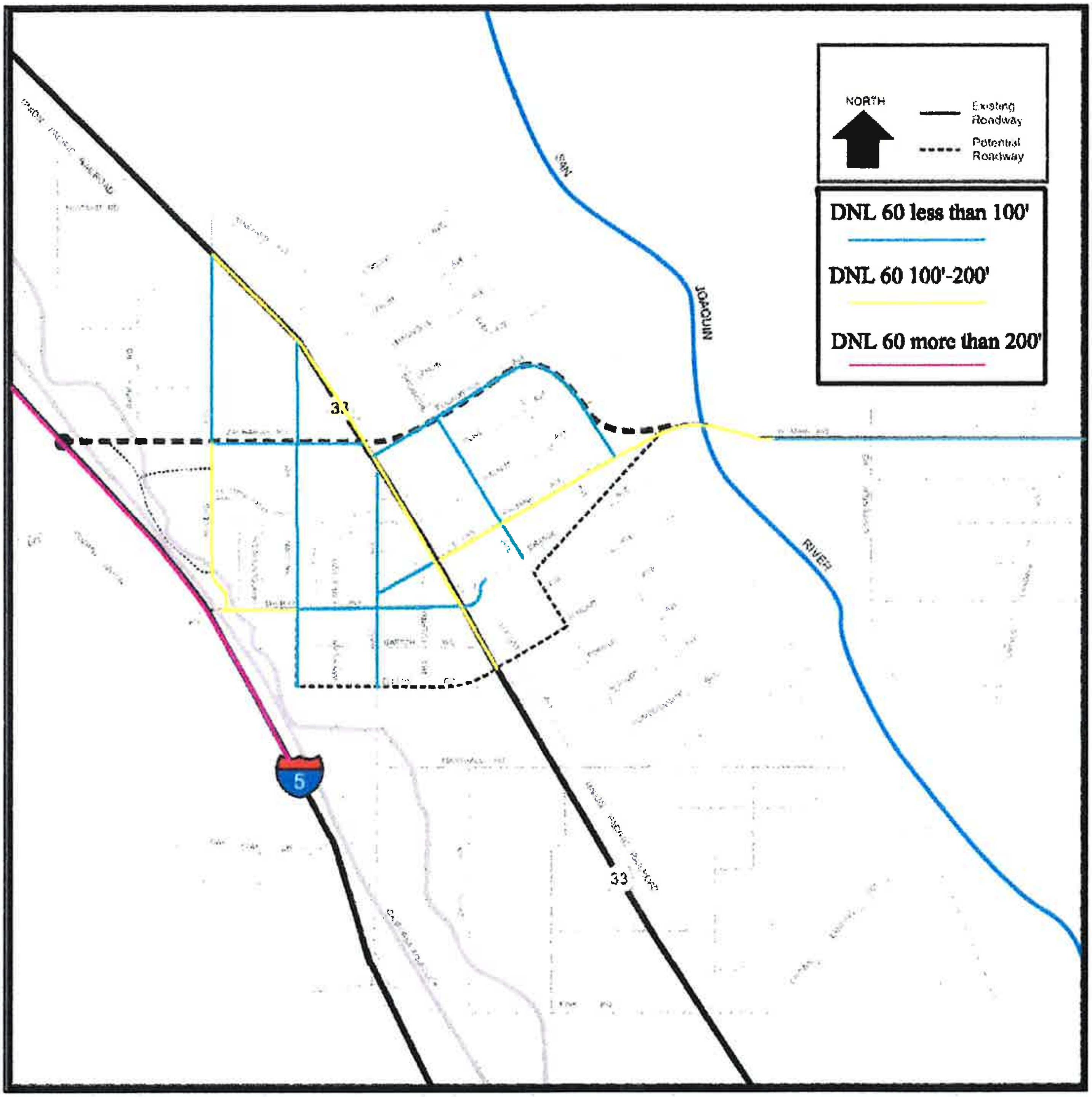
Table IX-6 summarizes calculated noise exposure at typical building setbacks and the distances to the DNL 60 and 65 dB contours for existing traffic conditions. Figure IX-9 shows the roadways where distances to DNL contours were calculated for existing traffic conditions. The streets are color coded to indicate the approximate distances to the 60 dB DNL contours. Traffic noise exposure information is generalized for flat terrain and the absence of acoustical shielding or reflections that may be caused by site-specific conditions.

Table IX-6: Generalized Traffic Noise Exposure, 2010

Roadway	Segment	DNL @ Typical Setback, dB[1]	Distance, Feet[2]	
			60 dB DNL	65 dB DNL
I-5	n/o Sperry Ave.	73.4	1564	726
	s/o Sperry Ave.	74.0	1705	792
SR-33	w/o Baldwin Rd.	65.4	172	80
	e/o Baldwin Rd.	63.3	125	58
	n/o Zacharias Rd.	62.1	104	48
	s/o Zacharias Rd.	62.5	110	51
	n/o Las Palmas Ave.	62.1	103	48
	s/o Las Palmas Ave.	63.7	132	61
	n/o Sperry Ave.	63.6	131	61
	s/o Sperry Ave.	64.8	156	73
Rogers Rd.	s/o SR-33	52.6	24	11
	n/o Sperry Ave.	63.2	122	57
	s/o Sperry Ave.	---	---	---
Sperry Ave.	w/o Rogers Rd.	62.0	102	47
	e/o Rogers Rd.	61.2	90	42
	w/o Baldwin Rd.	61.0	88	41
	e/o Baldwin Rd.	60.7	83	39
	w/o Ward Ave.	61.2	90	42
	e/o Ward Ave.	61.4	93	43
	w/o SR-33	59.4	69	32
	e/o SR-33	54.8	34	16
Baldwin Rd.	n/o Sperry Ave.	56.2	42	19
	s/o Sperry Ave.	52.3	23	11
	s/o SR-33	49.3	15	7
Ward Ave.	n/o Sperry Ave.	58.4	58	27
	s/o Sperry Ave.	56.2	42	20
Zacharias Rd.	w/o SR-33	50.0	16	7
	e/o SR-33	---	---	---
Eucalyptus Ave.	e/o SR-33	48.1	12	6
Las Palmas Ave	w/o SR-33	59.5	69	32
	e/o SR-33	62.7	113	53
	w/o Poplar Ave.	63.6	130	60
	e/o Poplar Ave.	63.6	130	61
Sycamore Ave.	n/o Las Palmas Ave.	54.3	31	14
	s/o Las Palmas Ave.	56.3	42	20
Poplar Ave.	n/o Las Palmas Ave.	49.1	14	7
W. Main Ave.	n/o Las Palmas Ave.	61.3	91	42
	s/o Las Palmas Ave.	59.9	73	34

Source: Brown-Buntin Associates, Inc.
Notes:
1. Assumed to be 75 feet from the center of all roadways except I-5 where a setback of 200 feet was assumed. Calculations are generalized and do not take into consideration sound walls or other site-specific conditions.
2. From the center of the roadway.

Figure IX-9: Traffic Noise Exposure Contours – Existing Conditions



Railroads

The California Northern Railroad (CFNR) currently operates freight trains over the Westside Branch of the Union Pacific Railroad (UPRR) through Patterson between Tracy and Los Banos. According to the Federal Railroad Administration rail crossing inventory (01/01/96), an average of six trains per day pass through Patterson. It should be noted that this figure includes switching movements at local industries, and that, based upon field observations, this may be a high estimate for current operations over the line. Freight trains may occur at any time during the day or night. The current maximum train speed through Patterson is 25 mph.

There are approximately 20 public or private roadway grade crossings within the Study Area. Train engineers are required to sound the warning horn when approaching within approximately 1,000 feet of a grade crossing. Train noise levels are therefore higher at locations near grade crossings. Due the number of grade crossings within the Study Area, warning horns are used frequently as trains pass through Patterson.

Noise levels produced by a northbound freight train with two locomotives and 15 cars were recorded by Brown-Buntin Associates, Inc. (BBA) near the M Street grade crossing on March 25, 2010. At a distance of 100 feet from the track, the measured maximum (L_{max}) and Sound Exposure Level (SEL) values were 103.3 and 109.8 dBA, respectively. The SEL is a measure of total sound energy produced by a noise event, normalized to a reference duration of one second. The SEL is not actually heard but is the noise metric used for the calculation of cumulative noise exposure as defined by the DNL. Noise levels produced by passing trains are variable, depending upon speed, length of train, condition of equipment and tracks, perceived safety conflicts of individual train crews and other variables.

Railroad noise exposure within the City of Patterson was calculated based upon the above-described operations data and noise level data for freight train movements recorded by BBA for numerous studies along the UPRR and other railroads in the Central Valley. At a distance of 100 feet from the center of the track, typical freight train pass-bys near a grade crossing have been shown to produce average SEL values of 106.3 dBA. At distances greater than 1,000 feet from a grade crossing, typical freight train pass-bys have been shown to produce average SEL values of 102.1 dBA at 100 feet from the tracks.

It was assumed for the calculations that freight train operations may occur at any time of the day or night. Within 1,000 feet of a grade crossing, the calculated distance to the 60 dB DNL contour for current railroad activity is 575 feet from the center of the tracks. At distances greater than 1,000 feet from a grade crossing, the calculated distance to the 60 dB DNL contour is 288 feet from the center of the tracks. Calculated distances are generalized and do not take into consideration site-specific conditions such as acoustic shielding or reflections caused by nearby buildings.

Aircraft Noise

The Patterson Airport and former Crow's Landing Airfield Facility (CLAF) are located within or affecting the Study Area. Only the Patterson Airport is still active. The Patterson Airport is a private airport consisting of a single 2,500 foot-long runway. According to FAA records, there are 12 aircraft based at the airport and an average of 33 aircraft operations per day. However, no aircraft operations were observed during field studies and aircraft were not observed on the airfield. If aircraft operations do occur, they are sporadic and do not generate significant noise exposure as defined by the CNEL noise metric. However, such operations would be distinctly audible in the vicinity of the airport.

Crows Landing Airfield is currently not in use. However, Stanislaus County has proposed that it be reopened as a general aviation airport as part of the Stanislaus County public airport system. According to the January 2009 draft of the Crows Landing Airport Land Use Compatibility Plan (ALUCP), the airport would reopen with a single 5,300 foot-long runway with approximately 4,000 annual aircraft operations. In the "ultimate" configuration (20 years+), the airfield would have two parallel runways 6,300 feet long and 200,000 annual operations. Operations would be mostly single and twin engine propeller or turboprop aircraft and helicopters, with approximately 10% business jet operations. The airport design aircraft for the ultimate development of the airport is the Gulfstream III business jet.

Noise-Sensitive Land Uses

Noise-sensitive land uses are generally considered to include those uses that would result in noise exposure that could cause health-related risks to individuals. Places where quiet is essential are also considered noise-sensitive uses. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Other land uses such as parks, historic sites, cemeteries, and recreation areas are also considered sensitive to increases in exterior noise levels. School classrooms, places of assembly, hotels, libraries, and other places where low interior noise levels are essential are also considered noise-sensitive land uses.

Findings

- Patterson has not experienced a great degree of seismic activity. The primary seismic hazards in Patterson are related to groundshaking and soil liquefaction.
- The California Department of Conservation estimates that Patterson could experience an earthquake with a maximum shaking intensity of VII to VIII on the modified Mercalli Scale, causing general alarm and moderate damage.
- The steep slopes and unstable geology of the Diablo Mountains on the western edge of the Study Area present potential landsliding hazards.
- The 100- and 500-year floodplains have been mapped for the Study Area by the Federal Emergency Management Agency. The maps show the potential for flooding throughout the majority of Patterson; however, the maps have not been updated since 1990, and fail to take into consideration new drainage and flood control infrastructure.
- Both structural and wildland fire hazards exist within the Study Area. The greatest risks of wildland fires are in the brush west of I-5 and in the riparian shrubs along the San Joaquin River. The greatest structural fire hazards are from older and substandard structures in the older parts of the city.
- The primary sources of noise in Patterson are traffic on major roadways and highways, railroad operations, and industrial and agricultural activities.

Bibliography

Areas Damaged by California Earthquakes, 1900-1949. California Division of Mines and Geology. 1982.

California Geological Survey. Earthquake Shaking Potential for the San Francisco Bay Region Counties. Summer, 2003. http://www.seismic.ca.gov/pub/intensitymaps/sfbay_county_print.pdf -

City of Patterson. General Plan, 1992.

City of Patterson, General Plan Update Preliminary Environmental Impact Report, 1985.

Department of Water Resources. News Online. "High Waters Along the San Joaquin." http://www.news.water.ca.gov/1998.fall/SJwaters.html

Stanislaus Area Association of Governments. Environmental Resources Management Element -Geology and Seismic Safety. June 1978.

Stanislaus County. General Plan, 1994.

Stanislaus County. General Plan Support Documents, 1994.

Stanislaus County Department of Public Works, Flood Management Study of Salado Creek. Prepared by Camp Dresser & McKee Inc.. December 1982.

Turnstone Consulting. Villages of Patterson Final Environmental Impact Report. 2006.

Turnstone Consulting. West Patterson Business Park Final Environmental Impact Report. 2003.

Glossary

Active Fault - A fault that has moved recently and which is likely to move again. For planning purposes , "active fault" is usually defined as one that shows movement within the last 11,000 years and can be expected to move within the next 100 years.

Alluvial - Pertaining to or composed of alluvium, or deposited by a stream or running water.

Alluvium- A general term for clay, silt, sand, gravel, or similar unconsolidated detrital material deposited during comparatively recent geologic time by a stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or on its flood plain or delta, or as a cone or fan at the base of a mountain slope.

Ambient Noise Level - The composite of noise from all sources. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Beds; Bedding - Layers in sedimentary rocks distinguished from one another on the basis of rock type, grain size, composition, color, etc.

CNEL - Community Noise Equivalent Level. The average equivalent A-weighted sound level during a 24-hour day. obtained after addition of live decibels to sound levels in the evening from 7:00 p.m. to 10:00 a.m. and after addition of ten decibels to sound levels in the night before 7:00 a.m. and after 10:00 p.m.

Compaction - Reduction in bulk volume or thickness of, or the pore space within, a body of fine-grained sediments in response to the increasing weight of overlying material that is continually being deposited, or to tile pressure resulting from earth movements within the crust. It is expressed as a decrease in porosity brought about by a tighter packing of the sediment particles.

Consolidated Material -Soil or rocks that have become firm as a result of compaction,

Decibel, (dB) - A unit for describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 rnicronewtons per square meter).

Earthquake - Perceptible trembling to violent shaking of the ground, produced by sudden displacement of rocks below and at the earth's surface.

Epicenter - An area of the surface of the earth directly above the focus of an earthquake.

Equivalent Energy Level (L,.) - The sound level corresponding to a steady state sound level containing the same total energy as a time varying signal over a given sample period. L,. is typically computed over 1, 8, and 24-hour sample periods.

Erosion - Movement of material (such as soil) from one place to another on the earth's surface. Agents of movement include water, ice, wind, and gravity.

Fault - A fracture in the earth's crust forming a boundary between rock masses that have shifted.

Fault System - Two or more interconnecting fault sets.

Fault Trace -The intersection of a fault with the earth's surface.

Fault Zone - A zone in which surface disruption or rock fracture has occurred due to movement along a fault. A fault zone may be expressed as an area with numerous small fractures, or breccia (essentially, fractured rock) as a fault gouge. A fault zone may be anywhere from a few meters (or yards) to two or more kilometers (I mile or more) wide.

Fire Hazard Zone - An area where, due to slope, fuel, weather, or other fire-related conditions, the potential loss of life and property from a fire necessitates special fire protection measures and planning before development occurs.

Ground Failure - Mudslide, landslide, liquefaction, or the seismic compaction of soils.

Hazardous Material - An injurious substance, including pesticides, herbicides, toxic metals and chemicals, liquefied natural gas, explosives, volatile chemicals, and nuclear fuels.

Inactive Fault - A fault which shows no evidence of movement in recent geologic time and no potential for movement in the relatively near future.

Intensity (of an earthquake) - A measure of the effects of earthquake waves on man, structures, and the earth's surface at a particular place. The intensity at a specific point depends not only upon the strength of the earthquake, or the earthquake magnitude, but also upon the distance from the point to the epicenter and the local geology. Intensity may be contrasted with magnitude, which is a measure of the-total energy released by an earthquake.

Landslide - A general term for relatively rapid mass movement, such as slump, rock slide, debris slide, rnudflow, and earthflow.

Lateral Spreading - The movement of loose soils over horizontal or low-angle slopes into open areas, caused by ground motion during an earthquake.

Ldn. Day/Night Average Level - The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of ten decibels to sound levels in the night before 7:00 a.m. and after 10:00 p.m. (Note: CNEL and Ldn represent daily levels of noise exposure averaged on an annual basis, while L" represents the equivalent energy noise exposure for a shorter time period. typically one hour.)

Liquefaction - A process by which water-saturated granular soils transform from a solid to a liquid state because of a sudden shock or strain.

Lurch Cracking - The development of all types and sizes of fissures in the ground, due to ground motion during an earthquake.

Magnitude (Earthquake) - A measure of the strength of an earthquake, or the strain energy released by it, as determined by seismographic observations. As defined by Richter, it is the logarithm, to the base 10, of the amplitude in microns of the largest trace deflection that would be observed on a standard torsion seismograph at a distance of 100 kilometers from the epicenter.

Noise Exposure Contours - Lines drawn about a noise source indicating constant energy levels of noise exposure. CNEL and Ldn are the descriptors utilized herein to describe community exposure to noise.

Potentially Active Fault - (1) A fault that moved within the Quaternary Period before the Holocene Epoch (the last 2,000,000 to 10,000 years); (2) A fault which, because it is judged to be capable of ground rupture or shaking, poses an unacceptable risk for a proposed structure.

Seiche - An earthquake-induced wave in a lake, reservoir, river, or harbor.

Seismic - Of or pertaining to earthquakes.

Settlement - The downward movement of soils, and structures on them or in them, resulting from reduction in the voids in the underlying soils.

Shear - A kind of fracture (or fault) in rock produced by intense pressure.

Subsidence - The gradual, local settling or sinking of the earth's surface with little or no horizontal motion, (Subsidence is usually the result of gas. oil, or water extraction, hydrocompaction, or peak oxidation. and not the result of a landslide or slope failure.)

Surface Rupture - A break in the ground's surface and the associated deformation resulting from the movement of a fault.

Water Table - The upper surface of saturated earth material below which all the materials are saturated.

Wildland - A nonurban, natural area which contains uncultivated land, timber, range, watershed, brush, or grasslands.

V. TRANSPORTATION

Introduction

This chapter discusses Patterson's transportation system and services, including streets and roads, parking, public transit, air service, and rail service.

Street and Roadway System

Regional Context

Patterson is located three miles east of Interstate 5. a major north-south transportation route through the Central Valley. 1-5 connects with Interstate 580 approximately 15 miles north of Patterson, which provides access for commuters to the East Bay Area cities of Livermore and Dublin. State Route 33 provides north-south access to Westley to the north and Crows Landing to the south. Las Palmas Avenue provides the easterly connection to Modesto and Turlock via a bridge over the San Joaquin River.

Physical Constraints on the Street and Road System

Physical constraints on the City's circulation system are the natural and man-made local features that limit existing and future roadway connections and alignments, and thereby constrain the community's access and circulation capacity. The primary physical constraints on the city's circulation are:

- The Southern Pacific Railroad tracks which run parallel to Highway 33. These tracks limit the number of east-west street connections between the portions of the city on either side of the railroad line.
- The various canals and creeks which require bridge structures at each point where roadways cross them.
- Interstate 5 to the west of the city, which has only one interchange to enter or exit Patterson along Sperry Avenue.
- The San Joaquin River to the east, with the Las Palmas bridge as its only crossing to and from Patterson.

Functional Classification of Roadways

The street system that serves a city can be described in hierarchical fashion, relating to the functional classification of the streets and highways. Patterson's street system can be classified according to four basic functional types of roadways:

Local Service Roadways provide immediate access to properties. are likely to be discontinuous in alignment, and generally carry very light traffic volumes. Those streets not identified with the other three street classifications described below fall into this functional classification.

Collector Roadways are fed by local service road-ways, provide local circulation options, provide connections to other roadways, and generally carry light to moderate traffic volumes. Included in this classification are the following streets:

Ivy Avenue	Orange Avenue
"M" Street	Ward Avenue
Baldwin Road	W. Las Palmas
Keystone Pacific Parkway	
Calvinson Parkway	
Hartley Street	Olive Avenue
Eucalyptus Avenue	

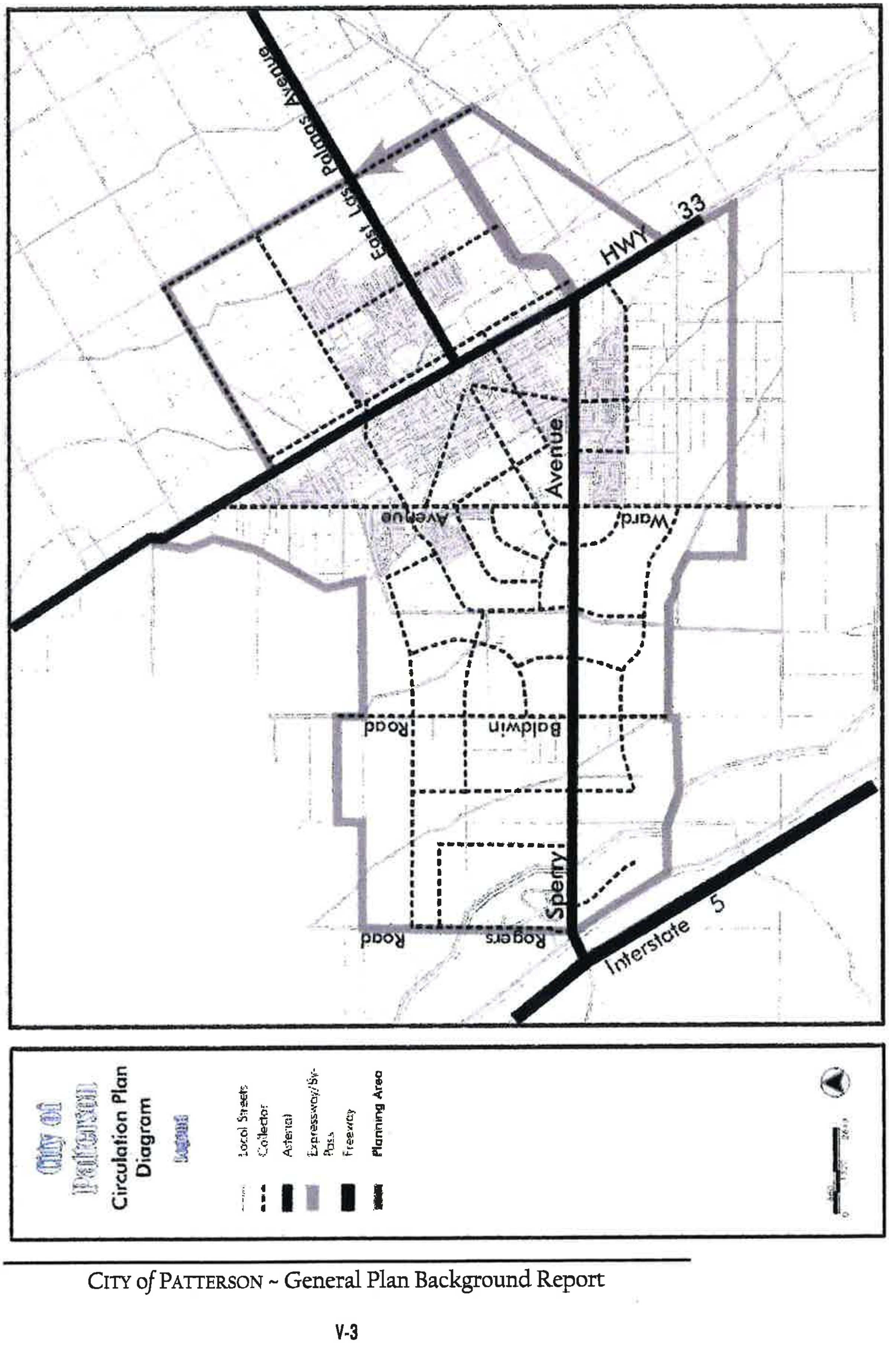
Arterial Roadways are fed by local service and collector roadways. They provide intra-city circulation routes and connections to regional roadways and generally carry relatively heavy traffic volumes. Included in this functional classification are the following streets:

E. Las Palmas Avenue
Second Street (State Route 33)
Sperry Avenue

Freeways are fed by collector and arterial roadways. They provide intra-city and inter-city travel, provide connections to other regional highways, and are capable of carrying heavy traffic volumes. Interstate 5 serves this function in the Planning Area.

This hierarchy of streets is a general guide to the classification of streets which make up the circulation system of a city. Often a street serves a dual function, such as providing both arterial and collector service. Therefore, it is sometimes difficult to provide a definitive classification. In addition, the width of a roadway does not always correspond directly to its function in the overall circulation system, though the wider roadways tend to have more regional functions within the circulation system.

Figure V-1: 1992 General Plan Circulation Element Diagram



The city's existing street system is shown in Figure V-2, with roadways discriminated by the functional classifications described above. The City's current General Plan Circulation Element shows a north-south/east-west grid of collector streets (Ward Avenue, Baldwin Road, Hartley Street, Sycamore Avenue, Calvison Parkway) conveying traffic from residential neighborhoods to a series of arterials (Sperry Avenue, East Las palmas, 2nd Street) which provide connections to the West Patterson Business Park, Downtown and commercial areas and the I-5 Freeway.

Roadway Widths and Physical Characteristics

The local and collector roadways in the oldest portions of the city (west of Second Street. east of Ninth Street, north of Sperry Avenue, and south of M Street) generally have right-of-way widths of 80 feet, with pavement widths of 52 feet.

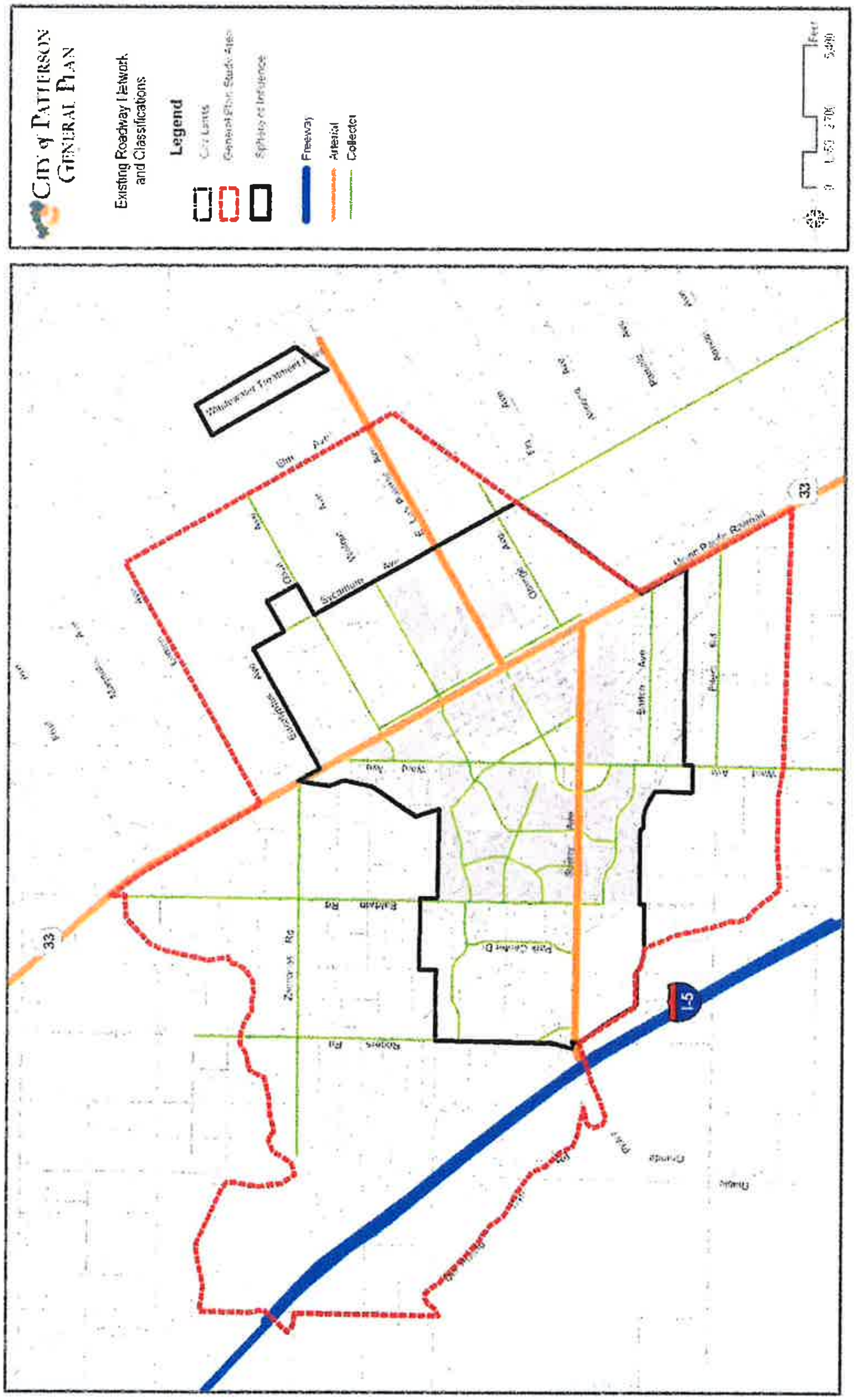
Streets which lie outside of the original portion of the city have generally been constructed to the City's cross-section improvement standards for the type of roadway involved (i.e., collector, major, industrial. and parkway). Figures V-3, V-4, and V-5 show the City's current standard street cross sections.

The traffic-carrying capacity of city streets is typically quantified in terms of the ability of the various intersections to accommodate peak-hour traffic volumes. Peak hours are the times of highest traffic flows, which generally occur during morning and evening commute hours. The intersections are the critical "valve" points in the street system, where right of way assignment for conflicting traffic flows is accomplished by intersection controls (e.g., signals or STOP and YIELD signs). Roadway segments with unusual characteristics, such as freeways with multiple interchanges or narrow bridges can also be traffic-limiting points.

For planning purposes, it is possible to estimate approximate daily traffic volume levels which are associated with the peak-hour traffic-carrying ability of the various types of streets. The ultimate "capacity" of a street is the maximum level of traffic which a street of a given width (number of lanes) can carry in a specified time period (per hour or per day) without resulting in extreme congestion during the peak traffic loading periods of the day. These maximum flow conditions are generally considered unacceptable, however, and special criteria are therefore used to identify lower traffic volume levels which have better (more free-flowing) peak period traffic conditions. These criteria, called "Level of Service" criteria, generally reflect traffic speeds and the percentage of the roadway's "capacity" used by the traffic.

For urban roadways, the proportion of capacity used, or volume-to-capacity (V/C) ratio, is usually the primary criterion used to characterize the levels of service. Service levels are identified by the alphabetic characters A, S, C, D, E, and F, with A representing the best (most free-flowing) peak period traffic conditions and F representing the worst conditions, with traffic volumes in excess of hourly capacity levels.

Figure V-2: Existing Street Network



Each of these levels has a corresponding V/C ratio. The level of traffic volumes which fill the maximum capacity of a roadway is assumed to have a V/C ratio of 1.00. A roadway operating at maximum capacity of a roadway is typically assumed to be the highest end of Level of Service "E", representative of heavily congested conditions. By definition, a V/C ratio cannot exceed 1.00. Because daily roadway capacities are calculated based on typical peaking characteristics, however, it is not unusual to find such an occurrence.

Figure V-3: Arterial Street Section

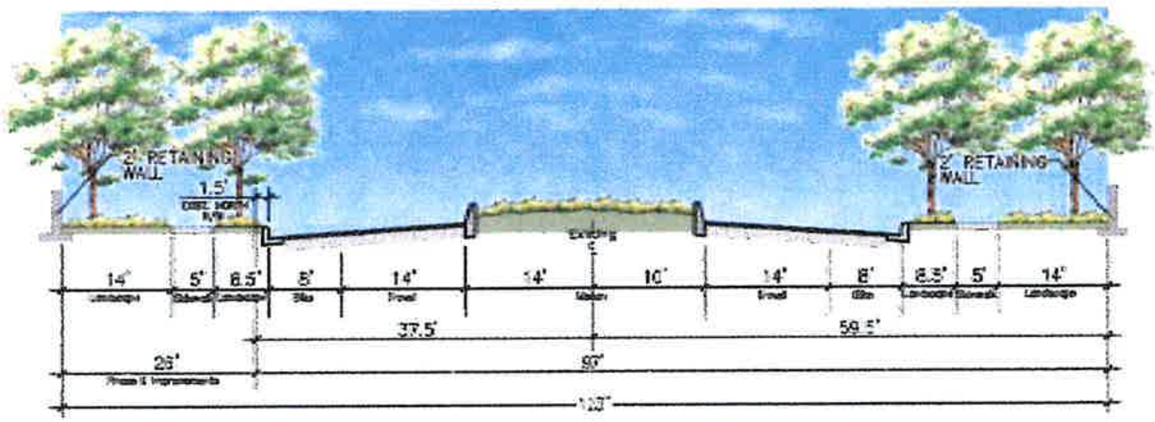


Figure V-4: Collector Street Section

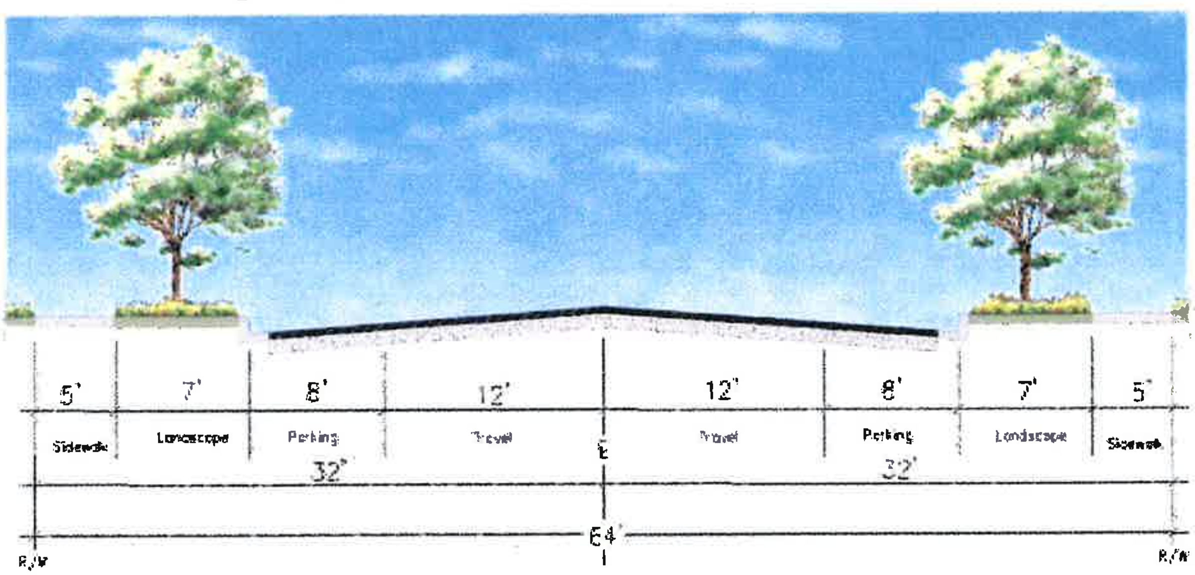
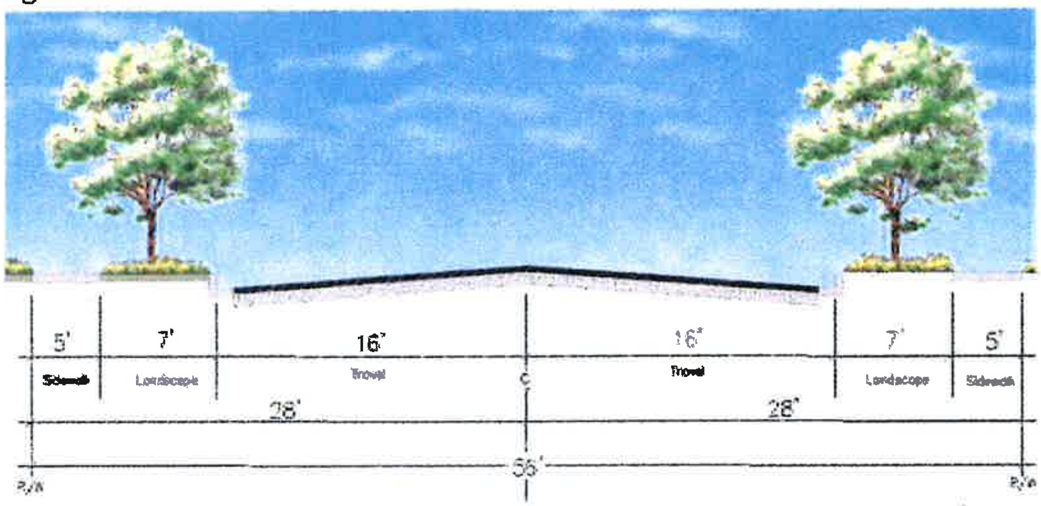


Figure V-5: Local Street Section



Level of service definitions can be used to describe traffic operating conditions on both roadway segments and intersections. Tables V-1 and V-2 provide a description of the level of service criteria and the delay in seconds associated with signalized and non-signalized intersections, respectively.

Table V-1: Level of Service Criteria For Signalized Intersections

Level of Service	Description	Average Control Delay Per Vehicle (second)
A	Operations with very low delay. Progression is extremely favorable and most vehicles arrive during the green phase. Many vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.	‹10.0
B	Operations with low delay, with good progression and/or short cycle lengths. More vehicles stop causing higher levels of delay.	›10.0 to 20.0
C	Operations with higher delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear when a given green phase does not serve all queued vehicles and overflow occurs. Many vehicles still pass through an intersection without stopping.	›20.0 to 35.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high volumes. Many vehicles stop, the proportion of vehicles not stopping declines. Individual cycle failures are frequent.	›35.0 to 55.0
E	This is considered to be the limit of acceptable delay. Operations with high delay values indicating poor progression, long cycle lengths, and high volumes. Individual cycle failures are frequent.	›55.0 to 80.0
F	Operation with delays unacceptable to most drivers. Oversaturation, arrival flow rates exceed the capacity of the intersection. Many individual cycle failures. Poor progression and very long cycle lengths may also be contributing factors to higher delay.	›80.0

Note: › means greater than, ‹ means less than.
Source: TJKM, 2006 High Capacity Manual Special Report No. 209, Transportation Research Board, 2000

Table V-2: Level of Service Criteria For Unsignalized Intersections		
Control Delay (seconds/vehicle)	Level of Service	Delay
0 – 10	A	Little or no delay
>10 – 15 sec/veh	B	Short traffic delays
>15 – 25 sec /veh	C	Acceptable traffic delays
>25 – 35 sec/veh	D	Long traffic delays
>35 – 50 sec/veh	E	Limit of tolerable traffic delays
> 50 sec/veh	F	Unacceptable traffic delay

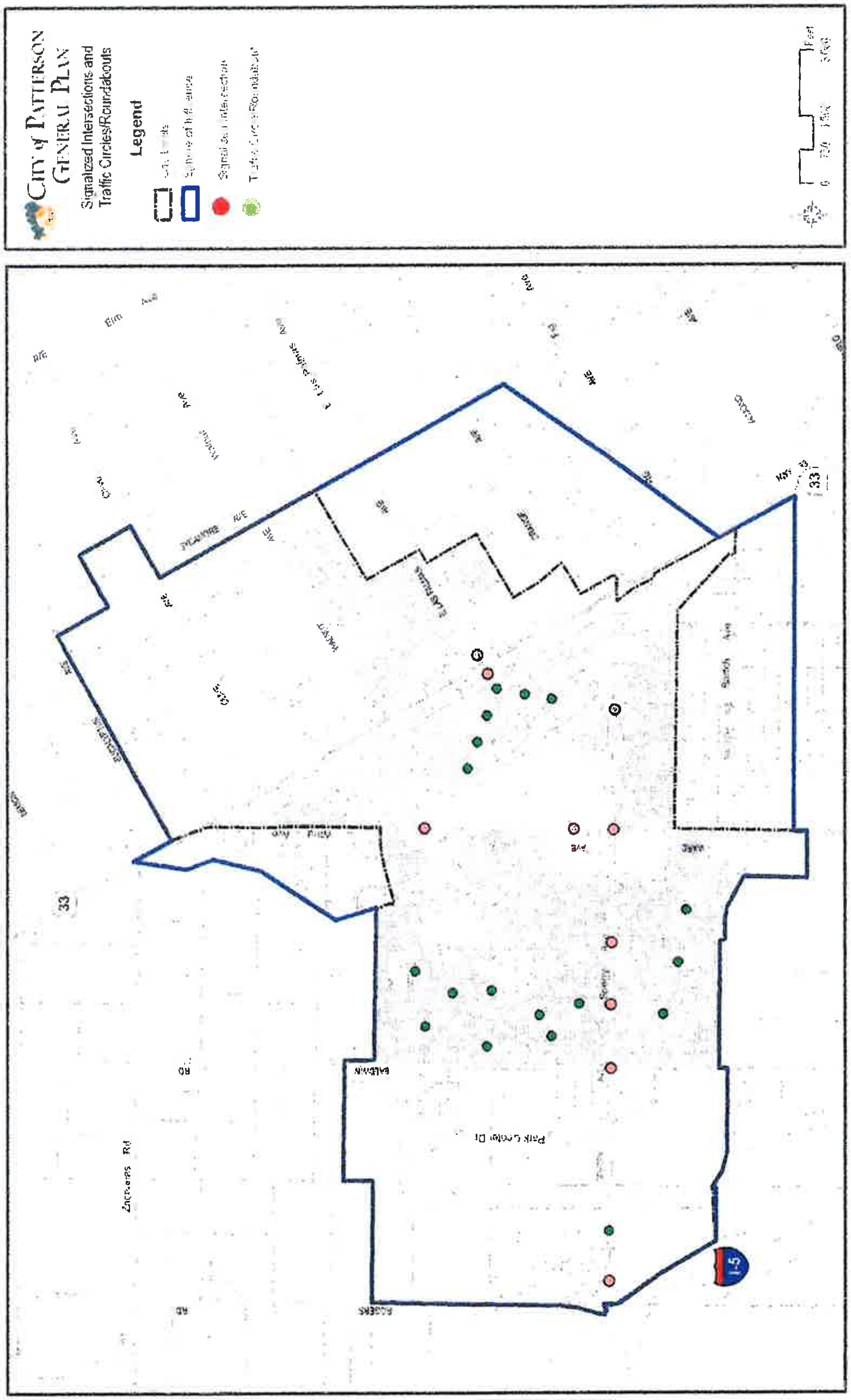
Source: TJKM, 2006 High Capacity Manual Special Report No. 209, Transportation Research Board, 2000

Traffic conditions up to Levels of Service C or D are frequently considered to be within the range of acceptable congestion or delay for urban communities. In relatively smaller communities, however, there is frequently an aversion to almost any measurable level of delay as being incompatible with the character of the community. Heavier traffic levels and congestion will usually be tolerated for short periods during special occasions or local celebrations, but not on a regular, day-to-day basis. In such cases, it is not unusual for traffic conditions of Levels of Service A or B to be cited as the worst conditions which are acceptable to local motorists.

Intersection Controls

The City has completed a number of traffic improvements since 1998 in response to urban development. Signalized intersections are shown on Figure V-6, in addition to planned signalized intersections. In addition to signals, the City has implemented a program of installing 'traffic circles' at selected intersections as shown on Figure V-7. A traffic circle controls the flow of traffic through an intersection in a clock-wise fashion in which traffic merges with other traffic entering the intersection.

Figure V-6: Existing and Planned Signalized Intersections



Traffic Volumes

Traffic volume levels on Patterson's streets range from a few hundred vehicles per day (vpd) on local service streets to 7,400 vpd on portions of East Las Palmas Avenue. The heaviest traffic volumes were recorded on Sperry Avenue at 12,600 vpd. Table V-3 summarizes levels of service measured at selected intersections in Patterson in 2006. Levels of service for selected roadway segments as measured in 2006 are provided in Table V-4. Levels of service for freeway segments are provided in Table V-5. Traffic volumes on Interstate 5 north and south of the Del Puerto Road/Sperry Avenue interchange averaged 38,500 to 41,500 vehicles per day in 2006, according to Caltrans.

Table V-3: 2009 Levels of Service for Signalized Intersections

Intersection	Existing Control	A.M.		P.M.	
		Delay	LOS	Delay	LOS
1. Sperry Ave/I-5 SB Off-Ramps	One-Way Stop	11.5	B	31.8	D
2. Sperry Ave/I-5 NB On-Ramps	One-Way Stop	10.1	B	13.4	B
3. Sperry Ave/Rogers Road	Signalized	6.9	A	6.3	A
4. Sperry Ave/Baldwin Rd	Signalized	6.0	A	5.3	A
5. Sperry Avenue/Walker Parkway	Signalized	5.3	A	5.0	A
6. Sperry Ave/American Eagle Dr	Signalized	5.3	A	5.1	A
7. Sperry Ave/Las Palmas Ave	Two-Way Stop	14.0	B	18.5	C
8. Sperry Ave/Ward Ave	Signalized	7.3	A	9.8	A
9. Sperry Ave/S Del Puerto Ave	Signalized	7.2	A	8.6	A
10. Sperry Ave/SR-33	Two-Way Stop	18.2	C	18.5	C
11. SR-33/Las Palmas Ave	Signalized	7.9	A	8.4	A
12. Ward Ave/ American Eagle Dr	Signalized	9.6	A	7.3	A
13. Ward Ave/SR-33	One-Way Stop	12.3	B	14.1	B
14. Zacharias Rd/SR-33	One-Way Stop	9.4	A	10.7	B
15. Baldwin Rd/SR-33	One-Way Stop	10.7	B	14.7	B
16. Rogers Rd/SR-33	One-Way Stop	11.9	B	13.5	B
17. SR-33/Eucalyptus	One-Way Stop	12.1	B	14.6	B
18. Olive Avenue/SR-33	Two-Way Stop	11.4	B	17.3	C
19. Walnut Avenue/M Street/SR-33	Two-Way Stop	27.2	D	28.1	D
20. Las Palmas Avenue/Sycamore Ave	All-Way Stop	19.5	C	12.9	B
21. Poplar Ave/Las Palmas Ave	One-Way Stop	15.0	B	14.1	B
22. Carpenter Rd/W Main Ave	All-Way Stop	11.8	B	12.8	B
23. Crows Landing Rd/W Main Ave	All-Way Stop	10.4	B	11.9	B

Source: TJKM, 2010

Notes: LOS = Level of Service
X = Intersection level of service
X.X = Overall intersection delay in seconds per vehicle for signalized intersections
X.X = Delay for minor movement at Unsignalized intersections

Table V-4: 2009 Levels of Service for Arterials

No.	Roadway Segment	Direction	Dir. Lanes	A.M. Peak Hour Volume (Veh.)	A.M. Peak Hour Speed (mph)	A.M. Peak Hour LOS	P.M. Peak Hour Volume (Veh.)	P.M. Peak Hour Speed (mph)	P.M. Peak Hour LOS
A	Rogers Rd, s/o Zacharias Rd	EB	1	93			104		
		WB	1	135	23.8	C	105	23.8	C
B	Sperry Ave. e/o Rogers Rd.	EB	2	255			535	29.2	B
		WB	2	445	29.3	B	279		
C	Baldwin Rd., n/o Sperry Ave.	NB	1	93			104		
		SB	1	135	23.8	C	105	23.8	C
D	Sperry Ave. e/o Ward Ave.	EB	2	255			535	29.2	B
		WB	2	445	29.3	B	279		
E	Ward Ave., n/o Las Palmas Ave.	NB	1	361	24.1	B	159		
		SB	1	338			185	24.3	B
F	Zacharias Rd, w/o SR 33	EB	1	303	27.9	C			
		WB	1				342	27.8	C
G	SR-33, n/o Zacharias Rd.	NB	1	467	25.6	D			
		SB	1				314	27.9	C
H	SR-33, s/o Walnut Ave.	NB	1	394	27.7	C			
		SB	1				444	27.6	C
I	Ward Ave., n/o Marshall Rd.	NB	1	139			127	29.6	B
		SB	1	144	29.6	B	114		
J	SR-33, s/o Sperry Ave.	NB	1	394	27.7	C			
		SB	1				444	27.6	C
N	E Las Palmas Ave., w/o Sycamore Ave.	EB	1	343	30.0	B	312		
		WB	1	337			317	30.0	B
O	Main St., e/o of Carpenter Rd.	EB	1	222			321	32.3	B
		WB	1	236	32.3	B	239		

Counts: TJKM, 2010
Source: Highway Capacity 2000- Urban Streets Analysis

Table V-5: 2008 Levels of Service for Freeways						
No.	Freeway Segment	Lanes	Capacity	Peak Hour		
				Volume	Density (pc / mi / ln)	LOS
K	I-5, n/o Sperry Ave.	4	9,200	4,650	18.7	C
L	I-5, s/o Sperry Ave.	4	9,200	5,000	20.2	C
M	I-5, s/o Fink Rd.	4	9,200	3,900	15.7	B

Counts: Caltrans 2008
Source: Highway Capacity 2000- Basic Freeway Segments Analysis

Traffic Incidents

In 2007 there were 74 reported traffic collisions within the city. This is down from the 135 reported collisions in 2006. In Table V-6 presents a tabulation of the traffic incidents reported in recent years by type of collision according to severity (fatality, injury, or non-injury), as well as DUI arrests, moving citations, license and non-moving citations, and parking citations. The table uses incident-per-thousand in population in order to show trends from 1998 to 2007.

Most incident categories seemed to have reached a high point during the years from 2000 to 2005. Although the number collisions vary with each year, they have remained relatively stable over time. The only category which seems to have steadily risen is parking citations.

Table V-6: Traffic Statistics (1998-2007)										
Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Population	10,300	10,850	11,606	12,225	13,092	13,750	14,257	16,187	19,269	20,857
Traffic Incidents Per Thousand in Population										
DUI Arrests	8.6	6.5	9.0	6.9	8.2	5.7	7.4	5.1	4.4	3.4
Collision (Injury)	1.3	2.1	1.8	2.0	2.1	2.3	1.6	2.0	0.9	1.1
Collision (Non-injury)	6.8	8.0	8.0	7.2	7.8	5.4	4.8	7.2	6.1	3.4
Collision (Fatal)	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Moving Citation	32.4	19.1	14.7	48.3	39.2	58.1	46.2	23.2	30.9	24.0
License & Non-moving Citation	50.9	39.2	31.9	44.7	41.4	62.3	84.5	70.6	72.2	59.3
Parking Citation	4.4	4.0	4.0	18.3	8.6	35.4	27.8	32.9	28.4	28.0

Source: City of Patterson, Police Department, 2008

Regional Transportation Plan

The Regional Transportation Plan is a long-range transportation plan containing a list of the regional and local transportation improvements required to provide for regional mobility in Stanislaus County, StanCOG is the regional transportation planning agency and metropolitan planning organization designated to prepare the Regional Transportation Plan (RTP). The County of Stanislaus acts as a Lead Agency for non-State Highway projects identified in the Regional Transportation Plan that are located in the unincorporated area of the County, and as Responsible Agency for State Highway projects located in the unincorporated area of the County.

The RTP is required by federal and State law to list all of the projects required to achieve the region's mobility goals, including local projects drawn from the general plans of the cities and the County. The RTP must be consistent with the applicable local general plan policies. In turn, the State's General Plan Guidelines require local general plans to coordinate with and incorporate the Regional Transportation Plan, as applicable.

As per the Direction of the Stanislaus Council of Governments Policy Board, the 2007 Regional Transportation Plan represents a continuance of the policies and project priorities of the 2004 RTP. The 2007 RTP can best be described as a minor update to its predecessor, maintaining the projects (and their accompanying priorities), while continuing to adhere to StanCOG's goals and objectives.

The preferred alternative adopted by the StanCOG Board consists of those regional transportation improvements, primarily State Highway improvements, which can be funded with State and federal transportation funds projected to be available by the year 2030.

Parking

The City completed a Downtown Parking Study in May 1989, which documented the city's parking supply, and existing and potential future demand in the downtown area. Although the study is about twenty years old, circumstances in the Downtown have not changed appreciably with respect to parking demand and many of the findings remain valid at the time of this writing:

- In 1989 there was a total of 601 parking spaces downtown, with an additional 68 spaces on the outer curb of El Circulo at the fringe of downtown, for a total of 669 spaces available to serve the parking demands of downtown.

- Of the 669 total spaces, 417 are on-street spaces and 252 are off-street spaces. Of the off-street spaces, 48 are marked for private use and 204 are available for customer use.

- Of the on-street spaces, most do not have time limits; only 44 spaces do have time limits (40 at two-hour limits. 2 at 30-minute limits, and 2 at 15-minute limits).

- The peak number of spaces occupied as observed during the study was 382, at approximately 57 percent of the available parking spaces. Maximum parking space occupancy occurred between noon and 1 p.m. When the maximum spaces occupied in each block at any time of the day (not necessarily at the same time) was considered, the maximum spaces occupied in downtown totaled 402 spaces, or about 63 percent of available spaces.

- The average length of time a vehicle parked was 1.8 hours in on-street spaces. and an average of

- About two vehicles used each space between 9 a.m. and 5 p.m. Overall, spaces downtown were occupied 48 percent of the time.

- Portions of downtown experienced much higher than average parking demands and occupancy levels. These areas include most of the southern portion of downtown, most of the on-street spaces along both sides of El Circulo (except between Salado and North Third), and most of the spaces on the outer side of the Plaza.

- Parking demand downtown could increase significantly if new development is allowed to occur without providing on-site parking to meet its parking demands.

- At theoretical parking demand levels, occupancy of presently vacant or underutilized floor space downtown could increase parking demand by approximately 95 spaces. Development of presently vacant parcels could increase parking demand by approximately 445 spaces. Redevelopment of certain parcels could increase parking demand by approximately 1.35 spaces.

- At theoretical demand levels, there could be a deficit in parking supply downtown by approximately 430 spaces.

Parking space deficits could be eased by implementing one or more of the following strategies:

- Require new development to provide on-site parking adequate to accommodate the added parking demands it will generate;\

- Develop one or more of the presently vacant parcels as a public parking lot(s) and allow the remaining vacant parcels to develop without on-site parking;

- Develop one or more of the presently vacant parcels as a public parking lot(s) and allow the remaining vacant parcels to develop with on-site parking;

The following changes to parking supply and demand have occurred since 1989:

- In 2004, the City acquired a vacant parcel on the north side of W. Las Palmas between El Circulo and Plaza Streets which was developed with a public parking lot consisting of 28 spaces.

- The City constructed a new city hall on the property bounded by W. Las Palmas, Plaza and Del Puerto.

- In October, 2002, the City adopted the City of Patterson Community Design Guidelines and Downtown Physical Design Plan which sets forth a vision for the revitalization of the Downtown. The Downtown Plan estimates future demand for parking could exceed the available supply by as much as 500 spaces, and identifies two potential sites for additional parking. One site is on the west side of Salado Avenue between Plaza and El Circulo and the other on Third Street between Plaza and El Circulo. Together these parcels could support 53 surface spaces or up to 150 spaces in multi-level parking structures.

Existing and Potential Problem Areas

The City has experienced unprecedented levels of urban development since 1998, accompanied by significant increases in motor vehicle traffic. To accommodate new development while maintaining the desired level of service, the City has implemented an ongoing program of traffic monitoring and the installation of improvements to the City's roadway system. Appendix V-1 lists the roadway and intersection improvements programmed for installation to accommodate existing plus future traffic through the year 2030, based on development accommodated by the 1992 General Plan and the growth in regional traffic.

In addition to improvements programmed for the coming years, the City has taken the lead in addressing the traffic issues identified in the 1992 General Plan. For example the City has:

- Constructed traffic circles at the following intersections:
  - Del Puerto and First Street
  - Del Puerto and El Circulo
  - N. Salado and El Circulo
  - N. Salad and First Street
  - N. Salado and J Street

- Established a plan line for an east-west bypass that extends Sperry Avenue east to E. Las Palmas and Sycamore Avenue;

- Implemented the re-alignment of M Street at Second Street;

- In conjunction with the County, implemented the widening of Sperry Avenue between Baldwin Road and the I-5 Interchange, and the widening of the bridge over the Delta Mendota Canal.

Notwithstanding the improvements identified in 2006, there remain several areas within the city's circulation system with the potential for future traffic problems. These include:

- Traffic operations and safety within the Plaza traffic circle;

- At grade crossings of the railroad tracks will become more problematic in the future with additional urban development on the east side of the City combined with a potential increase in train traffic;

- The I-5/Sperry Avenue interchange is expected to be operating at a less than acceptable level of service in the near future. Caltrans has prepared a Project Study Report with associated costs for improvements to the interchange and these costs are incorporated into the City's development impact fees for traffic;

- While there appears to be adequate parking supply overall to accommodate the existing parking demand, there are some areas where peak demand has resulted in a perception of parking and safety problems. Future development will need to include the provision of enough parking spaces to adequately accommodate its parking demands, so that the existing parking conditions are not aggravated.

- In recent years there has been informal discussion regarding the need for an east-west expressway to connect the I-5 freeway to areas east of Patterson. The most often cited connection would be to wrap around the north side of the City between E. Las Palmas and the I-5 freeway to a new interchange at Zacharias Road. While the need for another interchange and its location has not been the subject of formal analysis, preliminary discussions have taken place between the City and the County. Continued development in the City and cities to the east may necessitate a more in-depth analysis of the need for this roadway and where it might be located.

Bicycle Circulation

In 2001, the City adopted a Bicycle Transportation Master Plan (Master Plan) as an amendment to the Circulation Element of the Patterson General Plan. The Master Plan sets goals and funding options for bicycle transportation improvements for the City's 1992 General Plan area, and is intended to integrate with, and complement, the Regional Bicycle Transportation Master Plan prepared by Stanislaus County.

The Master Plan designates bicycle circulation routes in accordance with the following definitions set forth by the California Motor Vehicle Code:

> Class I - A bike path or Class I Bikeway is a separate off-road bikeway that runs within its own right of way and does not share a road or street right of way with other vehicles. Bike paths are intended for the exclusive use of bicyclists, although they are sometimes used by pedestrians and others.
>
> Class II - A bike lane or Class II Bikeway is a bikeway that lies within the paved area of a road or street and shares the roadway with motor vehicles. Bike lanes are delineated by stripes and provide preferred but not exclusive use to bicycles.
>
> Class III - A bike route or Class III bikeway is a bikeway that shares the roadway with motor vehicles. A bike route provides signs but no stripes.

The Master Plan is depicted by Figure V-7.

Public Transit

Intercity bus service is provided by Greyhound Bus Lines, with a terminal in Modesto. In addition, the Altamont Commuter Express connects Stockton with San Jose (and points in between) with morning and evening train service. The nearest station to Patterson is in the City of Tracy.

The Patterson Dial-a-Ride, operated by Stanislaus Regional Transit provides door to door intra-city service within the City only. The Newman Dial-a-ride connects Patterson with the cities of Newman and Gustine to the south.

Stanislaus Regional Transit operates fixed-route transit service within the County. Route 45 connects Gustine, Newman and Patterson with the City of Turlock, where connections can be made to Modesto on Route 10.

No taxi service is presently available in Patterson.

Air Service

Patterson Airport

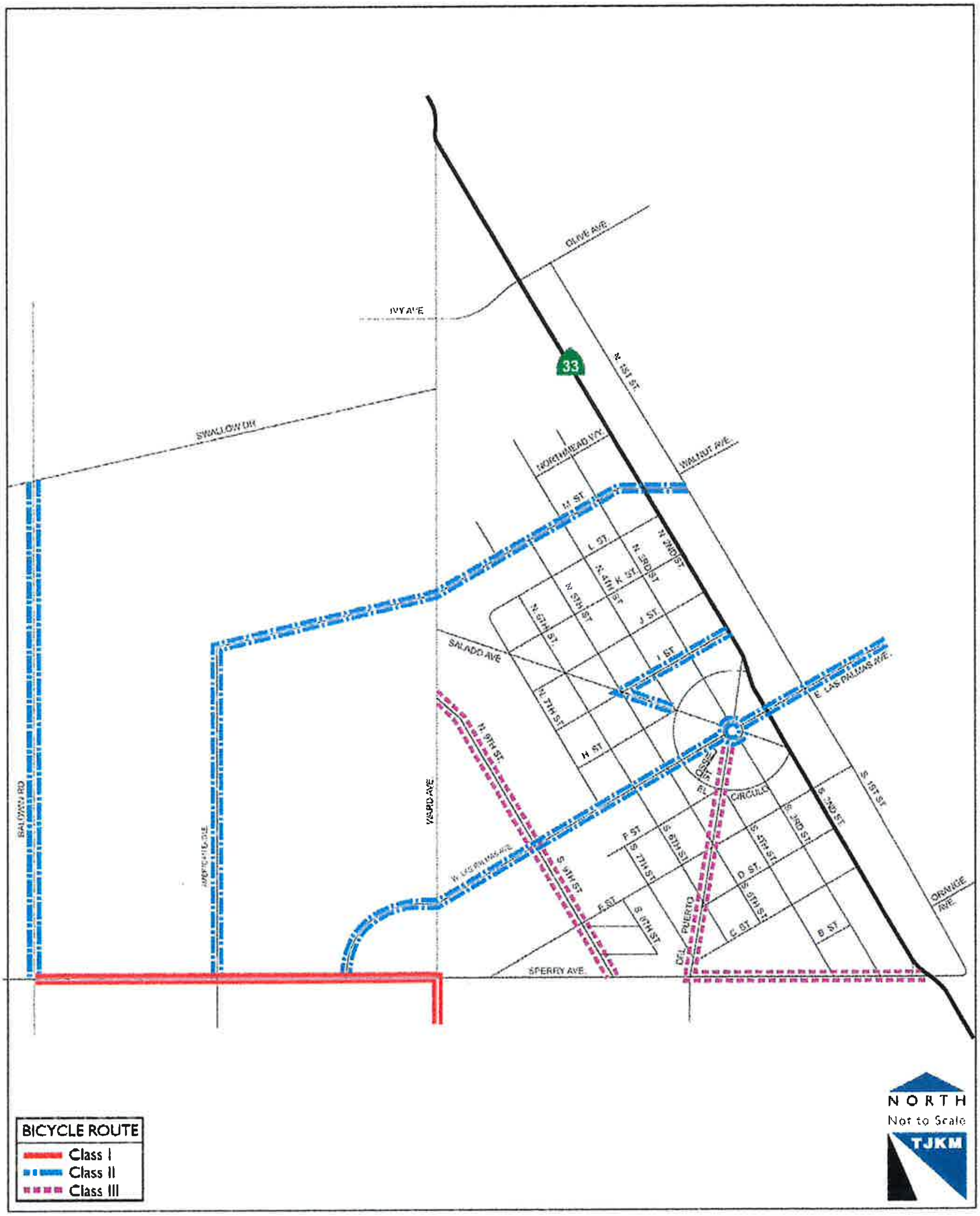
Patterson Airport is a private airport located on tile north side of Sperry Road immediately east of the Delta-Mendota Canal, with services available to the public. The airport includes one 2.500 by 75 foot north-south runway, of which the northern 665 feet is paved. The airport is an uncontrolled airway with no control tower. It is limited to crop dusting operations.

Crows Landing Auxiliary Naval Landing Field

The Crows Landing Naval Air Station is located about two miles northwest of the town of Crows Landing and about one mile south of the Patterson's southern city limits (see Figure I-10). Crows Landing previously functioned as an auxiliary landing field for operations from Moffett Field, Lemoore Naval Air Station, Alameda Naval Air Station, Castle Air Force Base, the Air National Guard, and the National Aeronautics and Space Administration (NASA). Crows Landing served as an important training and testing facility for the air operations of other air stations impacted by their volumes of air traffic or by urban encroachment.

Facilities include two concrete-paved runways in an "X" configuration. Operations and personnel support facilities occupy about 30 acres of the station's total of 1.528 acres. Historically, operations at Crows Landing were primarily training and air field practice of experienced pilots. Most of the operations occurred Monday through Friday during day hours, although the air field occasionally operated weekend and nighttime flights. Most aircraft were light jet or multi-engine jet airplanes. Large planes, such as the KC135 Tanker and Weather Reconnaissance aircraft, were flown about six to seven

Figure V-7: Bicycle Master Plan



times a year. Annual operations for 1987 were approximately 30,000 to 33,000 take-offs and landings over a 255-day flight year (excludes most weekends and holidays). Crows Landing averages six night operations a year.

Stanislaus County began efforts to acquire the property in 1989. President Clinton approved the transfer in 1999, and county and federal officials finalized the details in 2004. In 2007 the County entered into negotiations with a private developer to re-develop the airfield with an industrial park mixed-use development.

Commercial Air Service

Commercial air service is available to residents of the Planning Area via Modesto City-County Airport (Harry Sham Field), approximately 16 miles east of Patterson. The current (2007) commercial carrier is United Express with service to Los Angeles and San Francisco.

Stockton Airport is located about 30 miles northeast of Patterson. In 2006 Allegiant Air began non-stop service from Stockton to Las Vegas five times per week.

Aeromexico Airlines has committed to providing service between Stockton Metropolitan Airport and Guadalajara and Morelia, Mexico when a Federal Inspection Station is built and approved by the Bureau of Customs and Border Protection. It is anticipated service will begin in the fall of 2007.

Rail Service

The Southern Pacific Railroad line runs through Patterson, adjacent to Highway 33. The line runs north to Tracy, and south to Fresno, with multiple rail connections. Southern Pacific Transportation Company operates freight trains along this line. An average of one to two trains daily pass through Patterson.

An AMTRAK passenger train station is located in Denair, about 20 miles east of Patterson. Trains run multiple times per day. Major destinations include Merced, Fresno, and Bakersfield to the south (with bus and train connections to Los Angeles from Bakersfield) and Stockton, Antioch, Martinez, and Oakland to the north.

Findings

- Patterson's street system has a number of man-made and natural barriers to the orderly and efficient development of a local circulation system. These obstacles include:

- The difficulty and cost of widening streets in areas of existing development;
- The limited alternatives for effectively increasing the north-south and east-west traffic-carrying capacity of the street network;
- The difficulty and cost of making street extensions and connections is a result of barriers, such as the railroad and canals; and
- The lack of adequate, undeveloped sites for additional public parking facilities in areas of highest existing and future parking demands.

- Existing daily traffic volumes are generally within the traffic-carrying capacity of Patterson's streets.

- The City has implemented a program of traffic monitoring and improvements to maintain the desired level of service as new urban development occurs.

- Potential future problems with traffic operations and safety exist at the Plaza traffic circle and for roadways that cross the railroad tracks.

- There is a need for a new interchange with Interstate 5 to the north of the City, and an east-west connector to provide additional access to the freeway for residents to the east of Patterson and an alternate route for truck traffic.

- Public transportation in Patterson is provided by Stanislaus Regional Transit and Westside Dial-A-Ride. Additional intercity bus service is available to Patterson residents by Greyhound, with a station located in Modesto.

- Patterson Airport is a private airport located in the Planning Area which is limited to crop spraying operations. Modesto and Stockton Airports provide the nearest passenger air transportation for Patterson residents.

- The Crows Landing Naval Auxiliary Field south of Patterson was acquired by the County in 2004 and is planned for a mixed-use industrial/business park.

- The Southern Pacific railroad line runs through Patterson. Approximately one to two freight trains pass through Patterson daily. Patterson residents have access to AMTRAK passenger trains from a station in Denair.

Bibliography

Association of Governments, Stanislaus County Regional Expressway Study, prepared by Fehr & Peers Associates, March 1990 Stanislaus County,

California Department of Transportation. 1987 Traffic Volumes 011 California State Highways. 1987.

California Highway Patrol, 1985. 1986, and 1987. Trip Generation -Fourth Edition, Institute of Transportation Engineers, 1987. Stanislaus Area

City of Patterson, Downtown Parking Study, May 25. 1989.

Economic Development Corporation, Patterson Community Assessment, May 1987

General Plan Support Documents, 1987. Stanislaus County Airport Land Use Commission. Airport Land Use Commission Plan, 1978. Stanislaus County

Highway Capacity Manual. 3rd Edition. (TRB Special Report 209),

Transportation Research Board of the National Research Council, 1985.

Statewide Integrated Traffic Records System (SWITRS) Traffic Collision Report for the City of Patterson.

Glossary

ADT - Average daily traffic volumes

Caltrans - Califomia Department of Transportation

Level of Service - An indication of the peak hour traffic conditions which are experienced on a given street with the particular traffic-carrying capacity of the street and a given amount of traffic using the street; this is typically defined by a range of volume to capacity ratios, designated by the alphabetic characters A, B, C, D, E, and F.

Right-of-Way - The width of publicly-dedicated streets, including the pavement, sidewalks, and planting area; the width of publicly-owned property for public projects.

Roadway Capacity - The maximum amount of traffic which a street can carry in a given amount of time without reaching unstable (or forced low) traffic conditions. Usually expressed as "vehicles per hour."

SAAG - Stanislaus Area Association of Governments, a regional planning agency which addresses transportation problems and other issues.

Volume to Capacity Ratio - The ratio of the volume of traffic carried by street to the street's traffic-carrying capacity: used to determine the applicable level of service for a street at a given traffic volume level; abbreviated as vie.

VI. Public Services & Facilities

Introduction

City development is dependent on a complicated network of public facilities and services. Each type of service has a unique set of constraints and must adapt to growth and change differently. This chapter focuses primarily on water, sewage collection and treatment, drainage, schools, fire protection, and law enforcement, describing the various systems and their capacities and discussing their implications for the general plan.

Transportation facilities and services are discussed separately in Chapter V and parks and recreational facilities are discussed in Chapter VII.

General Government

Patterson is a general law city operating under a council/manager form of government. The City Council includes the Mayor, who is directly elected to a two-year term, and four city council members, who are elected at-large for staggered four-year terms. The City has created four advisory commissions and committees with specific decision making responsibilities.

Planning Commission - This five-member body is appointed by the City Council and advises that body on land use and zoning matters.

Parks and Recreation Commission - This five-member body is appointed jointly by the City Council and the Patterson Unified School District and advises the City Council on the development and operation of park and recreational facilities and on the management of recreation programs.

Economic Strategic Commission - The ESC is a five member body aimed at improving and maintaining the local economy and maintaining a climate conducive to conducting business.

Senior Center Board of Directors - This five-member board manages the operation of the City's Senior Center and advises the City Council regarding programs and activities aimed at the City's senior population.

The administration of the City is organized into several departments which are directed by the City Manager: Community Development (which includes planning and building), Recreation, Public Works/Engineering, Utilities, City Clerk, Police, and Fire. The City's organizational structure is shown in Figure VI-1.

City operations are concentrated in two facilities. The fire and police stations operate out of the original city hall building at 344 West Las Palmas

Avenue. The City's administrative offices are located in City Hall at 1 Plaza Street. The City collects fees from new development for the construction of new city facilities. The City's corporation yard is located on South 4th Street at B Street. Figure VI-2 shows the location of these and other public and quasi-public facilities.

Figure VI-1: City Organization Chart

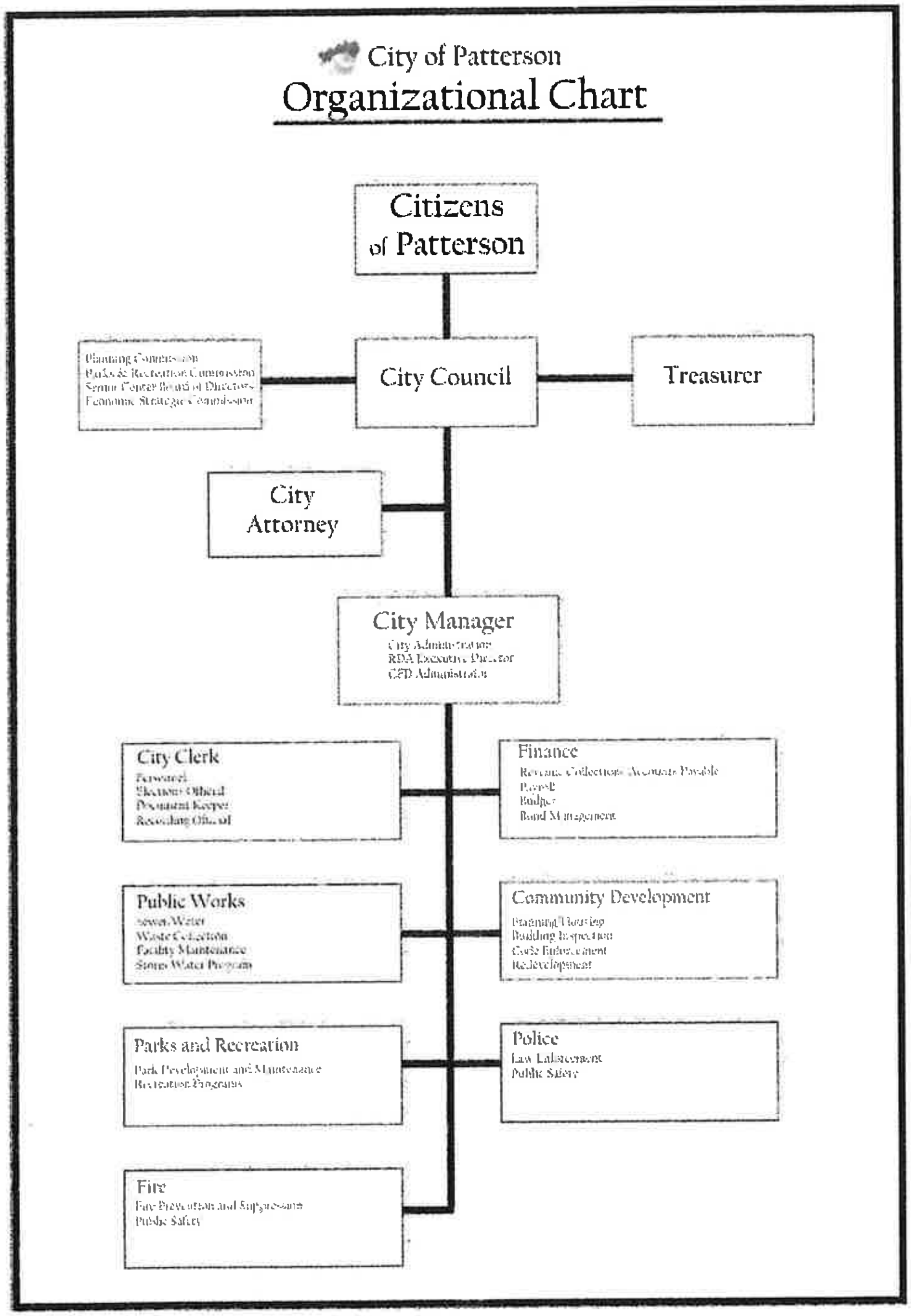
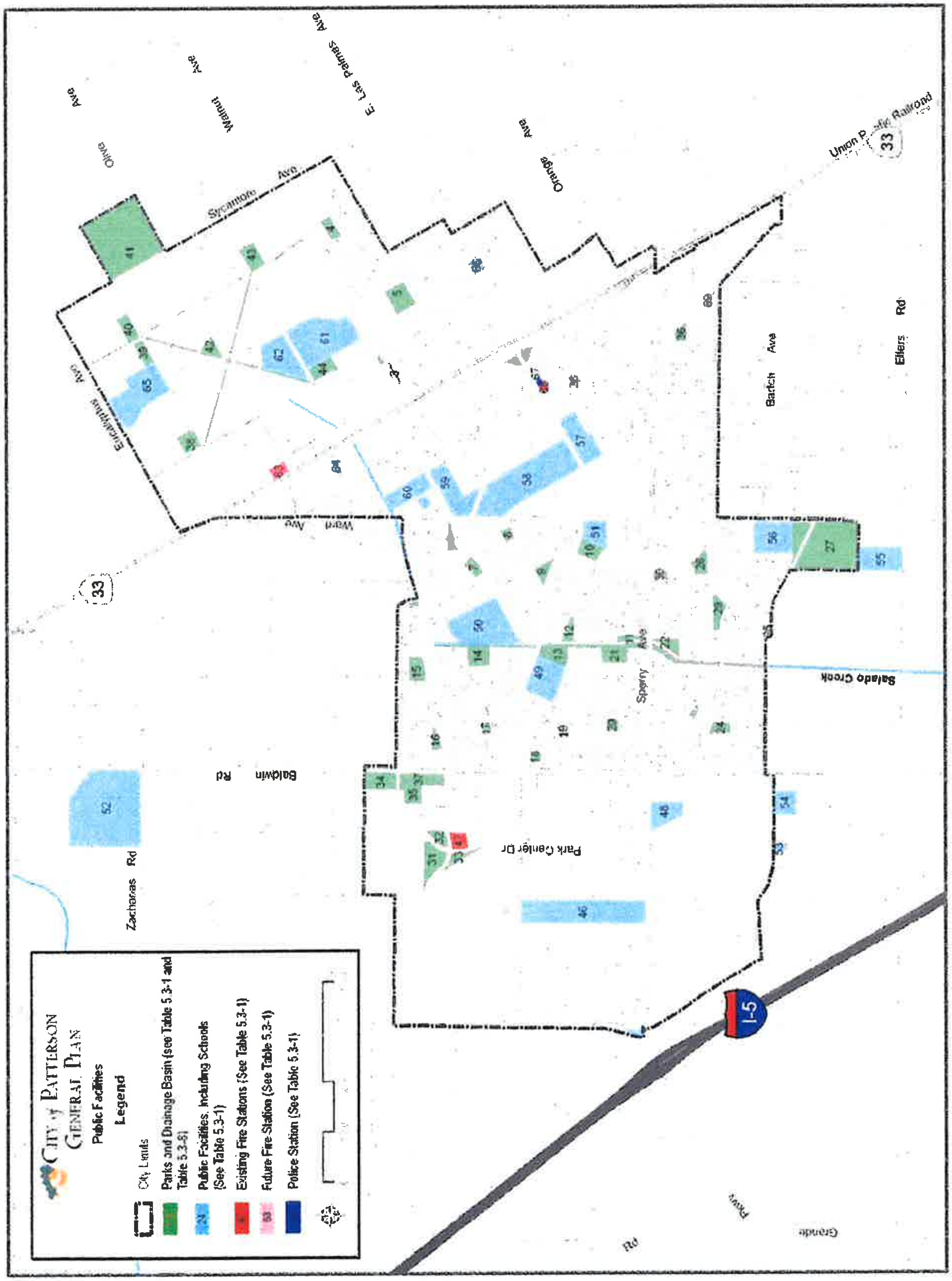


Figure VI-2 Public Services



Water Service

Four water purveyors provide water to portions of the Study Area: the City of Patterson, the Patterson Irrigation District (PID), West Stanislaus Irrigation District (WSID) and the Del Puerto Water District (DPWD). Currently, land located west of the California Aqueduct within the Study Area does not fall within the service area of any water provider and is irrigated with private wells. In addition, the service areas of two irrigation districts overlap with the water service area of the City: DPWD near Interstate 5, and PID in a large triangular parcel located at the northeast corner of Sperry Avenue and Ward Avenue. Figure VI-3 shows each district's boundaries in comparison with the Study Area boundaries. Table VI-1 provides a summary of the total acreage within the Study Area served by each water purveyor and the corresponding water allocations for these areas.

Table VI-1: Water Purveyors Serving the General Plan Study Area, And Corresponding Acreage

Water Purveyor	Acres Within the General Plan Study Area	Acre Feet of Water Supplies Allocated To These Areas
Del Puerto Water District	2,761	7,536
West Stanislaus Irrigation District	1,807	9,589
Patterson Irrigation District	3,195	15,975
City of Patterson	3,820	8,300
Areas Not Within A Water Service Area[1]	1,185	--
Total:	12,768	41,400

Source: Stanislaus Local Agency Formation Commission and CMCA, 2010

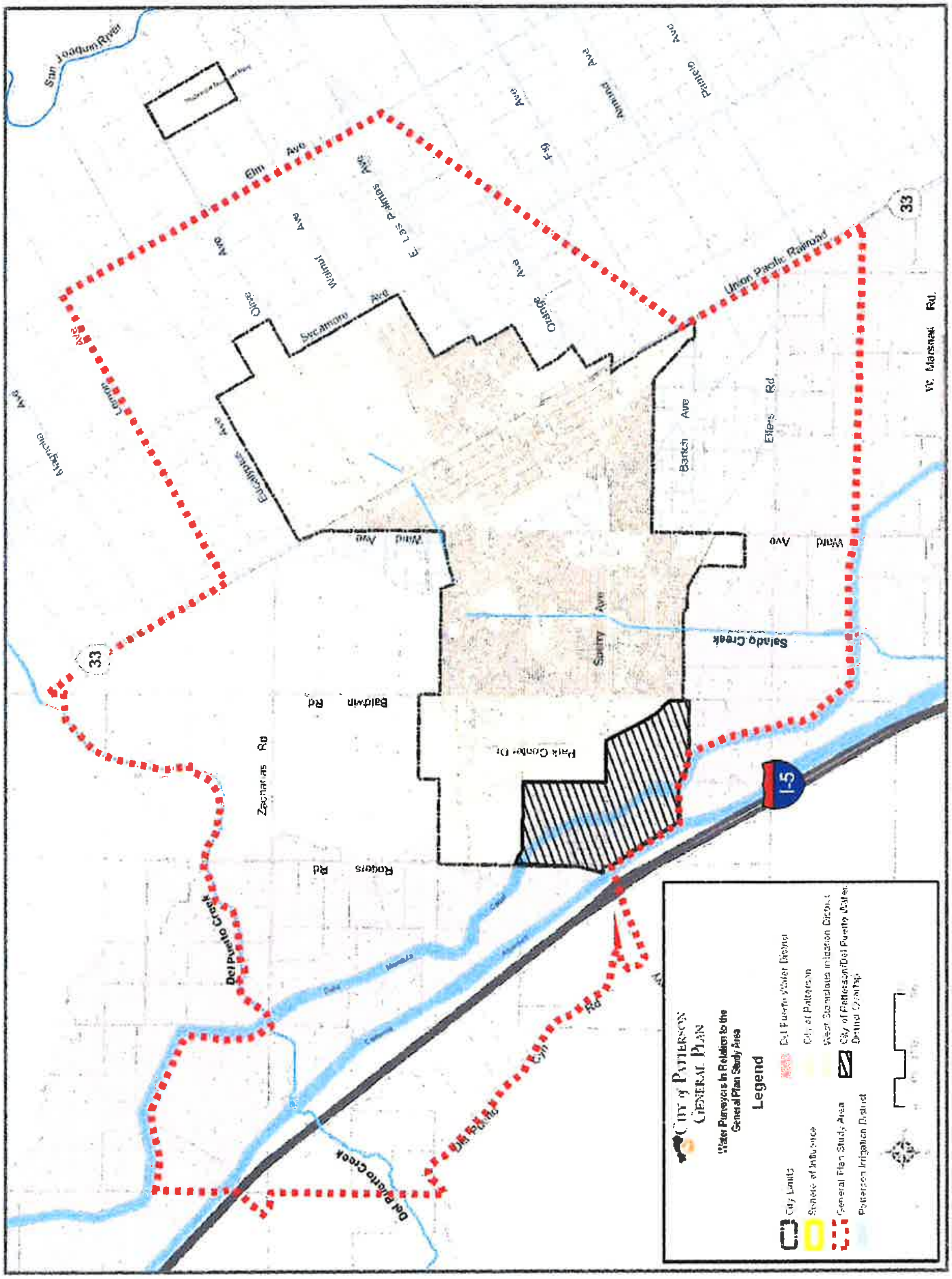
Notes:
1. Includes properties not within the service area of water purveyor as well as freeway right-of-way.

City of Patterson

The City supplies potable groundwater for residential, industrial, and commercial uses through a combination of groundwater wells, storage tanks, and network of piping. Each water service is equipped with a water meter for accounting and billing. The City is responsible for operating and maintaining the water system up to the water meter. Water meters for residential services range from 5/8" to 1" in diameter. Commercial services are typically 1" or greater, depending on the type of use. The largest connection is 6" in diameter.

Municipal and industrial water use includes metered and un-metered connections, although very few connections are not metered. All new connections made to the water system are required to be metered. The City does not separately track different types of water use sectors (e.g. residential, commercial, industrial, landscaping, etc.), so projections of future demands are based on per capita use. These values account for commercial, industrial, common property landscaping (e.g. parks), construction water, and unaccounted for losses.

Figure VI-3: Water Purveyors Serving the Study Area



Historical water demand expressed in terms of groundwater production and deliveries to customers is summarized in Table VI-2. The City operates nine (9) wells with a total capacity of 9,600 gallons per minute, with a projected production of about 7,500 AFY. The wells currently (2010) produce a combined 5,000 AFY[1]. However, as discussed above, the local groundwater basin has production limitations, and for purposes of water supply planning it is estimated that an average of 8,300 acre feet/year of groundwater is available for City use[2]. Although previous studies have indicated as much as 11,500 acre-feet/year is readily available from natural recharge[3], due to competing users of local groundwater, additional groundwater use by the City beyond its projected production capacity of 7,500 acre feet/year may require artificial recharge of supplementary sources through spreading basins or direct injection.

Table VI-2: Historical Groundwater Production, City of Patterson 2005 to 2009 (acre-feet per year)

Year	2005	2006	2007	2008	2009
Total Groundwater Production	3,502	3,750	3,272	4,401	3,836

Del Puerto Water District (DPWD)

Del Puerto Water District (DPWD) was formed in 1947, and is located on the west side of the City generally west of Rogers Road and east of the California Aqueduct. In 1995, the district reorganized and consolidated with ten other districts, increasing its size to approximately 47,400 acres. The district area is about 50 miles long, but is relatively narrow since it stays within 2 miles of the DMC footprint. The district boundaries span Stanislaus, San Joaquin, and Merced Counties. DPWD is governed by property owners within the district.

The district receives CVP water directly through turnouts on the Delta-Mendota Canal. DPWD does not have any distribution facilities and does not own any pumps, pipelines, or canals to transport the CVP supply. All turnouts, pumps, pipelines, and canals in the district are privately owned, maintained, and operated. The DPWD recently received a federal grant to install 20 wells within their service area to augment surface water supplies. They are also working on an agreement with the city of Modesto for the use of recycled water.

[1] The H2O Group 2010, page 3-6.

[2] Net long-term use of 8,300 ac-ft/yr based on current use, development of groundwater pumping facilities, and previous groundwater studies. Groundwater use may vary year-to-year based on water year type, surface water availability, etc.

[3] Groundwater Pump Tests conducted 2006, Ken Schmidt & Associates, Groundwater Consultants, Fresno, Ca. H20 Group

In 1953, DPWD signed a long-term contract[4] with the Bureau of Reclamation for 10,000 acre-feet of CVP water. After the 1995 consolidation, the water service contracts of the other ten districts were assigned to Del Puerto Water District and were renegotiated as a single contract, bringing its total CVP service contract entitlements to 140,210 acre-feet. DPWD water can be used for irrigation or municipal and industrial (M&I) uses, however, only 20 acre-feet are classified at M&I[5]. A long-term renewal contract was executed on February 25, 2005, and is in effect for 25 years.

As shown in Table VI-1, approximately 2,761 acres of land within the Study Area lies within the DPWD.

Patterson Irrigation District (PID)

The Patterson Irrigation District (PID) consists of approximately 13,500 acres, that borders the City to the east. The district was formed in 1955 originally as the Patterson Water District, but later changed its name. PID has 425 landowners, and over 600 water users. PID maintains several miles of lined and unlined canals, pumps, and small storage basins for distribution of water to its users.

PID relies on multiple sources of water to serve its customers:

- Central Valley Project water from the Delta Mendota Canal
- Groundwater
- Pre-1914 water rights to the San Joaquin River, and
- A drainage reclamation and groundwater recharge program.

PID has an agreement with the Bureau of Reclamation for 6,000 acre-feet of exchange, or replacement water. In 1967, PID entered into a long-term contract with the Bureau for 16,500 acre-feet of Central Valley Project water[6]. According to the Bureau, 1,000 acre-feet of this water is classified as M&I water[7]. A long-term renewal contract[8] was executed on March 9, 2005, and is in effect for 25 years.

Due to multiple water rights, PID has a reliable water supply program capable of meeting most or all demands under all water year scenarios. As shown on Table VI-2, about 3,195 acres of the Study Area fall within the PID service area.

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[4] Contract 14-06-200-922

[5] Per discussions of 1/30/06 with William Harrison, General Manager, DPWD.

[6] Contract 14-06-200-3598A, executed 12/18/67.

[7] Based on classification of water prior to release of the BOR 1995 draft "M&I Water Shortage Policy", thereby subject to lesser reductions during dry periods as compared to irrigation water.

[8] Contract No. 14-06-200-3598A-LTR1

The District is governed by voters residing within the district boundary. In 1999 the PID switched from a being a water district to an irrigation district to enable the District to provide electrical power to customers and to extend the delivery of water outside district boundaries.

West Stanislaus Irrigation District (WSID)

West Stanislaus Irrigation District (WSID) is located north of the City between the boundaries of the Patterson Irrigation District and the Del Puerto Water District. WSID was formed in 1920, with the first water deliveries made in 1929. The current size of the district is 24,800 acres, but only a portion (19,700 acres) is irrigated. WSID has a distribution system of lined canals and laterals to distribute water. The main canal carries water supplied by six pumping plants.

WSID relies on multiple sources of water that include:

- Central Valley Project water from the Delta Mendota Canal;
- Groundwater; and
- State rights to water from the San Joaquin River.

In 1953, WSID signed a long-term contract with the Bureau of Reclamation for 20,000 acre-feet of CVP service contract water[9]. The contract amount was increased to 50,000 acre-feet in 1976. The contract has no provisions for M&I use. The contract expired in 1994, but a series of interim renewal contracts have been executed since that time. A long-term renewal contract[10] was executed on February 25, 2005, and is in effect for 25 years.

About 1,807 acres of land within the Study Area falls within the service area of the WSID, as shown on Table VI-1. As with the PID, WSID is governed by registered voters within the district.

Existing City Water Supplies

The City of Patterson has historically satisfied all of its demand for water from the underlying groundwater basin. The City lies within the Delta-Mendota Groundwater Subbasin ("the Subbasin"), as defined by the California Department of Water Resources (DWR)[11].The Basin covers about 747,000 acres extending along the western side of the San Joaquin Valley between the San Joaquin River and the western edge of the Valley alluvium, from the Stanislaus/San Joaquin County line through Stanislaus and Merced Counties into Fresno County to the boundary of the Westlands Water District south of the City of Firebaugh. A regional Groundwater Management Plan prepared by the San Luis and Delta Mendota Water Authority (SLDMWA) identified three sub-basins – a Northern Sub-basin, a

[9] Contract 14-06-200-1072

[10] Contract No. 14-06-200-1072-LTR1

[11] California Department of Water Resources, Bulletin 118, San Joaquin Valley Groundwater Basin Delta-
Mendota Subbasin, updated 1/20/06.

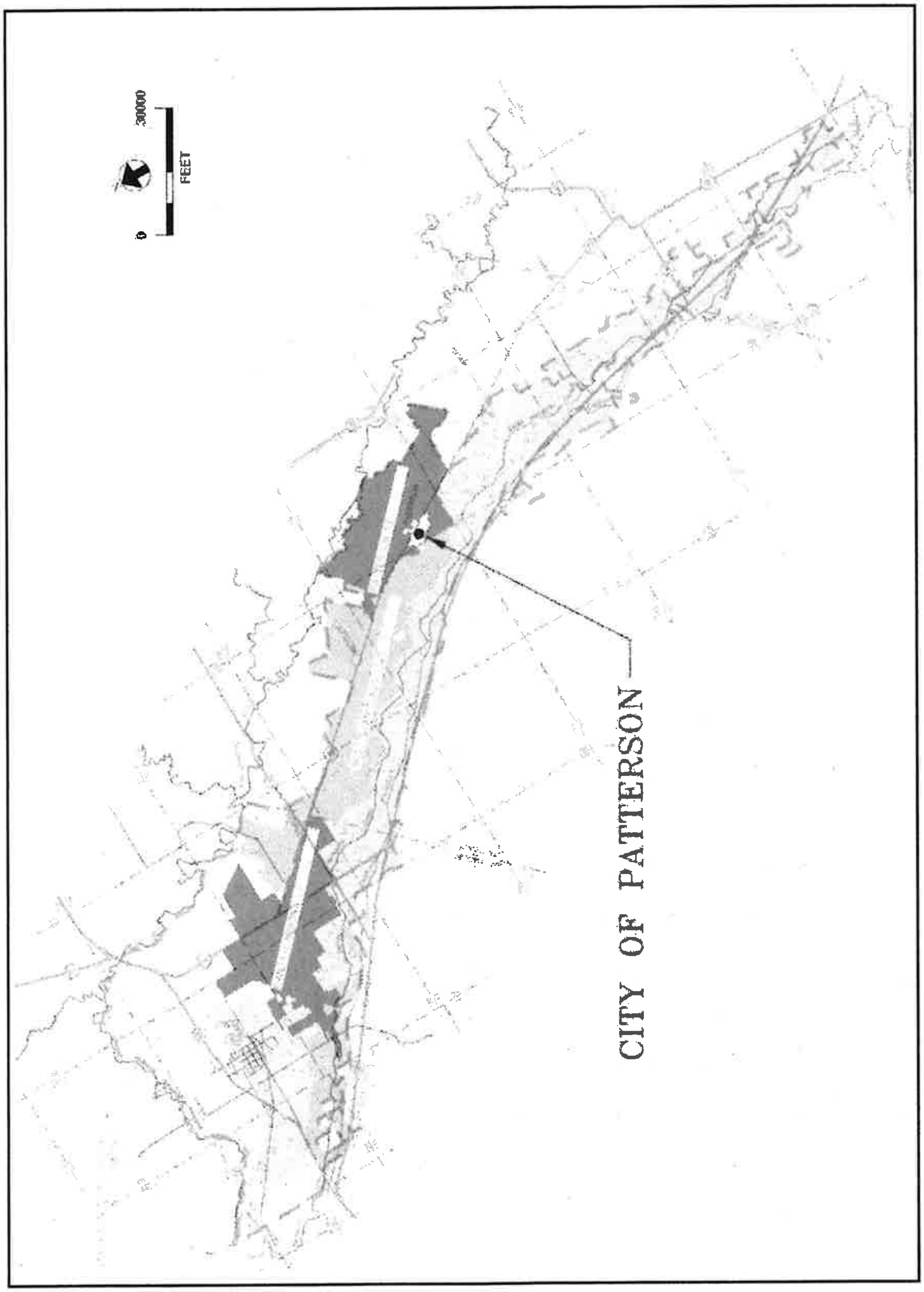
Central Sub-basin, and a Southern Sub-basin[12]. As shown in Figure VI-4, the City of Patterson is located in the Northern Sub-basin.

In the vicinity of the City, groundwater is found in a shallow unconfined aquifer and a deeper confined aquifer, hydraulically separated by a thick layer of fine-textured soils known as Corcoran Clay. The depth from the surface to the bottom of the Corcoran Clay layer varies from approximately 100 feet west of the City near I-5 to 350 feet east of the City[13]. The confined aquifer lying below that depth is the primary source of the City's water supply, as discussed further below. The shallow aquifer supplies groundwater to some existing agricultural water users as well as for various domestic wells. A substantial component of the recharge to the shallow aquifer is believed to be percolation from applied irrigation water. The confined aquifer is recharged primarily by lateral inflow from the south and southeast.

In 1995 the San Luis and Delta-Mendota Water Authority (SLDMWA) prepared a regional groundwater management plan (GMP) to assess the condition of the Delta-Mendota Groundwater Sub-Basin. Although the City of Patterson was not a participant in the plan, it included detailed information about the Northern Sub-Basin that underlies the City[14]. The GMP analyzed the sustainable yield of the sub-basin based on basin-wide groundwater pumping during an eight-year study period, and accounted for impacts to the groundwater basin associated with the of export of water through the Delta-Mendota Canal. Based on this analysis, the GMP found that the northern portion of the sub-basin was in a hydrologically balanced condition during the 8-year study period, meaning that withdrawals from the basin are roughly balanced with the amount of water being recharged. The GMP projected that under normal rainfall conditions there would be a net annual increase in water storage of about 35,000 acre-feet[15]. The outflow from the groundwater basin to the San Joaquin River varied annually between about 73,000 AF per year to 185,000 AF per year. This suggests that an increase in pumping of more than 35,000 AF per year could occur without causing an overdraft condition.

[12] City of Patterson, 2000 Urban Water Management Plan, 2002, p. 14
[13] City of Patterson, Final Environmental Impact Report for West Patterson Projects, 2003, p. III.I.11
[14] H2O Group WSA, July 2006, p. 9.
[15] One acre-foot is equal to 325,851 gallons.

Figure VI-4: Sub-Basins of the Delta Mendota Groundwater Basin



Recent studies have confirmed that groundwater in the vicinity of the City is not overdrafted[16]. In 2002 the City undertook a study of the groundwater basin in the vicinity of the City as part of the City's 2002 Urban Water Management Plan[17]. That study revealed a total of at least 80,000 AF of water in the aquifer underlying the City and that 30,000 to 50,000 AF of this water was estimated to be of suitable water quality for municipal and industrial uses. The 2002 study estimated annual recharge to be about 9,300 AF to both aquifers (the confined aquifer and the shallow aquifer), not including seepage from irrigation and Salado and Del Puerto Creeks.

In 2006, to better understand the sustainability of groundwater for future planning, a 6-day aquifer test was conducted[18]. The test showed that recharge is substantially higher than previously estimated, approximately 11,500 AF per year (8,300 AF to the confined aquifer[19] and 3,200 AF to the shallow aquifer[20]). This suggests that the total sustainable production from the lower aquifer alone could be as high as 8,000 AF per year. The test also showed that:

- No significant downward leakage occurs between the upper and lower aquifers.
- Groundwater flow is in a northwesterly direction, as opposed to a northeasterly direction as previously suspected.

This updated information indicates that the safe yield of the lower aquifer is somewhat higher than shown in previous studies. The study also suggests that recharge of the lower aquifer is from the southeast, which could be beneficial for recharge and water quality. And lastly, minimal leakage between the upper and lower aquifers suggests that the City could pump more water from the lower aquifer without impacting private, shallow wells. Table VI-3 summarizes key attributes of the groundwater basin underlying the City.

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[16] These studies are discussed in Appendix D to the 2000 Urban Water Management Plan
[17] City of Patterson, 2000 Urban Water Management Plan, 2002, p. 14.
[18] H20 Group, WSA, July 2006, p. 11.
[19] Kenneth Schmidt and Associates, Groundwater Hydrology Test Report, prepared for The H20 Group,
April 4, 2006, Appendix C to the City of Patterson Water Supply Planning Study, Final Draft, April 2006.
[20] City of Patterson, 2000 Urban Water Management Plan, Appendix D, pp. 8 and 11.

Table VI-3: Key Attributes of the Northern Sub-Basin of the Delta Mendota Groundwater Basin

Attribute	Quantity (acre-feet)
Groundwater Underlying the City	About 80,000
Amount Estimated to Meet Safe Drinking Water Standards	30,000 – 50,000
Safe Yield/Annual Recharge to the Confined (lower) Aquifer	8,300
Safe Yield/Annual Recharge to the Shallow (upper) Aquifer	3,200
Total Safe Yield/Annual Recharge (upper and lower aquifers combined):	11,500

Sources:
City of Patterson, 2002 Urban Water Management Plan, page 14 and Appendix D
Kenneth Schmidt and Associates, Groundwater Hydrology Test Report, prepared for The H20 Group, April 4, 2006, Appendix C to the City of Patterson Water Supply Planning Study, Final Draft, April 2006.
City of Patterson, 2000 Urban Water Management Plan, Appendix D, pp. 8 and 11.

Reliability

Water levels and well capacity in the area have not changed significantly over time, according to City records and groundwater production has increased as the City's population has grown. Although the City continues to add wells to satisfy increasing demand, the local groundwater table appears to remain stable[21]. Moreover, the City has not seen measurable changes in the groundwater table or yield due to periods of low rainfall. Studies of the local groundwater supply have indicated that low rainfall will not adversely impact groundwater levels, yields, or quality[22]. Nevertheless, the City, along with other jurisdictions, has adopted a Drought Contingency Plan in the event that an extended drought impacts the local groundwater supply. The contingency plan would be implemented by the City Council in three stages: Stage 1, with voluntary rationing; Stage 2, with mandatory rationing intended to reduce water use by 20 percent; and Stage 3, with mandatory rationing and limited water allocations to some users[23].

However, based on previous studies, the reliability of the City's groundwater (upper and lower aquifers) to produce 8,300 AFY is assumed to be 100 percent.

Present and Future Water Demand

Water use in the State of California varies depending on location. Areas where the climate is warmer and have less rainfall use more water than

[21] H2O Group, WSA, July 2006, p. 11.
[22] H2O Group, WSA, July 2006, p. 5, citing studies by Kenneth Schmidt & Associates in 2002 and 2006.
[23] H2O Group, WSA, July 2006, p. 22

colder, wetter locations. For example, households in the Bay Area and San Diego use less water than those in Sacramento and Bakersfield. Due to the climate of the Study Area (hot and dry), the City would be expected to have higher demands similar to other communities in the Central Valley. However, pumping records indicate that the City's household use is much lower than the statewide average of 244 gallons per capita per day (gpcd)[24]. Table VI-4 provides a projection of future population and corresponding water demand through the year 2030. It should be noted, however, that these projections do not account for the population and non-residential development that may be accommodated by any of the Equal-Weight Alternatives, but are based on buildout of the City's currently-adopted General Plan. Table VI-4 suggests that future water demand associated with the 1992 General Plan would be about 8,100 AFY.

There are three main water use values that must be considered when planning and designing water supply programs. These include annual demand, maximum day demand, and peak hour demand, as described below:

Annual Demand – The total amount of water a community uses during the year. This value determines the water needed from source supplies, such as groundwater and/or surface water. Communities must plan to secure long-term water availability based on annual demand projections.

Maximum Day Demand – The highest amount of water used in one 24-hour period. This value determines the capacity of water treatment facilities. Although this condition may only occur a few days each year, communities should plan to size treatment facilities (and storage) to meet maximum day conditions assuming an unscheduled maintenance event removes a portion of the treatment capacity from service.

Peak Hour Demand – The highest amount of water the system will move at any given moment. This value determines the storage and pipe (distribution) capacity of the system[25]. This condition is assumed to last for approximately 4 hours during a maximum day demand.

[24] Based on total system pumping and includes commercial, industrial, and public uses. Household use of Fresno and Bakersfield range between 250 gpcd and 350 gpcd (DWR, Bulletin 160-98).
[25] Emergency flow conditions (e.g. fire demands) are also taken into account when designing these facilities.

Table VI-4: Past and Projected Future Population and Associated Water Demands Assumed By The City's 2006 Urban Water Management Plan

	2005	2010	2015	2020	2025	2030
Population	16,150	21,000	25,500	30,000	34,000	35,600
Demand (AF)[1]	3,250	4,704	5,712	6,720	7,616	8,176

Source: 2006 Urban Water Management Plan, Table 3-6, page 34

Notes:

1. Based on a demand factor of 200 gpcd x 1.15 for factor of safety.

Existing and Planned Water Supply and Distribution Improvements

The City's Water Master Plan identifies arterial water distribution pipelines, water storage tanks, pressure control devices and groundwater wells and pumps necessary to serve buildout of the City's General Plan. The design criteria and recommended components of the system are summarized in the Draft Year 2001 Water Master Plan, and in The Villages of Patterson Water System Study and Master Plan (GDR Engineering, July 2005) which are incorporated by reference.

Planned water system improvements are shown on Figures VI-5 and VI-6 which show tentative locations for production wells, trunk distribution lines, storage tanks, and pump stations.

Figure VI-5: Planned Water Distribution Improvements

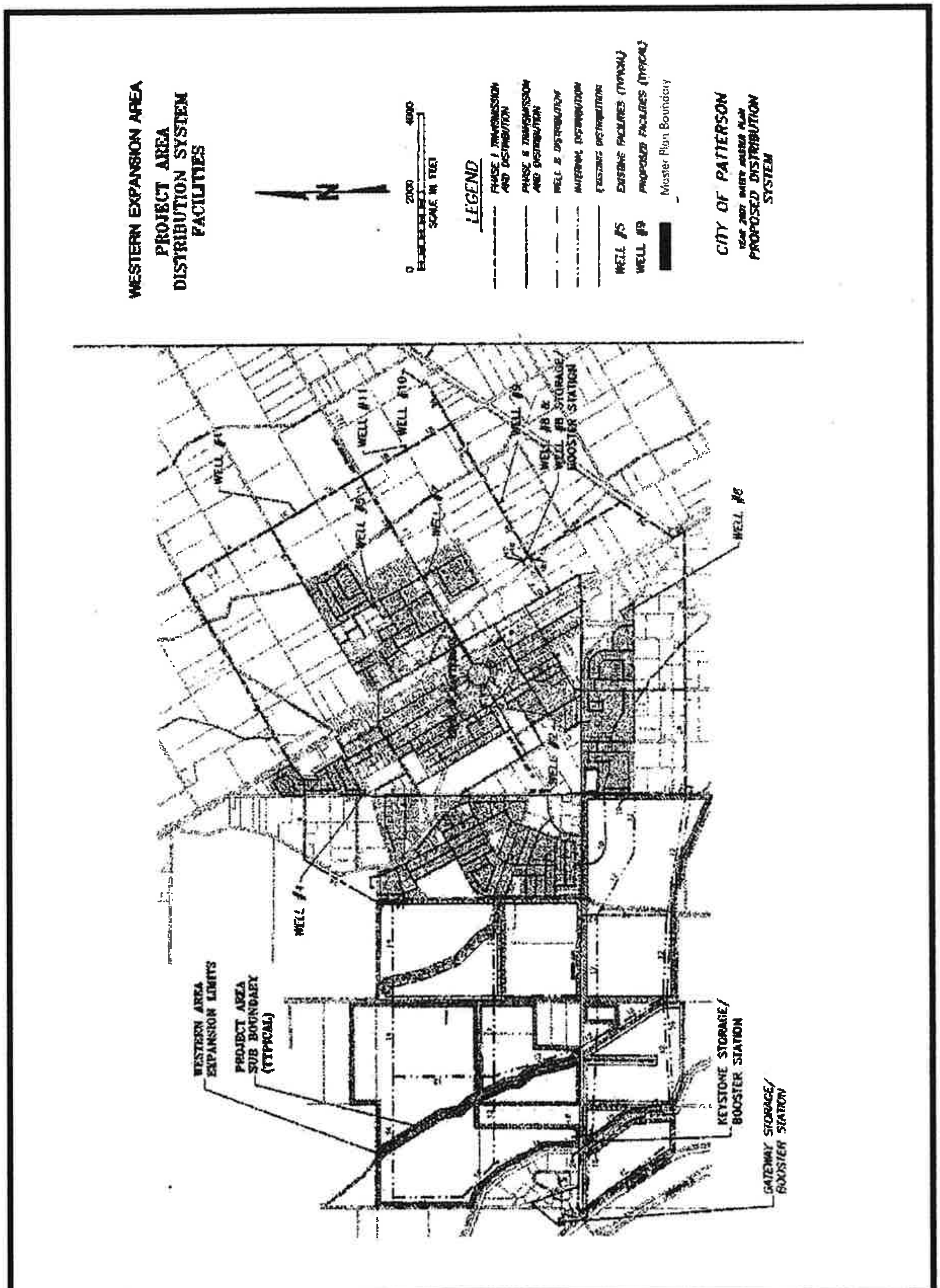
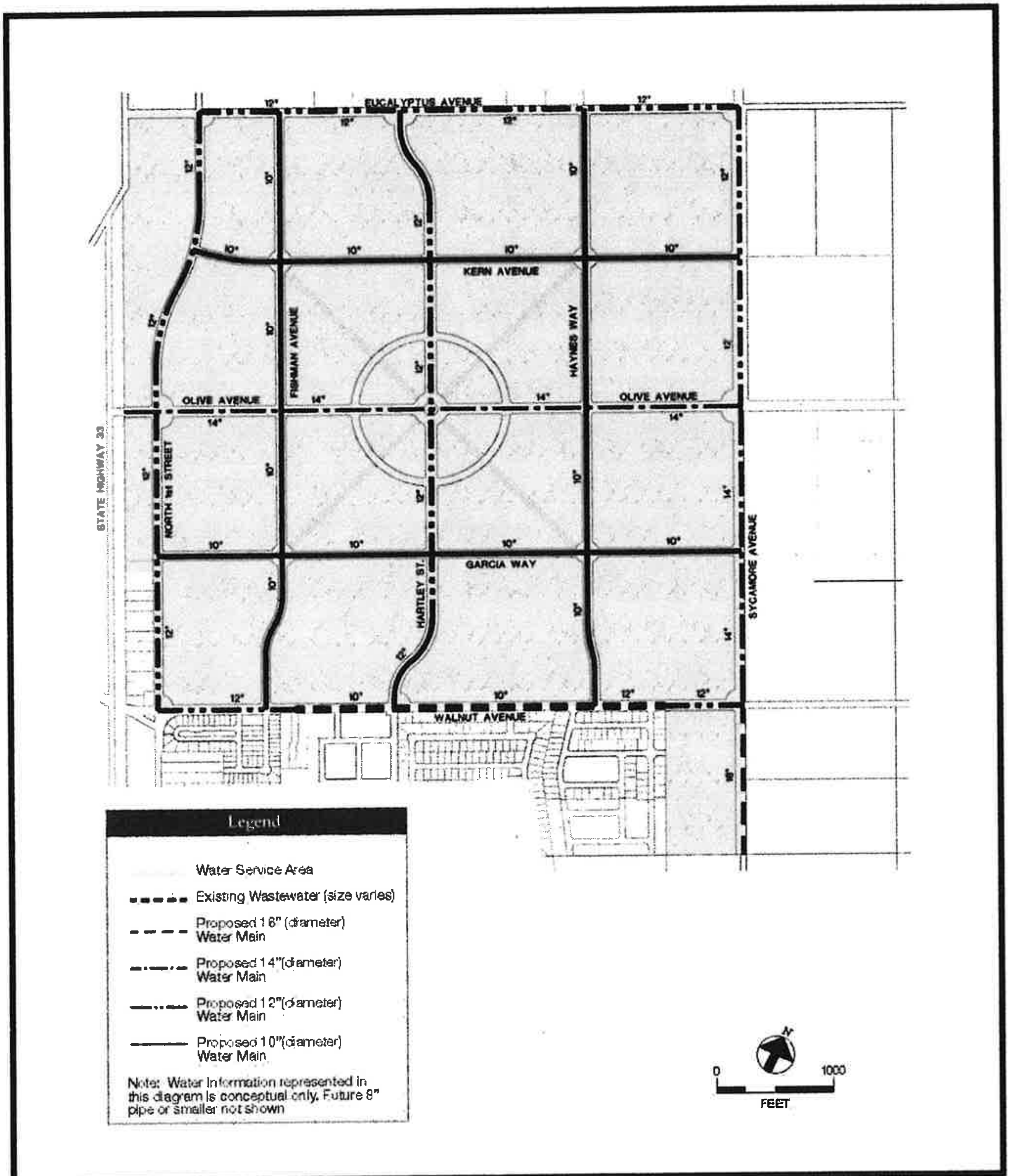


Figure VI-6: Water Distribution System for the Villages of Patterson Project



SOURCE: William Hezmalhalch Architects, Inc

Water Quality

Groundwater Quality

In general, local groundwater has high alkalinity, hardness, and total dissolved solids (TDS) concentrations. The TDS levels range from 450 to 1,110 mg/L. A large component of TDS is represented by the sum of calcium, sulfate and chloride concentrations. The City has a goal of 400 mg/L TDS and/or 150 mg/l hardness, based on an objective to reduce salts so that the community does not need private self-generating softening units. The salt reduction goal was set below the state's recommended maximum contaminant level (MCL) of 500 mg/l to enhance both drinking water quality and wastewater disposal. Controlling salts will also reduce maintenance of the City's distribution system, and increase the longevity of water infrastructure. Sulfate levels are also important factors in considering treatment processes for other contaminants. For example, ion exchange processes for arsenic and nitrate control are impacted by the presence of high sulfate levels.

Based on past sampling, a summary of groundwater constituents of concern is described as follows:

- Antimony has been detected in Well 6 at 2 µg/l and in Wells 7, 8, 9, and 11 at 5 ug/l. The water quality goal for antimony is 4.8 ug/l, and therefore the groundwater could require treatment for antimony removal.

- Arsenic levels in the groundwater range from 1.2 ug/l in Well 6 to 10 ug/l in Well 2. While the majority of samples have arsenic in the range of 3 ug/l to 4 ug/l, the 90th percentile level has been estimated at 8.4 ug/l.

- Iron levels range from 0.02 mg/L in Well 11 to 0.3 mg/L in Well 1. The 90th percentile level is estimated at 0.24 mg/L, which is equal to the goal (e.g., the secondary MCL). While the 90th percentile level for manganese is 0.038 mg/L, one of two Well 6 samples showed a level of 0.09 mg/L. The treatment objective for manganese, based on the secondary MCL, is 0.04 mg/L.

- Nitrate levels range from 2 mg/L in Well 6 to 48 mg/L in Well 7, and varies considerably among the different wells. The 90th percentile value of 48 mg/L is higher than the treatment level objective of 36 mg/L (as NO_3).

Table VI-5: Groundwater Quality Summary

Parameter	Unit	Samples	Min	Max	Ave	90th Percentile	Water Quality Goal
Alkalinity	mg/L	16	0	260	141.9	196	no goal
Alpha Particles	pCi/L	14	0.0	5.4	2.6	4.7	12
Aluminum	ug/L	14	11	1600	169	230	800
Antimony	ug/L	14	2	5	4.6	5	4.8
Arsenic	ug/L	16	1.2	10	4.0	8.4	8
Barium	mg/L	16	0.014	0.5	0.1	0.33	1.6
Bentazon	ug/L	1	5.0	5.0	5.0	5.0	14
Beryllium	ug/L	14	0.3	1	0.5	0.5	3.2
Cadmium	mg/L	16	0.00018	0.001	0.0009	0.001	0.004
Calcium	mg/L	16	52	110	74.3	90.2	150 (as total hardness)
Chloride	mg/L	17	24	280	124	211	250
Chromium VI	ug/L	7	3.7	17.2	9.3	14.5	40
Color	units	16	0	5	3.1	4.2	15
Conductivity	umho/cm	21	710	1600	1294	1600	no goal
Copper	ug/L	16	0.05	30	13.9	20	1
Cyanide	ug/L	7	0.2	0.5	0.3	0.5	0.12
Fluoride	mg/L	16	0.1	0.77	0.2	0.6	2
Hardness	mg/L	16	270	490	392.3	476	150
Iron	mg/L	16	0.02	0.3	0.1	0.24	0.3
Lead	mg/L	16	0.001	0.005	0.004	0.005	0.015
Magnesium	mg/L	16	31	64	50.3	63	150 (as hardness)
Manganese	mg/L	16	0.010	0.090	0.021	0.038	0.5
Mercury	mg/L	16	0.000	0.001	0.000	0.001	0.0016
Methane	ug/L	1	1.0	1.0	1.0	1.0	no goal
Metolachlor	ug/L	1	0.6	0.6	0.6		no goal
MTBE	ug/L	2	3.0	5.0	4.0	4.8	5
Nickel	ug/L	14	5	5	5	5	80
Nitrate	mg/L(NO3)	22	2	48	20.8	48	40
Nitrite	ug/L	10	100	100	100	100	400
Odor	TON	16	1	1	1.0	1	15
o-propane	ug/L	1	0.5	0.5	0.5	0.5	
pH	units	16	7.5	8	7.8	7.9	6.5-9.5
Selenium	mg/L	17	0.001	0.006	0.005	0.006	0.04
Silver	mg/L	16	0.0004	0.005	0.002	0.005	0.1
Sodium	mg/L	16	22	160	108.3	150	250
Sulfate	mg/L	16	170	560	302	488	250
TDS	mg/L	22	450	1100	854.3	1000	400
Thallium	ug/L	13	1	2	1.9	2	0.0016
Toluene	ug/L	4	0.5	1.7	0.9	1.4	120
Total Chromium	mg/L	16	0.006	0.026	0.01	0.021	0.040
Turbidity	NTU	16	0.1	9.4	1.7	2.8	no goal
Zinc	mg/L	16	0.01	0.81	0.29	0.62	5

Source: The H2O Group, 2010

Units

mg/L = mlligrams per liter

ug/L = micrograms per liter

mg/L(N) = milligrams per liter nitrogen

pCi/L = picocuries per liter

umho/c = micromhos per centimeter

TON = threshold odor number

Surface Water Quality
As discussed previously, surface water is currently delivered to properties within the Study Area. Surface water could be obtained by the City from either the California Aqueduct (CA), part of the State Water Project (SWP), operated by the State of California, or from the Delta-Mendota Canal (DMC), part of the Central Valley Project (CVP), operated by the United States Bureau of Reclamation. Both of these sources receive their water from the Sacramento-San Joaquin Delta (Delta). The Sacramento, San Joaquin and Mokelumne Rivers combine in the Delta which supplies potable and agricultural water for areas south of the Delta. Water is pumped into the canal systems by the Tracy Pumping Plant (CVP) and the Banks Pumping Plant (SWP).

There are several sources of Delta water contamination. Recreational activities in the Delta include motor vehicle sports, like boating, water skiing, and other water craft activities. These activities can introduce gasoline related contaminants such as methyl-tert-butyl ether (MTBE) into Delta waters. Effluents from wastewater treatment facilities (approximately 23 major facilities in the Delta basin) have the potential to add organic and microbial contaminants. Runoff from farmlands also adds sediments, nutrients, organic contaminants and microbes to the Delta source water. Similarly, urban runoff can add sediment, nutrients, road salts, heavy metals, petroleum hydrocarbons, and microbes. Seawater intrusion can also increase salinity, bromide, and total dissolved solids content of Delta water.

The design and operation of the DMC allows for surface water runoff and agricultural return water to enter the canal. In the section between the Tracy Pumping Plant and where the City would take water (Mile Post 40), there are approximately 87 locations where surface water can enter the canal, and one (1) location where agricultural return water can be pumped into the canal. A number of dairy and agricultural operations (e.g., confined animal feeding operations) discharge into the DMC downstream of the Tracy Pumping Station, potentially contributing to further degradation of source water quality. As a result, the California Department of Health Services has stated that DMC water is not a viable option for drinking water, regardless of the treatment provided. Thus, for water supply planning purposes any surface water that is directly treated and delivered to customers for drinking water must be diverted from the California Aqueduct, not the DMC.

The City performed water quality sampling of the CA and DMC as part of the groundwater study prepared in 2006[26]. Both CA and DMC source waters consist of low turbidity, higher than neutral pH, relatively high TDS, and moderate hardness. These source waters are also expected to contain low level organic contaminants, representative of watershed activities such as recreation, agriculture, treated effluents from wastewater treatment plants, urban runoff, and confined animal feeding operations. These discharges may also contribute to microbial contamination. Due to a large

[26] H20 Group, WSA, July 2006,

number of agricultural returns to the DMC, a higher incidence of agricultural chemicals and microbes can be expected. While not identified in these DWR databases, SWP also contains taste and odor causing chemicals. The major issue with both surface waters is the potential for drinking water disinfection by-product (DBP) formation due to high precursor levels (both organic and inorganic). The observed TDS levels in the DMC appear to be higher than in the CA, but the 75th percentile levels are below the primary goal of 400 mg/L.

While the analyzed data represents general water quality in the CA and the DMC, limited data are available from points in both sources near the possible locations being considered for raw water intakes for a future City of Patterson treatment plant. Therefore, the location of raw water intakes will be determined by a sampling program for a period of one year to compare the water quality between the two sources, and at points where surface water intakes would be located along each source. The water quality parameters recommended for monthly monitoring include alkalinity, pH, hardness, bromide, dissolved organic carbon, UV absorbance at 254 nanometers (nm), iron, manganese, nitrate, total dissolved solids, turbidity, total and fecal coliform, and E. coli. In addition, complete scans of all organic and inorganic contaminants with primary MCLs, secondary MCLs, and notification levels are recommended once per quarter over one year. Analysis of taste and odor causing contaminants, such as geosmin and MIB, is also recommended on a quarterly basis. Asbestos was observed in DMC source water and its occurrence in CA and DMC source water must be confirmed with additional samples.

Table VI-6: Water Quality of the California Aqueduct and the Delta Mendota Canal Near Patterson

Water Quality Parameter	Unit	Cal. Aqueduct Banks Pump Station	Delta Mendota Canal	Cal Aqueduct Patterson	Water Quality Goal
Alkalinity	mg/L as CaCO3	70	105	65	none
Antimony	mg/L	<0.001	<0.001	ND	0.048
Arsenic	mg/L	0.002	0.002	0.002	0.008
Beryllium	mg/L	<0.001	<0.001		0.0032
Boron	mg/L	0.1	0.3		no goal
Bromide	mg/L	0.3	0.29	0.36	0.08 (as bromate)
Calcium	mg/L	17	31	17	150 as total hardness
Dissolved Organic Carbon	mg/L as C	2.3	3	2.3	1.5
Total Organic Carbon	mg/L as C	2.8	3.6	2.9	1.5
Chloride	mg/L	91	93		250
Chromium	mg/L	0.003	0.003		0.04
Copper	mg/L	0.002	0.002		1.0
Fluoride	mg/L	<0.1	<0.1	ND	2
Hardness	mg/L as CaCO3	92	143	100	150
Iron	mg/L	0.022	0.007		0.3
Lead	mg/L	<0.001	<0.001		0.012
Magnesium	mg/L	12	16	14	150 (as total hardness
Manganese	mg/L	0.01	<0.005		0.05
Nitrite + Nitrate	mg/L as N	0.58	NR	0.7	8
Phosphate-Ortho	mg/L as P	0.04	NR		0.3
Phosphorus-Total	mg/L	0.08	NR		0.3
Selenium	mg/L	0.001	0.002		0.04
Sodium	mg/L	59	72		150
Specific Conductance	mS/cm	490	670		no goal
Sulfate	mg/L	26	74	31	250
SUVA	m.L/mg			3.83	no goal
Total Dissolved Solids	mg/L	270	371	310	400
Turbidity	N.T.U.	6	15		0.24
UV Absorbance (254 nm)	1/cm			0.088	no goal
Zinc	mg/L	<0.005	<0.005		5

Source: The H2O Group, 2010

Units

mg/L = mlligrams per liter
ug/L = micrograms per liter
mg/L(N) = milligrams per liter nitrogen
mg/L as CaCO3 = milligrams per liter as calcium carbonate
mg/L as C = milligrams per liter as carbon
mg/L as P = milligrams per liter as phosphorus
pCi/L = picocuries per liter
umho/c = micromhos per centimeter
TON = threshold odor number
mS/cm = milliSeimen/centimeter
NTU = Nephelometric Turbidity Unit
ml/mg = milliliter per microgram

Notes:

1. The CA Banks P.S and DMC2 samples were taken in November 2005.
2. The CA Patterson sample was taken on December 5, 2005.
3. NR - not reported.
4. Blank cells indicate that data are not available for the particular contaminant at the specific location
5. ND - not detected.

Wastewater Collection and Treatment

The City's Wastewater System

The City of Patterson provides wastewater collection, treatment and disposal service for all residents, schools, commercial and industrial establishments in the City except for Patterson Frozen Foods, which has its own onsite treatment system, and a few residences, which are served by their own onsite septic tank systems. The City's wastewater system also serves the Villa Del Lago commercial development located near the I-5/Sperry Avenue interchange and the Diablo Grande Project west of the City. The City's wastewater system consists of three basic components: collection, treatment, and disposal.

Wastewater Collection

The City's wastewater collection system consists of gravity flow pipelines ranging in size from 6-inch to 33-inch diameters, typically located in City street rights-of-way. Older portions of the system, which generally serve the downtown core residential and commercial areas, were constructed before 1960. Newer developments have been connected to the system over time.

The City's existing trunk sewers (15 inches and larger) and corresponding capacities are shown on Figure VI-7. The main sewer line is located along Walnut Avenue where it extends from the treatment plant to just north of the downtown. The last downstream section of the trunk system as it heads toward the treatment plant has a capacity of 9.5 million gallons per day (mgd). The trunk system has sufficient capacity to serve wastewater flows expected from buildout of the 1992 General Plan.

Wastewater Treatment and Disposal

The City's wastewater treatment plant is located on a 160-acre site situated between Walnut and Las Palmas Avenues, east of Poplar Avenue and west of the San Joaquin River. The treatment facilities include a lift station, metering structure, headworks, comminuter, oxidation ditch, settling clarifiers, AIPS ponds, and sludge drying beds. The lift station is located at the terminus of Walnut Avenue where the influent (i.e., untreated wastewater) is received from the Walnut Avenue trunk sewer line into the plant.

The treatment plant provides three separate treatment processes: the South Activated Sludge Treatment System, the North Activated Sludge Treatment System, and the Advanced Integrated Pond System. The rated capacities of these three processes are listed in Table VI-7.

Figure VI-7: Wastewater Collection System Trunk Sewers

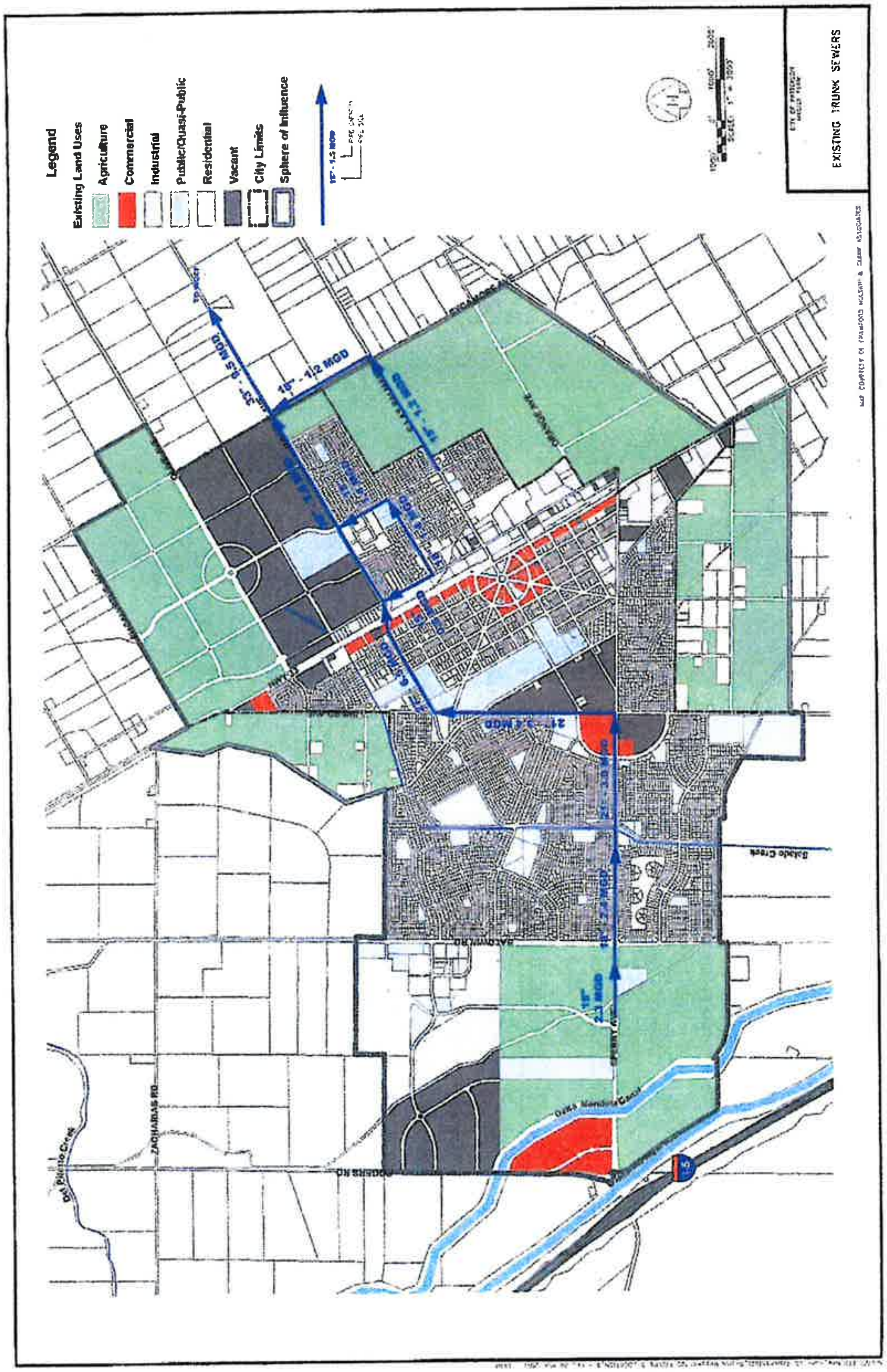


Table VI-7: Rated Capacities of the Three Treatment Processes	
Process	**Rated Capacity (mgd)**
South Activated Sludge Treatment System	1.25
North Activated Sludge Treatment System	0.8
Advanced Integrated Pond System	0.2
Total:	2.25
Source: Lee and Ro, City of Patterson Wastewater Master Plan, May 2010, page 14	

The plant's currently permitted capacity is 3.5 million gallons per day (mgd), and the average current volume of wastewater produced by the City is approximately 1.4 mgd. The remaining capacity is available to provide service for previously-approved expansion and to accommodate unanticipated high flow conditions. Table VI-8 summarizes the rated capacity of the treatment plant along with the permitted capacity and the remaining capacities in 2010.

Table VI-8: City of Patterson 2010 Wastewater Treatment Plant Remaining Rated Capacity and Permit Capacity (mgd)

Rated Capacity	Maximum NPDES Capacity	2010 Average Flow	2010 Remaining Rated Capacity	2010 Remaining Permitted Capacity
2.25	3.5	1.4	0.85	2.1

Source: Lee and Ro, City of Patterson Wastewater Master Plan, May 2010

Notes:
1. MGD = million gallons per day

There are currently 15 active separate percolation ponds for effluent disposal at the treatment plant. The total area is 109 acres and the capacity of these ponds, on an annual average disposal rate basis, is 3.38 mgd.

The treatment plant site is shown on Figure VI-8.

Wastewater Generation

The current (2010) average annual wastewater flow to the treatment plant is approximately 1.4 million gallons per day. The total cumulative wastewater flow projected in the City by the year 2030, including existing flows plus previously approved development, would be approximately 3.09 mgd. For purposes of projecting future wastewater flows the average annual flow rates for different land use categories are assumed to be those shown in Table VI-9.

Table VI-9: Average Annual Wastewater Flow Rate Factors

Category	Factor	Units
Residential Average Flow	55	Gallons per capita per day
Commercial/Industrial	562	Gallons per acre per day
Public/Quasi-Public	5	Percent
Infiltration	3	Percent

Source: Lee and Ro, City of Patterson Wastewater Master Plan, May 2010, page 5

Figure VI-8: Wastewater Treatment Plant Location

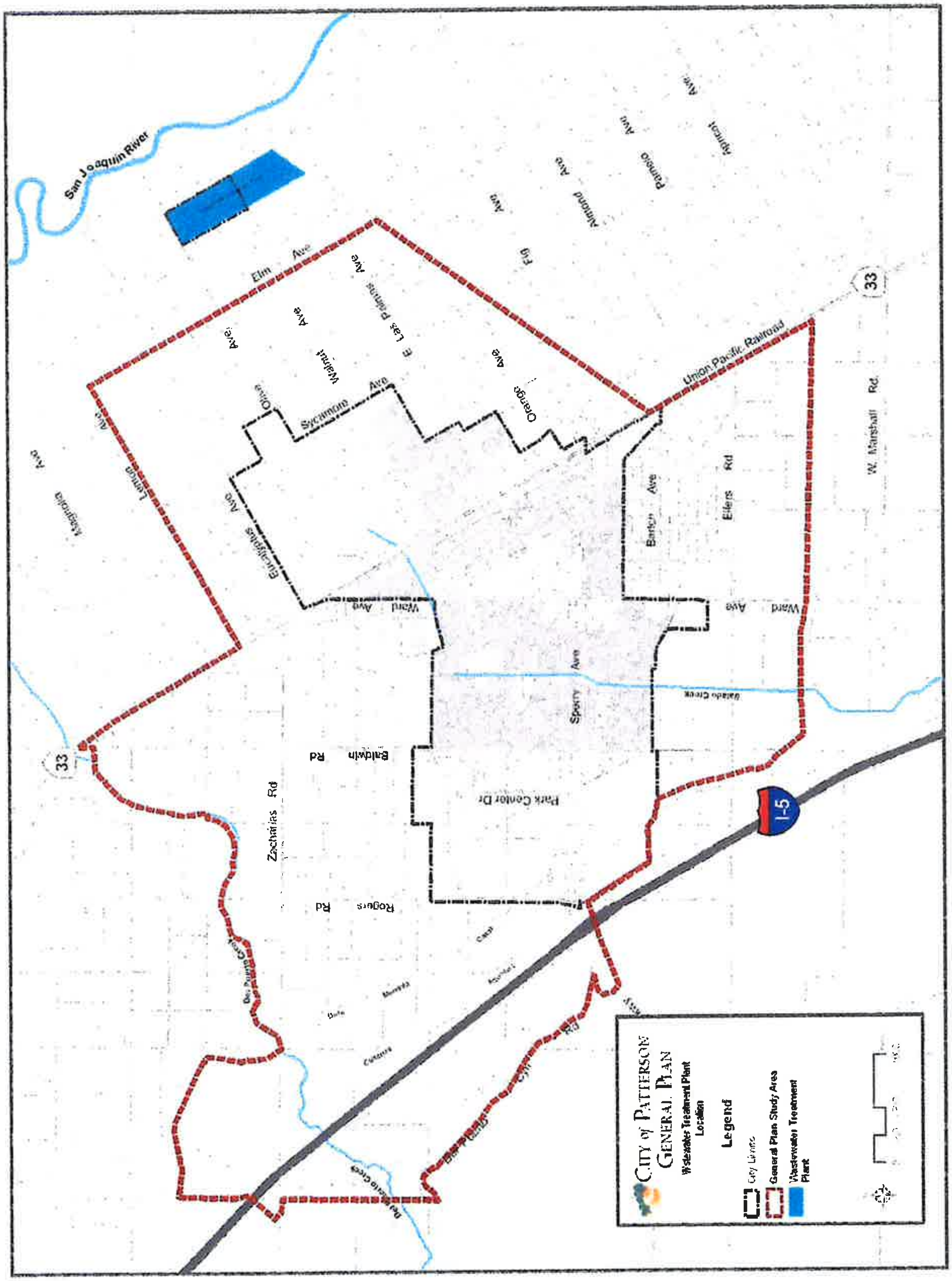
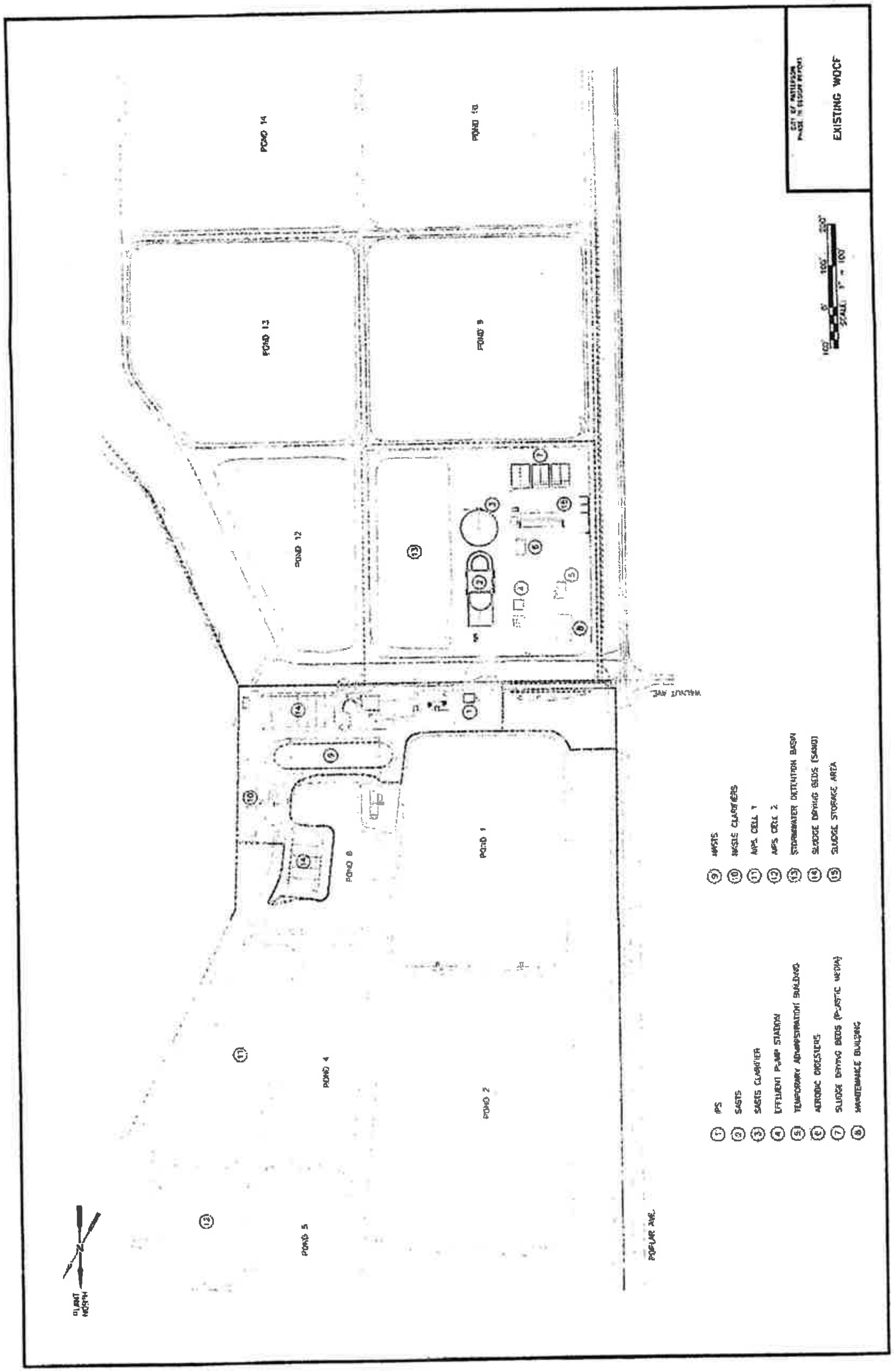


Figure VI-9: Wastewater Treatment Plant



Wastewater Infrastructure Improvements

In 2006, the City embarked on a program to expand its wastewater collection, treatment, and disposal system to accommodate wastewater generated by development within the City's sphere of influence. The program consisted of a 2-phase, 1 million gallon per day (1 mgd) expansion of its wastewater treatment and disposal facilities. In the near term, the City also proposed physical expansion of its collection system to serve two development proposals that were subsequently adopted: the Patterson Gardens residential project and the Keystone Pacific Business Park portion of the West Patterson Business Park Master Development Plan area.

The City has also adopted a plan to accommodate the wastewater generated by the Diablo Grande development in western Stanislaus County, and has entered into an agreement with the Western Hills Water District to do so. Flows from Diablo Grande accommodated by the City are expected to be 0.5 mgd by 2030 and 0.75 mgd by 2050.

Wastewater Collection System Improvements

To serve expected development in the western portion of the City's sphere of influence, a new sewer collection pipeline would be constructed from the intersection of Sperry Avenue and American Eagle Drive, running east under Sperry Avenue and north under Ward Avenue to the existing 27-inch line in M Street. A new sewer trunk line would be constructed from the end of the existing 27-inch sewer line in M Street. As described in the Western Expansion Area Sanitary Sewer Collection System report, the new sewer trunk line would run along M Street, cross Highway 33 and the railroad tracks, and then continue down Walnut Avenue to the wastewater treatment plant. Because the City is proposing to construct the wastewater collection lines that would be common to both Diablo Grande and development on the west side of the City 3 inches larger in diameter to accommodate flows from Diablo Grande, development on the western section of this sewer trunk line would be sized at 30 inches and the eastern section would be 36 inches in diameter. Slightly oversizing the trunk line now would avoid re-trenching and laying a second pipeline in the future if the City approves collection and treatment of Diablo Grande wastewater. If Diablo Grande wastewater is not collected by the City, the large collection facilities could accommodate additional development in the Master Development Plan area.

To accommodate wastewater generated by the Keystone Pacific Business Park portion of the West Patterson Business Park Master Development Plan area, the City is proposing to construct 12-inch and 21-inch sewer lines across the northern portion of the Creekside Meadows development to connect with the existing 21-inch line in the northwestern portion of Heartland Ranch.

Once constructed, the M Street and Walnut Street trunk line that was previously approved as part of the Creekside Development would convey wastewater generated by the Master development Plan area from the existing 27-inch line in M Street to the wastewater treatment plant. This sewer trunk line will run along M Street, cross Highway 33 and the railroad tracks, and then continue down Walnut Avenue to the wastewater treatment plant.

Treatment Plant Expansion

Expansion of the City's existing wastewater treatment plant has proceeded along a two-phase expansion program. The first phase involved expansion of the Activated Integrated Pond treatment system in the existing wastewater treatment plant facility, and construction of approximately 120 acres of percolation ponds. The first phase increased treatment plant design capacity by about 0.5 mgd and was constructed to serve the previously-approved 1,348-residences in the Creekside Development. The second-phase expansion added another 0.5 mgd and is intended to serve the balance of the Keystone Pacific Business Park and future development in the remainder of the General Plan area.

A sludge de-watering and disposal project is currently (2010) being designed. This project is planned for completion by the fall of 2010 and is intended to make it easier for plant personnel to dewater and dispose of excess sludge. In addition, another plant expansion which will include another activated sludge treatment system parallel to the existing system is currently in the design phase. The City is working with the State to obtain funding for this project, which will increase the rated capacity of the treatment plant to 3.5 mgd.

Drainage

The Study Area is located in the Great Valley Geomorphic Province of California, more commonly referred to as the San Joaquin Valley. The San Joaquin Valley is made up largely of alluvial fans sourced from the Sierra Nevada Range to the east, the Coastal Range to the west, and to some degree the Tehachapi Mountains to the south. Weathering of these mountain ranges combined with surface water flows and flooding have resulted in accumulation of alluvial (river), lacustrine (lake), and marine (ocean) deposits throughout the San Joaquin Valley at extreme depths.

The Study Area is situated mostly on dry, treeless alluvial fans that drain east to the San Joaquin River. West of Interstate 5, the Study Area consists of the treeless foothills that form the eastern edge of the Diablo Range, while a riverine strip along the western bank of the San Joaquin River forms its northeastern edge. The Sacramento-San Joaquin Delta is 20 miles to the north, but the gentle gradient of the bottomlands produces meandering river courses, cutoff oxbows, and localized marshes. The only other significant drainage is Del Puerto Creek, an intermittent stream that exits the Diablo Range and flows northeast to the San Joaquin. The 1947 Orestimba 15 minute quadrangle shows that Black Gulch, an even smaller intermittent creek, debouched on the fans west of Patterson, and did not flow as far east as the San Joaquin River. Salado Creek formerly flowed to the San Joaquin to the south of the Study Area; it was realigned to run north into the Study Area in historic times.

Existing Drainage Features

The drainage within this region is characterized by a series of generally eastward-flowing creeks, which drain the Coast Range uplands to the west and eventually discharge to the San Joaquin River. These creeks create alluvial fans4 where they emerge from the foothills onto the valley floor. The project site is located at a topographically low point between the alluvial fans created by Salado and Del Puerto Creeks. Both Salado and Del Puerto Creeks eventually drain into the San Joaquin River.

Salado Creek is an intermittent stream with a drainage area of approximately 25 square miles west of Interstate-5 (Watersheds of Salado and Del Puerto Creeks, Stanislaus County, California). Salado Creek flows through the Coast Range uplands in a steep well-defined channel and through the foothills in a moderately-defined and sometimes incised channel. Within about one-half mile of its emergence from the foothills, the creek crosses the Delta Mendota Canal (DMC) through an overchute structure. North of the DMC, Salado Creek flows through gently northward-sloping irrigated agricultural land and through the City of Patterson. Peak flows associated with Salado Creek are several magnitudes above the creek's channel carrying capacity. Peak flow rates have been reported to be approximately 600 cubic feet per second (cfs) for the 10-year rainfall return period and 2,800 cfs for the 100-year return period upstream of the Study Area where the creek crosses the California Aqueduct[27].

The flow of Salaod Creek into the Study Area is restricted by the capacity of the overshot flume across the DMC which has been rated at between 700 and 850 cfs.

Improvements to Salado Creek completed in 1998 by the City and Stanislaus County reduced the frequency of flooding along Salado Creek from approximately 1 in 4½ years to 1 in 8 years. Improvements to Salado Creek in the City have included enlargements of the channel, installation of some underground piped facilities and embankment construction between Sperry Road and the San Joaquin River. A 96-inch cast-in-place concrete pipeline (Salado Creek Pipeline) was installed from east of the Union Pacific Railroad line to the San Joaquin River. The design capacity of this system is dedicated to existing development in the City and upstream natural runoff flows. With these improvements, the capacity of Salado Creek between Sperry Road and the San Joaquin River was increased from the former capacity of approximately 300 cfs to a capacity of approximately 500 cfs. The channelized portions of Salado Creek flows northerly into the City adjacent to American Eagle Avenue, then northeasterly along Cliff Swallow Drive to Second Street between El Solyo Drive and Northmead Way where the flows are discharged into the Salado Creek Pipeline.

Black Gulch Creek is a tributary of Salado Creek that is detained and channelized within the City to where it discharges into Salado Creek. Black Gulch Creek flows for approximately 2½ miles through the Diablo Mountain Range to the lowlands 2½ miles west of Patterson, crossing I-5 near Sperry Avenue. The creek is channelized as it enters the City near Sperry Road and I-5. The channelized flow is discharged into a basin located in the area east of Rogers Road, south and west of the DMC, and north of Sperry Road. The detained flows are then discharged into a storm drainage pipeline that flows east along Keystone Pacific Parkway and Cliff Swallow Drive to discharge into the Salado Creek pipeline.

Del Puerto Creek has a watershed of approximately 73 square miles, substantially larger than that of Salado Creek. The DMC crosses under Del Puerto Creek in an underground siphon structure. The defined channel of Del Puerto Creek flows to the northeast from its point of emergence onto the valley floor to its confluence with the San Joaquin River. Peak daily flow rates at the United States Geologic Service (USGS) gauging station for Del Puerto Creek, approximately 1 mile west of the California Aqueduct, have been reported as high as 1,870 cubic feet per second (cfs)[28]. Depths of flow have been recorded as high as 14.92 feet, 11.62 feet and 14.68 feet at discharge rates of 5,270 cfs, 3,400 cfs and 1,800 cfs in 1998, 1995 and 1959, respectively. However, for several months of the year there is typically no flow recorded in Del Puerto Creek. Based on the USGS peak flow data, the peak flow rate for

[27] Stoddard, 2001
[28] USGS, 2010

10-year rainfall return period would be approximately 2,475 cfs, and 6,525 cfs for the 100-year return period. However, peak flow rates downstream of the canals are limited by the capacity of the overcrossing structures.

Other major physical features affecting the Study Area drainage include:

- I-5 lies on a northwesterly to southeasterly alignment along the western edge of the Study Area, and is a major transportation route from southern California through the State of Washington;

- The DMC and the California Aqueduct also lie on a northwesterly to southeasterly alignment along the western edge of the Study Area, and convey federal and State water from the Delta to agricultural and urban customers south of the Delta; and,

- State Route 33 (SR-33) lies on a northwesterly to southeasterly alignment through approximately the middle of the Study Area, and connects the cities in the western part of the valley between State Route 152 near Santa Nella Village to I-5 near Tracy.

Precipitation

The climate in Patterson is characterized as dry-summer subtropical (Mediterranean), with cool, rainy winters, and relatively warm, dry summers. During the summer months the San Joaquin Air Basin is influenced by a high pressure cell off the west coast. Within this cell, air descends almost continuously; the descending air is compressed, thereby raising its temperature and lowering the relative humidity. When this cell is dominant, there are neither major storms nor any region-wide precipitation. During the winter the influence of this high pressure cell is intermittent, resulting in alternate periods of stormy, unsettled weather and periods of stable, rainless conditions.

The mean annual precipitation for Patterson is approximately 11 inches.[29] Most of the precipitation occurs from December to April, while summer months are virtually rainless; however, Patterson occasionally receives rain during the summer months from thunderstorms. The lowest rainfall year on record for the Modesto-Patterson area is 1913, recorded as having only 4.3 inches of rainfall, while the highest recorded rainfall was 26.0 inches in 1983.[30]

The weather conditions in Patterson consist of mild winters and warm, dry summers. Based on historical weather data collected (from June 1902 to August 2009) by the Western Regional Climate Center[31] for the nearest weather monitoring station located in Newman, California (046168), the

[29] Western Regional Climate Center. Available at: http://www.wrcc.dri.edu/summary/lcd.html. Accessed April 2007.
[30] The City of Modesto, Engineering & Transportation Department, Capital Planning Division and the Modesto Irrigation District, *Urban Water Management Plan*, 2000.
[31] WRCC, 2009

monthly averaged low temperatures occur typically between December and February. The monthly averaged-low-temperatures for December through February were approximately 35.6° F, 36.1°F, and 39.5° F, respectively. The monthly-averaged-high temperatures occur typically between June and August. The monthly-averaged-high temperatures for June through August were approximately 92.0° F, 97.2° F, and 95.0° F, respectively. The 30-year (1971 – 2000) monthly mean minimum temperatures for December through February were fairly consistent with those for the entire period of record at approximately 35.5° F, 37.0° F, and 40.0° F, respectively. The 30-year monthly mean maximum temperatures for June through August were slightly milder than those for the entire period of record at approximately 90.5° F, 94.6° F, and 92.6° F, respectively. The hottest day on record was 116° F on July 23, 2006. The coolest day on record was 15° F on December 23, 1990.

Rainfall typically occurs between the months of November and March, with some infrequent events as late as May and as early as September. Over the entire period of record, the average annual rainfall measured at the Newman station (046168) was about 10.63 inches per year. The maximum annual rainfall was approximately 22.56 inches in 1998, and the low was approximately 3.34 inches in 1953. The maximum 24-hour rainfall was measured at 4.10 inches and occurred on January 17, 1988. Snowfall has only been recorded at the Newman station once in 1916 when approximately 4 inches fell.

Flooding

Based on the Federal Emergency Management Agency's (FEMA) 1989 Flood Insurance Study for Stanislaus County, flooding reportedly occurred in the Patterson/Newman area in 1954, 1955, 1957, 1958, 1959, 1963, 1968, 1969, 1978, 1980, 1983, and 1986. Since that report was published, flooding has occurred on Salado Creek several times in the 1990s, including 1995 and 1998.

Based on the Flood Insurance Rate Map (FIRM), a substantial portion of the Study Area is located within the 100-year special flood hazard area (Zone AO) (Figure VI-9) (Map of FEMA Special Flood Hazard Areas, City of Patterson and Adjacent Areas, Stanislaus County, California)[32],[33] Zone AO is defined as "areas of shallow flooding where depths are between one (1) and three (3) feet..." The northern and eastern portions of the site are located within the FEMA-designated Zone B. Zone B is defined as "areas between limits of the 100-year and 500-year flood; or certain areas subject to 100-year flooding with an average depth less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood." In this case, the Zone B designation is for "areas subject to 100-year flooding with an average depth less than one (1) foot." The FIRM indicates that as the Zone AO flood waters move through the project site, they would be expected to spread out and the depth of flooding

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[32] Federal Emergency Management Agency, Flood Insurance Rate Map for Stanislaus County, California, Community Panel Number 060384 0685B and 060384 0705C, September 29, 1989.
[33] Federal Emergency Management Agency, Flood Insurance Rate Map for City of Patterson Community Panel Number 060390 0001D, 1990.

would decrease (to less than one foot) and at that location the designation changes from Zone AO to Zone B.

The rate at which water is delivered to the Salado Creek channel is controlled by the amount of water that passes through the overchute at the Delta Mendota Canal (DMC). The overchute on, and the levee system upstream of, the DMC limit the peak discharge downstream of the DMC to 710 cubic feet per second (cfs)[34]. Salado Creek between the DMC and Sperry Avenue is capable of conveying 300 cfs (Stoddard, 2001). The disparity between the conveyance capacity of Salado Creek downstream of the DMC (300 cfs) and the conveyance capacity of the DMC overchute (710 cfs) is the reason that the FIRM shows a broad "Zone B" flood hazard area north of the DMC. Zone B is defined as "areas between limits of the 100-year and 500-year flood; or certain areas subject to 100-year flooding with an average depth less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood." The FIRM indicates that the creek overtops the channel banks just north of the DMC during the 100-year event, and therefore it is concluded that the Zone B designation is for "areas subject to 100-year flooding with an average depth less than one (1) foot."

In addition to the regulatory floodplain mapping conducted by FEMA's National Flood Insurance Program (NFIP), DWR has prepared Awareness Floodplain Maps which display the 100-year flood hazard areas. These maps provide an additional resource to evaluate the flood hazards within the Study Area. Since these maps were prepared by using approximate assessment procedures to determine the flood prone areas, areas displayed as flood prone do not include any flooding specific depths or hazards. The intent of the Awareness Floodplain Mapping project is to identify all pertinent flood hazard areas by 2015 for areas that are not mapped under the FEMA NFIP and to provide the community and residents an additional tool in understanding potential flood hazards currently not mapped as a regulated floodplain. These maps are not FEMA regulatory floodplain maps. However, at the request of the community FEMA would include this data on their maps.

It is notable that most of the Study Area generally east of Baldwin Road or north of Zacharias Road is shown on the Floodplain Awareness Map as at risk or prone to flooding. Additionally, there are areas along the upper reaches of Black Gulch Creek and Del Puerto Creek that are shown as flood prone, though not identified on the FEMA Flood Insurance Maps. This appears to indicate that there may be some flood risks in these areas not formally identified and included in the Flood Insurance Maps yet, that may need to be considered during future development in those areas. The DWR Awareness Floodplain Map is presented in Figure VI-11.

Another source of flood information is the Best Available Flood Information maps provided by the California Department of Water Resources. In

[34] FEMA, 1989

accordance with Senate Bill 5, DWR developed preliminary maps for the 100 and 200-year floodplains located within the Sacramento-San Joaquin Valley watershed that are to provide best available information on flood protection to cities and counties in the watershed for:

- Areas protected by State-Federal project levees, and
- Areas outside the protection of project levees.

These maps were developed based on the best information currently available. These floodplain maps are subject to change and may be updated periodically. These maps include the regulatory mapping and other available sources to delineate flood hazards. The mapping of flood hazard areas within the Study Area appears to correspond with those identified in the other maps, with much of the Study Area around the creeks in the west side being indicated as prone to flooding, and the majority of the Study Area east of Rogers Road also at risk for flooding. The DWR Best Available Map of flood information for the Study Area is presented in Figure VI-12.

In addition to the flood area maps developed by DWR and FEMA, DWR also prepares maps to delineate the Levee Flood Protection Zones for the major levees along the Sacramento and San Joaquin Rivers where flood risk may be incurred due to the potential for a levee break along these rivers. The Study Area lies west of and outside of the mapped Levee Flood Protection Zone along the San Joaquin River[35] .

Based on previous studies, the published flood maps and data mentioned above it appears that the Del Puerto Creek, Black Gulch Creeks and Salado Creek Drainage systems are at or exceed capacity during the 100-year flood event. While some discharge to these stream systems might be viable, additional study would be required to evaluate the risk of inducing greater flood risks downstream of where discharges might occur and to make possible recommendations to specifically address mitigation for induced flood hazards.

It is important to note that two infrastructure projects had been completed before the latest FIRM was published (September, 2008) that reduced flood hazards in the City. These include: 1) the Salado Creek diversion structures at the DMC, and 2) the improvement of Salado Creek conveyance capacity from Sperry Avenue to the San Joaquin River.

Salado Creek Diversion at the Delta Mendota Canal

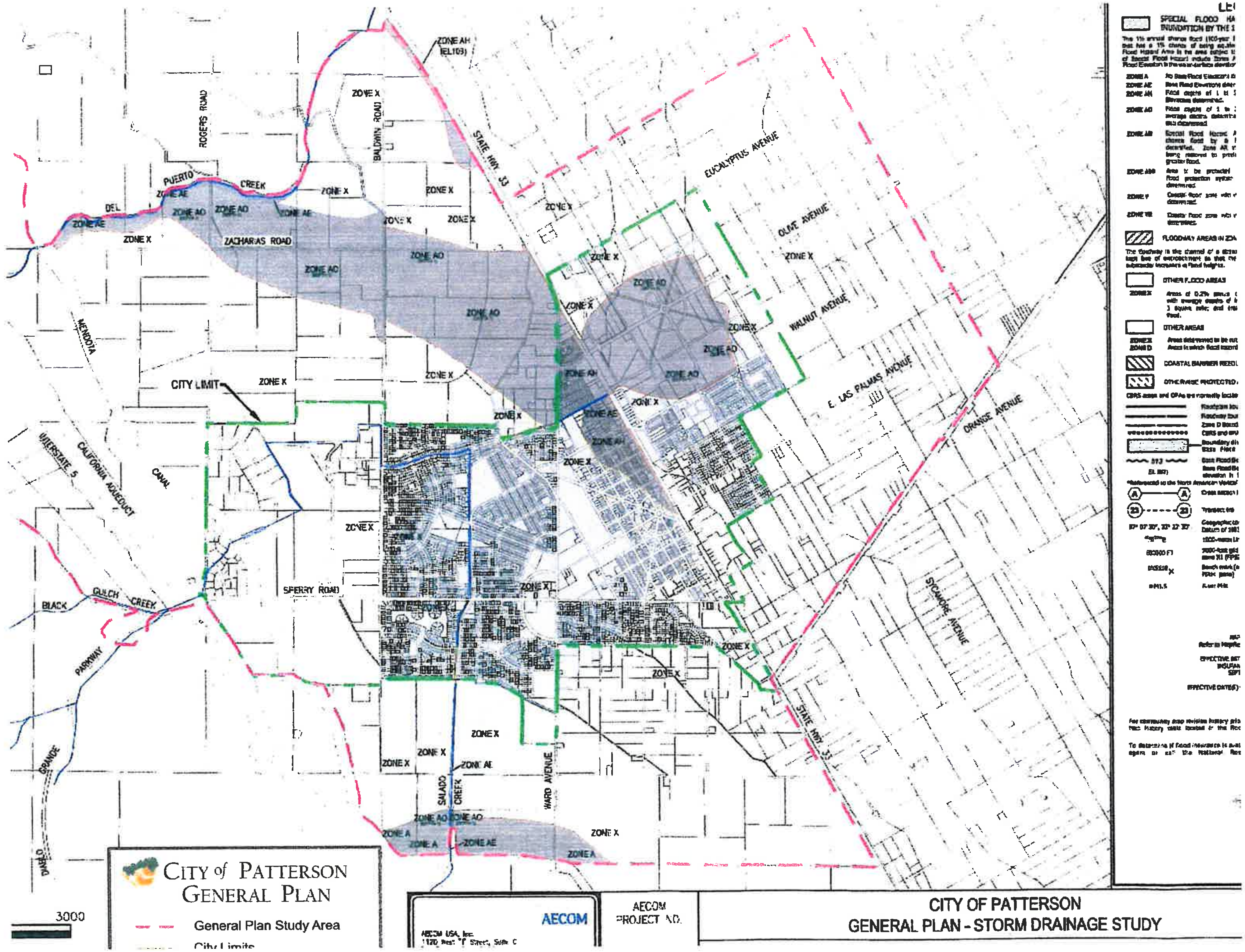
In 1998, three 60-inch diameter concrete culverts were installed through the levee that separates Salado Creek from the DMC. The culverts allow storm water to flow from Salado Creek into the DMC during moderate to large storm events. This diversion reduces the maximum peak flow through the DMC overchute and in Salado Creek north of the DMC. Prior to the installation of the diversion structures, the overchute had a calculated conveyance capacity of 710 cfs (during the 100-year event). The anticipated

[35] DWR, 2009

conveyance through the overchute during the 100-year event with the diversion structure in-place has not been calculated, but would be expected to be substantially less than 710 cfs.

Flooding can also occur as a result of catastrophic dam failure and the release of waters contained in upstream reservoirs. Figure VI-13 shows the general limits of dam inundation associated with the San Luis Reservoir.[36]

[36] Stanislaus County Multi-Jurisdictional Hazard Mitigation Plan, Volume One, 2005



CITY of PATTERSON GENERAL PLAN

General Plan Study Area

City Limits

AECOM

AECOM USA, Inc.
1120 West "I" Street, Suite C

AECOM PROJECT NO.

CITY OF PATTERSON
GENERAL PLAN - STORM DRAINAGE STUDY

Figure VI-11: Department of Water Resources Awareness Floodplain Map

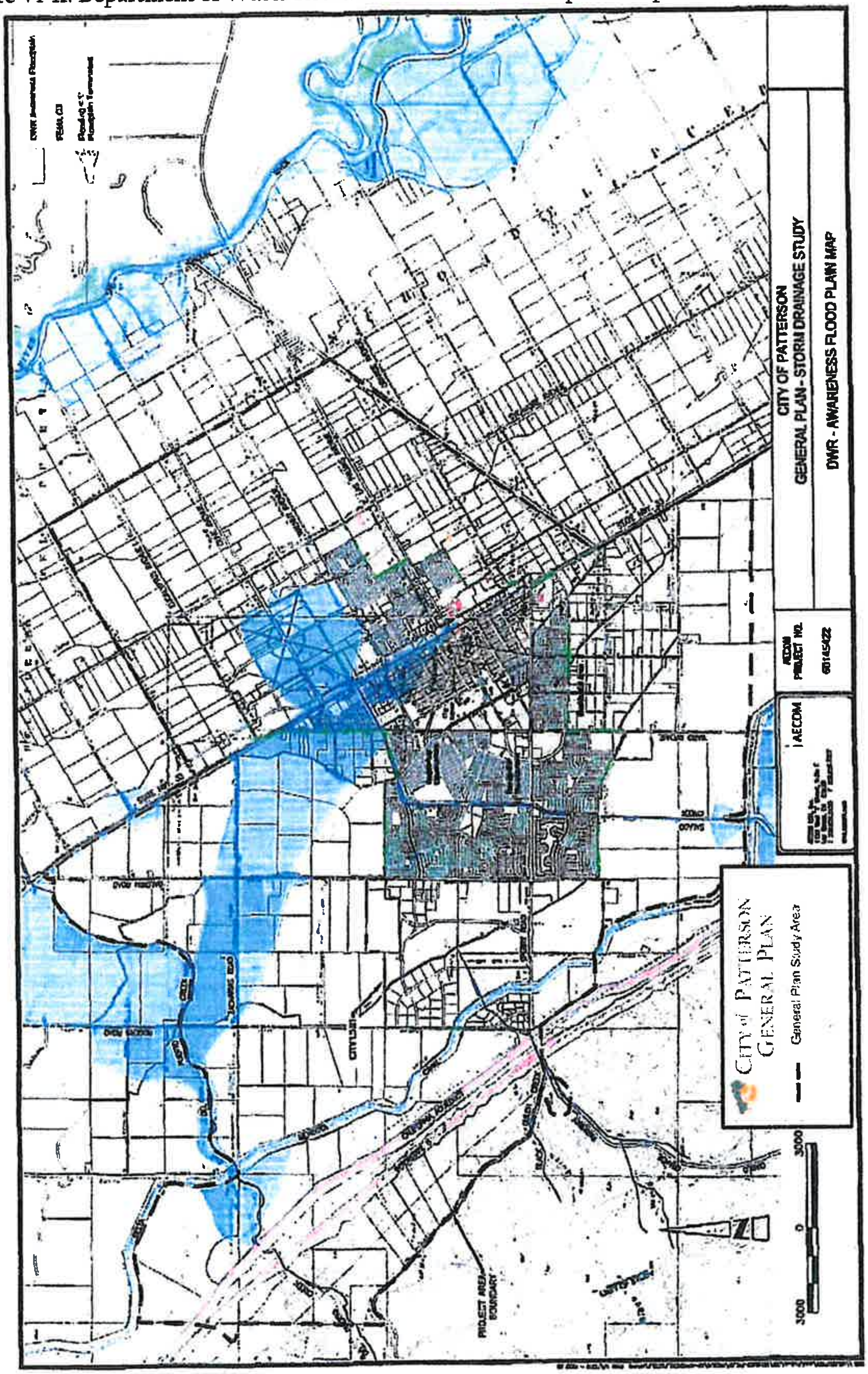


Figure VI-12: Department of Water Resources Best Available Flood Map

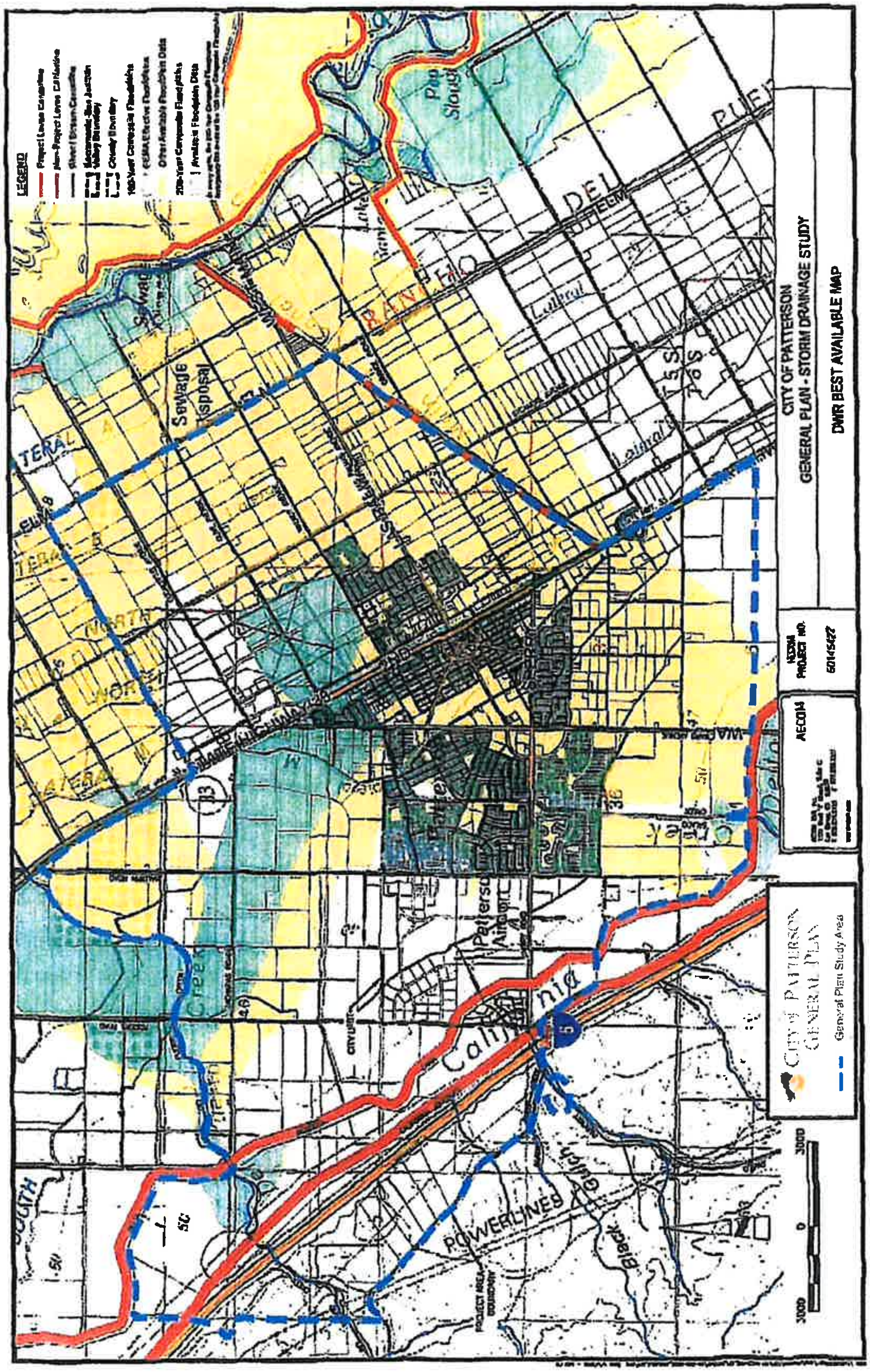
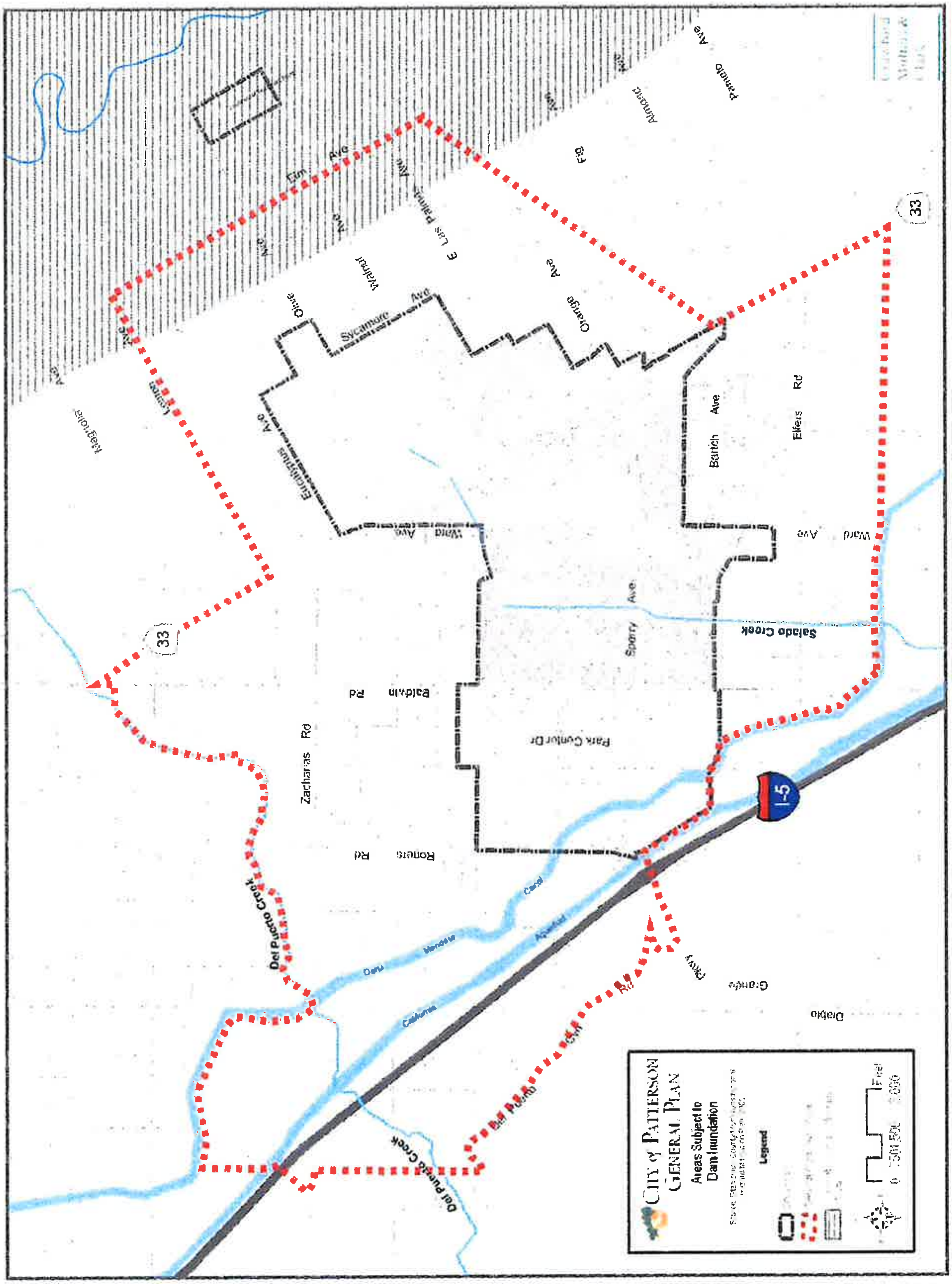


Figure VI-13: Potential Inundation Area for San Luis Dam



Previous and Ongoing Storm Management Efforts in Patterson

In 1992, the City prepared a Storm Water Master Development Plan that identifies the drainage improvements necessary to accommodate buildout of the City's General Plan area. The Master Plan recommends a combination of open channels and underground drainage pipes to mitigate the drainage impacts associated with buildout of the City.

The Storm Water Master Plan was modified with the approval of the Creekside Annexation and subsequent development agreement between the City and the developer of Patterson Ranch, the largest sub-area of the Creekside. The developer agreed to pay $2.5 million in up-front costs for storm drainage improvements that will serve their project and provide additional capacity to serve other areas of the City. This initial investment has been repaid over time by new development through the collection of impact fees. The money has been used to help alleviate the existing flooding problem east of Highway 33 through the installation of an expanded culvert and pipe between Ward Avenue and First Street, and through the construction of an open drainage channel between First Street and the San Joaquin River. The improvements described in the Storm Water Master Plan, as modified by the Patterson Ranch development agreement, are intended to mitigate potential drainage impacts associated with buildout of the City in accordance with the General Plan.

Salado Creek Flood Mitigation Project -- Completed in 1998

In 1998, a cooperative project among the County of Stanislaus, the City of Patterson, and Kaufmann & Broad was constructed to increase the carrying capacity of Salado Creek from Sperry Road all the way to the San Joaquin River. The improvements consisted of both channel enlargement and embankment construction with the majority of the work being construction of a 96-inch cast-in-place pipeline from a point just east of the Union Pacific Railroad all the way to the San Joaquin River. The design capacity of the facility between Sperry Road and the San Joaquin River is 500 cfs.

Drainage Improvements Associated With the Patterson Gardens Project – Completed in 2005

The final development plan for the Patterson Gardens residential project included improvements to the Salado Creek channel through that site. The plan reshaped the channel form to increase the conveyance capacity from an estimated 300 cubic feet per second (cfs) to 500 cfs. These improvements were beneficial to the region-wide drainage conditions which increased the channel capacity beyond 500 cfs since the downstream components are not designed to convey more than 500 cfs (Stoddard, 2001). In addition, the plan included bank reshaping measures and the establishment of a 20-foot setback (including a 7.5-foot oak savanna buffer). However, even with the proposed channel conveyance improvements, it has not been demonstrated that all 100-year flows would be contained within the channel banks, and therefore flooding of residential development proposed in the vicinity of Salado Creek could occur during moderate to severe flood events.

The 2001 Master Storm Drainage Plan, City of Patterson, Western Expansion Area (Master Drainage Plan) was prepared to guide storm drain infrastructure improvements required to adequately serve the anticipated growth in the Patterson Gardens and Business Park areas. The Master Drainage Plan specified Detention and Discharge to Salado Creek as the preferred alternative to address the drainage challenges of the west Patterson area. Specifically, the Master Drainage Plan states that (page 15):

- Storm water would be collected through a series of pipelines and discharged into one of many detention basins so that the flow could be attenuated and discharged to the creek. The discharge would be interrupted when insufficient capacity was available in the creek for conveyance some time later to avoid contributing to creek flooding downstream.

- Detention basins would be evacuated by gravity discharge with the basins connected in series to a pipeline which discharges to Salado Creek, with the exception of the basins near the creek which would be evacuated by use of pumping stations. Flow into the pipeline would both be 'metered' through an orifice, and regulated by a control gate. The rate of metering would be such that the entire contents of the basin could be evacuated within 48 hours. The basins would be designed to contain runoff from the 100-year 24-hour storm event.

- Detention basins would be configured to serve also as parks in a dual purpose function.

These improvements were completed in 2005.

Drainage Improvements Associated with The Villages of Patterson Project – Not Complete in 2010

The Villages of Patterson project lies within FEMA zones AO and B, and may be susceptible to flooding during an extreme storm event. Interpretation of the FEMA Flood Insurance Study data that was used to develop the flood hazard mapping for the area indicates that flood flows of up to 2,400 cubic feet per second could pass through the site during the 100-year flood event. Unmitigated, this magnitude of flood flow could cause injuries and/or substantial damage to proposed project elements, including residential buildings. The location of the proposed project occupies the overland flow path for a large portion of the overflow from Del Puerto Creek in extreme flood events. Therefore, it is not possible for the project to simply raise pad elevations above predicted base flood elevations without potentially impacting upslope areas due to obstruction of the flood flowpath. The preliminary hydraulic design for the proposed project specifies that the proposed Garcia Way and reconstructed Olive Avenue be designed to convey the flood flows (i.e., flood waters would flow over the street surfaces and be contained within the street right-of-way. This design is preliminary and requires additional hydraulic engineering.

The Villages of Patterson Storm Drainage Study and Master Plan describes the proposed approach to storm water management at the developed project site. Under The Villages project, the existing detention basin located northeast of the intersection of Olive and Sycamore Avenues would be expanded to accommodate increased runoff from the project site. The existing detention basin is designed to detain 40 acre-feet of storm water (runoff collected from the downtown area of the City of Patterson served by the Walnut/Sycamore Avenue storm drain line). The combined detention requirement of the expanded basin, which would receive stormwater flows from the Walnut/Sycamore storm drain line and the new Villages of Patterson development, would be 98 acre-feet based on a City of Patterson design criteria of the 10-year,24-hour storm event. The current design of the expanded basin includes approximately 80 acre feet of freeboard storage.

During extreme storm events associated with overflow from Del Puerto Creek reaching the basin, it is possible the capacity of the expanded detention basin would be exceeded. The basin would be designed so that the north and east (downstream) sides of the basin would be overtopped first and flood waters would be dispersed over a wide area. The basin would be designed to return flood flows to relatively flat lands northeast of the project site if the capacity of the basin was exceeded (essentially returning the flood flows to the path that they would take under existing conditions).

The project would reshape the 100-year floodplain through The Villages of Patterson site. Upon project implementation, the existing broad floodplain area would be replaced by relatively narrow flood conveyances. By restricting the area inundated at the site, the project would remove available floodplain storage, potentially increasing base flood elevations downslope.

The existing land use of the area downstream of the project site is rural, with relatively few residences or other structures that would be considered highly vulnerable to infrequent shallow flooding events. The applicant's engineering team has conducted a survey all the residences downstream of the project site that could be affected by the potential project-related incremental increase in 100-year flood level elevations. This survey determined that all of the finished floor elevations of the existing residences are greater than ten inches above surrounding grade. The maximum predicted depth of flooding (under both pre- and post-project conditions) is less than five inches. Therefore, provided the flood waters are properly dispersed at the eastern project boundary, none of the existing residences would be expected to be significantly impacted by the project.

Upon completion of construction of the new 100-year flood conveyance features at the project site, much of the proposed Villages of Patterson development would still be located in FEMA designated flood hazard zones (even though the FEMA floodplain would no longer represent actual flooding conditions because the project would direct the flows to the streets). To comply with the National Flood Insurance Program and City of Patterson policies, the development would be required to ensure that the elevation of all residential finished floors on lots adjacent to the 1 percent chance floodplain are at least one foot above the new 100-year flood elevation. Additionally, a formal revision of the FEMA flood hazard mapping would need to be completed to remove the requirement of purchasing flood insurance in those areas currently mapped in Zone AO.

Storm drainage improvements associated with The Villages project have not been completed in 2010 as the project has not started construction.

Storm Drainage Master Plan, 1992 – Completed By 1998

The Storm Drainage Master Plan for the City of Patterson, dated January 1992 (Santina, 1992), was prepared to address flooding problems from Salado Creek and develop a storm drainage system within the proposed growth areas shown in the City of Patterson General Plan, adopted June 11, 1992 (Patterson, 1992). This plan describes the proposed drainage system consisting of underground pipelines and open channels, and a detention basin along Salado Creek. Only the major trunk systems were described. The recommended system consisted of mostly open channels in the undeveloped areas, with the underground piping to be installed in the areas developed prior to the report publication. A 150-foot wide "Green Belt" was also recommended along SR-33.

Storm Water Management Plan

The completed Storm Water Management Plan (SWMP) for the City of Patterson was made available for public review beginning January 23, 2004, and provided to the RWQCB for their approval. The SWMP describes best management practices (BMPs), pollutant discharge related goals, and schedules for implementation of the plan for storm water management within the City.

Figure VI-14: Existing and Planned Drainage Improvements

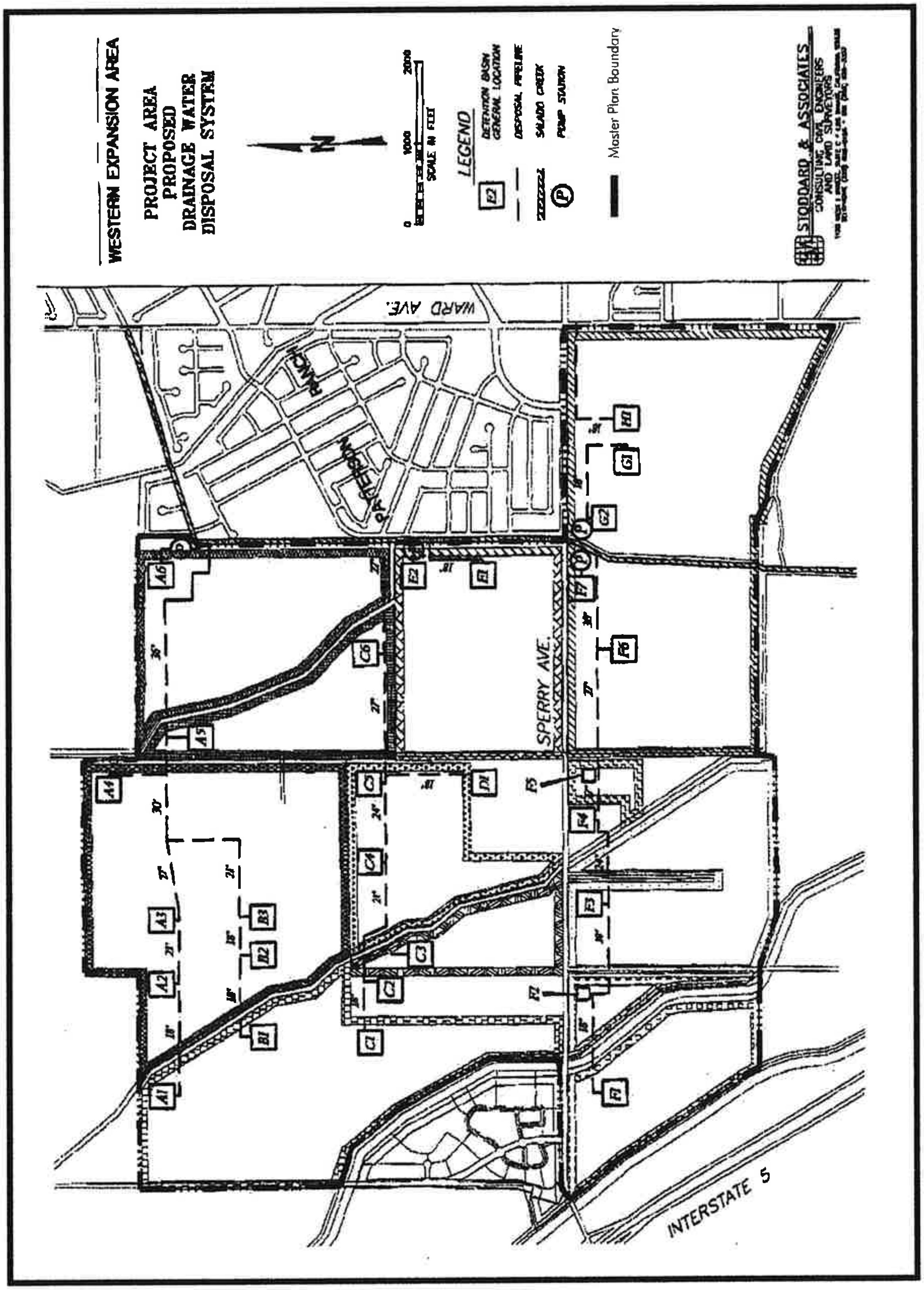


Figure VI-15: Drainage Improvements for The Villages of Patterson Project

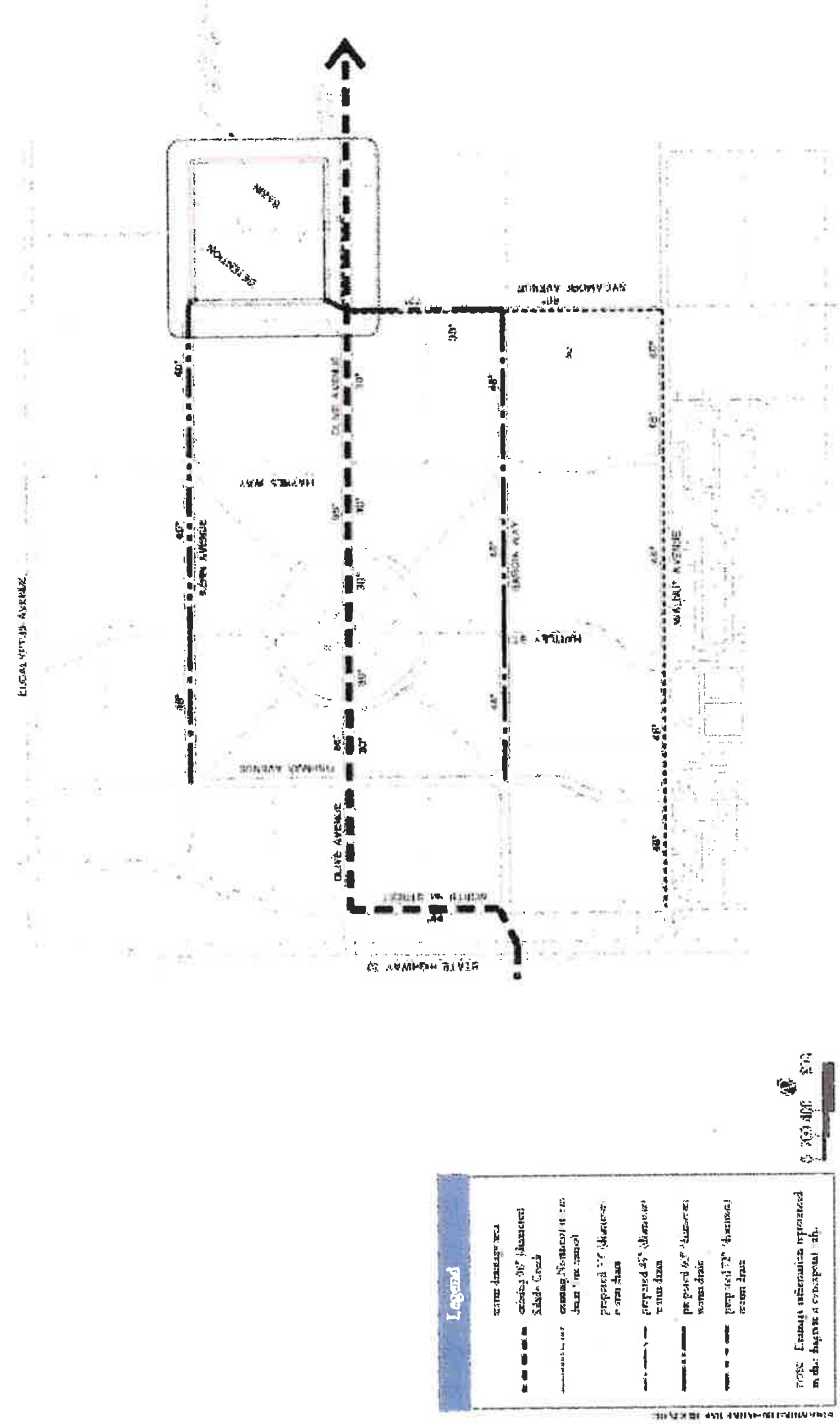
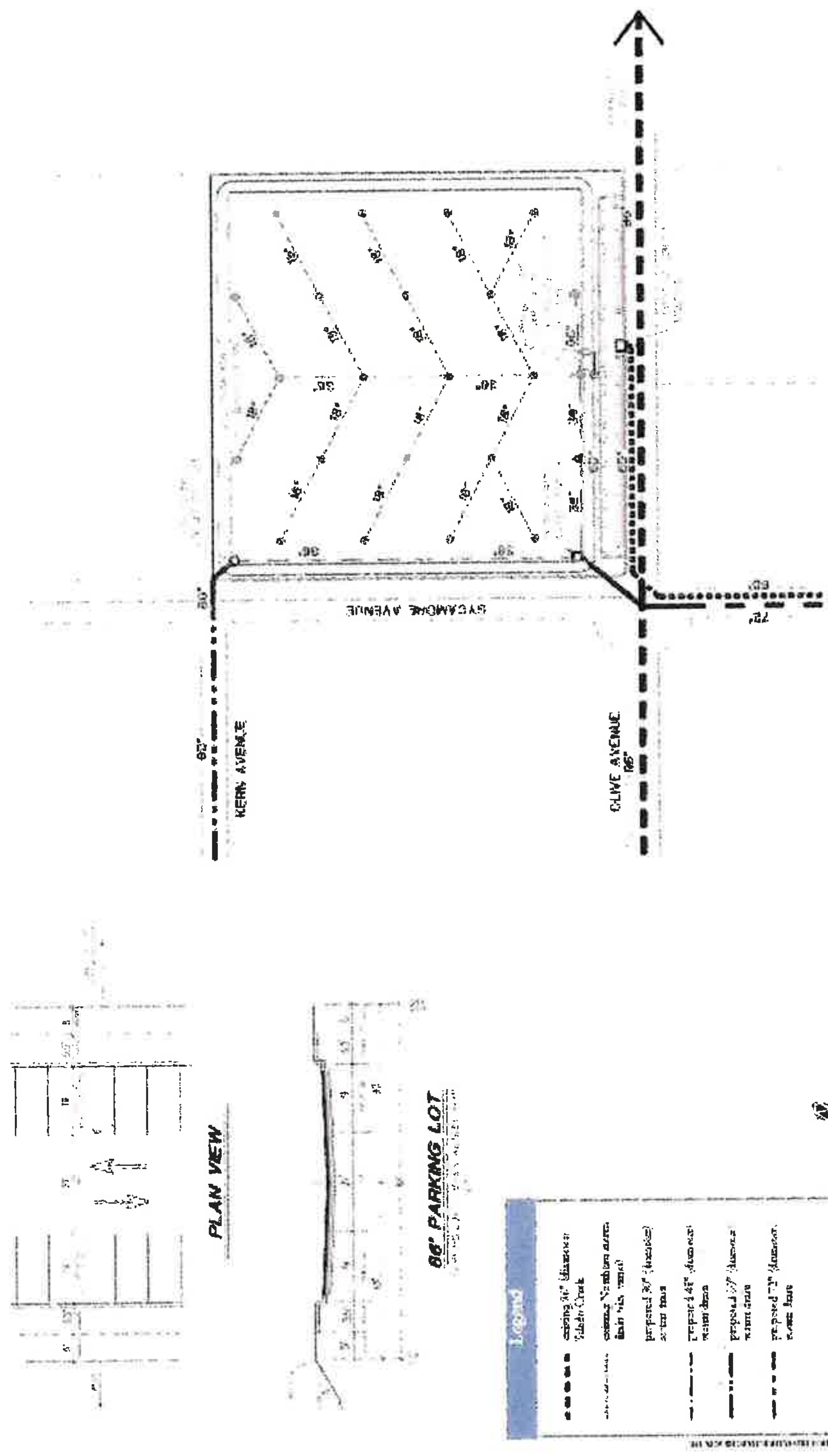


Figure VI-16: Drainage Improvements for The Villages of Patterson Project



Upon completion of construction of the new 100-year flood conveyance features at the project site, much of the proposed Villages of Patterson development would still be located in FEMA designated flood hazard zones (even though the FEMA floodplain would no longer represent actual flooding conditions because the project would direct the flows to the streets). To comply with the National Flood Insurance Program and City of Patterson policies, the development would be required to ensure that the elevation of all residential finished floors on lots adjacent to the 1 percent chance floodplain are at least one foot above the new 100-year flood elevation. Additionally, a formal revision of the FEMA flood hazard mapping would need to be completed to remove the requirement of purchasing flood insurance in those areas currently mapped in Zone AO.

Fire Protection

The Patterson Fire Department and the West Stanislaus Fire District (WSFD) provide fire protection within the City's General Plan Study Area. The Patterson Fire Department and WSFD share a full-time fire chief and a fire station in Patterson. For administrative purposes they operate as separate entities. The Patterson Fire Department provides fire protection to all lands within the city limits.

The Patterson Fire Department is staffed by 15 fulltime staff and 28 volunteers. Typically, two personnel are on duty at each station at any given time (Bill Kinnear, Fire Chief, March 2010). Volunteers are called from the area where the call originates.

The Patterson Fire Department and the WSFD have mutual aid agreements with all adjoining fire districts. In addition, the California Division of Forestry operates a fire station on Sperry Avenue east of Interstate 5.

The City operates two fire stations. The main station is located at 433 West Las Palmas Avenue but does not have adequate space for administration, equipment, equipment maintenance, storage, or adequate parking. A second fire station was recently completed within the Keystone Business Park at the southeast corner of Keystone Pacific Parkway and Park Center Drive. The Villages of Patterson project, which was approved in 2006 and subject to separate environmental review[37], has dedicated a building site as well as $3 million toward the cost of constructing a third fire station on the east side of the City. In addition, the developers have agreed to impose a fee on each dwelling of $270 to help fund the necessary staffing of the station. Together, the contribution of the project will provide adequate fire protection services for the Study Area and will help fund fire protection for the east side of the City.

The fire department's equipment includes three engines and one rescue vehicle (owned jointly by the City and the WSFD). Equipment owned by the WSFD includes nine engines (two reserves), five water tankers, three rescue vehicles (one reserve, one each owned jointly with the Cities of Patterson and Newman), one mobile air compressor, a large mobile generator, and a pickup truck.

[37] Turnstone Consulting, Final Environmental Impact Report for The Villages of Patterson Project, August 2006

The fire department's average response time varies, depending on the area. At present, 95% of calls are responded to within eight minutes (Kinnear, March 2010). The fire department's goal is to ensure that 95% of all calls are responded to within five minutes.

Fire protection classifications are designated by the Insurance Services Office (ISO). The ISO considers three primary factors in their rating system: fire department location, personnel, and equipment (50 percent); water supply and fire flow capacity (40 percent); and communications capabilities (10 percent). Ratings are based on a scale of 1 to 10, with 1 being the best possible protection. The Patterson Fire Department maintains an ISO rating of six within the city, and a rating of four in areas with hydrants (Kinnear, March 2010). Outside the City within the Study Area, the ISO rating is about nine.

In addition to fire suppression, the fire department's services include fire prevention, public education, fire hydrant maintenance, hazardous materials response, and nuisance abatement.

In 2000 the City prepared an updated capital improvement program and associated development impact fees study for public safety. These fees were subsequently updated in 2006 and identified a number of facilities and other equipment necessary to maintain acceptable fire safety standards through buildout of the General Plan. The recommended fire protection facilities and corresponding costs are listed in Table VI-10.

Table VI-10: Fire Protection Facility Needs for Buildout of the City's General Plan Area

Item/Facility	Quantity	Quantity Cost	Total
Station 3 Land	1.5 acres	$150,000/ acre	$225,000
Building	1	$2,700,000/building	$2,700,000
Fire Engines	2	$682,799	$1,365,598
Command Vehicles	2	$40,840	$81,680
Sub-Total:			$6,122,278
Aerial Ladder	1	$1,021,000	$1,021,000
Building for Aerial Ladder	1	$265,460	$265,460
Sub-Total:			$1,286,460
Station 1 Building Remodel			$1,750,000
TOTAL:			$7,408,738

Source: City of Patterson, CMCA, 2006

Table VI-10 shows that an additional fire station and specialized fire protection equipment will be necessary to accommodate buildout of the City's 1992 General Plan.

The desired ratio of fire fighters per 1000 population in Patterson is 4.7, and a ratio of about 1 to 1.25 full-time fire protection personnel per 1000. For a population of 19,200 (the City's 2006 population) the City would need a total of about 90 firefighters, including a minimum of 24 full-time staff. To achieve and maintain the desired ratio of firefighters to population through buildout of the City's 1992 General Plan, about 40 additional firefighters will be needed, in addition to the facilities identified in Table VI-10, above.

The Villages of Patterson project will be providing a building site as well as $3 million toward the cost of fire station No. 3 on the east side of the City. In addition, the developers have agreed to impose a fee on each dwelling of $270 to help fund the necessary staffing of the station. Together, the contribution of the project will provide adequate fire protection services for the project area and will help fund fire protection for the east side of the City.

Potential fire hazards associated within the City include the following:

- The use, storage and transport of flammable materials associated with residences, commercial businesses, industrial sites and public facilities;
- Gasoline stations and bulk petroleum storage facilities;
- Building materials associated with structures, including dwellings, retail and office buildings, industrial buildings and public facilities;
- Landscaping, street trees and weeds;
- Underground gas and petroleum lines and above-ground electrical facilities;

Police Protection

The City contracts with the Stanislaus County Sheriff's Department for police protection services. The Police Department (the Patterson Division of the Sheriff's Department) is located at 344 West Las Palmas Avenue and includes Administrative Offices, Investigative Bureau, Record Bureau, Volunteers in Public Service Training, Community Service Officers, Computer Information Services and a Central Dispatch Office.

The Division consists of 18 sworn officers, and 3 volunteers. There are three to six officers plus a shift supervisor on patrol at any one time. Response time is estimated to be less than 3 minutes to any part of the City. Police units are currently dispatched to City emergencies through the Stanislaus County Communications enter in Modesto. This County service is provided to the City on a contract basis.

The Division will respond to requests from other agencies outside the city limits when necessary. Other agencies who may request assistance include the California Highway Patrol, Stanislaus County Sheriff, City of Modesto Police Department, and the City of Hughson Police Department.

The draft Policy Document establishes a desired ratio of 1.5 full-time law enforcement employees per 1,000 population with recommended policy PS-5.3. The current staffing of 18 officers does not meet the desired ratio. Additional officer are funded through contractual arrangements with the County or by the City providing its own staffing. In addition, the financing district established for The Villages of Patterson project will fund police protection personnel for that portion of the City only.

In 2000 the City prepared an updated capital improvement program and associated development impact fee study for public safety. The costs and facilities were updated in 2006 as part of an update of the City's development impact fees. The fee study identifies facilities and equipment that will be necessary to maintain acceptable police protection safety standards through buildout of the 1992 General Plan. The recommended police facilities and their corresponding costs are listed in Table VI-11.

Table VI-11: Police Protection Facility Needs For Buildout of the City's Planning Area

Item/Facility	Quantity	Cost
Building	1	$1,351,200
Land (improved)	21,780 sq. ft.	$217,800
Vehicles and Other Equipment		$319,500
Office Equipment		$326,955
TOTAL:		$2,215,455

Source: City of Patterson, CMCA, 2006

Table VI-11 shows that additional building space and vehicles will be necessary to accommodate the level of development anticipated by buildout of the 1992 General Plan. The City's development impacts fees are aimed at providing funding for the equipment and facilities as they are needed to serve new development.

Parks and Recreation

Parks in Patterson are operated and maintained by the City. As shown on Table VI-12, the City has developed an extensive park system with a range of park facilities to serve active recreation and organized sports, as well as to provide open space and recreation amenities within residential neighborhoods. Existing park facilities include:

- Patterson Sports Complex is located south of the City at the southwest corner of Ward Avenue and Ranch Road and consists of 25 acres developed with ball fields, a children's play area, and parking.
- North and South City Parks at Las Palmas and Highway 33 make up a combined three acres. These are the oldest parks in Patterson, established when the town was originally laid out. The parks have

playground equipment, and are heavily used on holidays and weekends.

- Felipe Garza Park is a five-acre park at Walnut and Las Palmas Avenues. Facilities at the park include playground equipment, a baseball diamond, and an open grassy area.

- Several neighborhood parks located within the Patterson Gardens, Creekside, Patterson Ranch, and Walker Ranch projects.

City residents also use schools to supplement City park facilities. School grounds are open to the public after school and during the summer, and include the following:

- Northmead School is on a 7-acre site and is located at M and Fifth Streets. Facilities include a playground and an open grassy area. Roughly half of the 7 acres is designed for outdoor recreational purposes.

- Las Palmas School is on an 11-acre site located at 624 W. Las Palmas Avenue. The school grounds contain large open grassy areas suitable for field activities. About two-thirds of the site are available for outdoor recreational uses.

- Patterson High School and Junior High School share a 37-acre site at 200 N. 7th Street. Facilities include athletic fields, tennis courts, and a gymnasium. Little League baseball games are held at the high school. About half of the site is given to outdoor recreational uses.

In all, these school sites provide about 30 acres of informal recreational areas, which are not included in the City's 109.37-acre total shown in Table VI-12

The 1992 General Plan designates about 200 total net acres as Parks/Open Space. This acreage excludes school properties which are also used by City residents for recreation. Of the 200 total acres designated as Parks/Open Space, 109.37 acres are developed with a combination of parks and storm drainage detention basins. Of the 109.37 developed acres, 76.8 acres are developed as parks, while the remaining 32.5 acres are developed as drainage basins. Although land devoted to drainage basins may be used for some forms of outdoor recreation, this acreage is not counted toward the City's acreage of developed park land.

The draft Policy Document establishes a goal of 5 acres of developed parkland per 1,000 residents (policy PS-1.2). Section 66700 (A) of the Subdivision Map Act (the Quimby Act) states:

> *(A) The park area per 1,000 members of the population of the city, county, or local public agency shall be derived from the ratio that the amount of neighborhood and community park acreage bears to the total population of the city, county, or local public agency as shown in the most recent available federal census. The amount of neighborhood and community park acreage*

> *shall be the actual acreage of existing neighborhood and community parks of the city, county, or local public agency as shown on its records, plans, recreational element, maps, or reports as of the date of the most recent available federal census.*

The most recent available census is from 2000 when the City's population was 11,606 and the amount of developed parkland within the City was 22.1 acres, which result in a ratio of 1.9 acres of developed parkland per 1,000 residents. As discussed above, in 2010 the total acreage of developed parkland in the City is about 76.83 acres, making the ratio of developed parkland about 3.6 acres per thousand residents, which is below the current General Plan standard.

There remains a significant amount of undeveloped land designated for parks under the current General Plan. Most of the remaining undeveloped parkland lies within The Villages of Patterson project approved in 2006. The Villages project would provide about 66 acres of new parks, including a 40-acre soccer field complex at the northeast corner of Sycamore Avenue and Olive Avenue. Development of the remaining 90 acres of undeveloped park acreage in the same proportion as existing parks (about 77% for park facilities and about 33% for drainage facilities), would result in an additional 70 acres of developed parkland.

Excluding school property, Patterson has a ratio of approximately 3.6 acres of existing developed parkland per 1,000 residents. State law (California Government Code 66477 et seq.) allows local governments to require new development to provide through dedication of land or payment of an in lieu fee, the equivalent 3.0 acres per 1,000 residents unless the existing ratio of park acreage to population exceeds that limit. In such a case local governments may require up to the existing standard, but not to exceed 5.0 acres per 1,000residents.

Park facilities are listed in Table VI-12.

Table VI-12: Existing Park Facilities			
Name	**Location**	**Amenities**	**Acres**
Developed Parkland			
North Park	Las Palmas Ave and 2nd Street	Picnic table, playground	0.98
Memorial Park	Las Palmas Ave and Walnut Ave	Benches, horseshoe	0.99
Noble Park	Noble Park and Bennett Drive	Tot lot	0.52
Wilding Park	Ashwood and Oakwood Lane	Basketball court, playground, picnic table	2.47
Felipe Garza Park	Hartley Street	Baseball diamond, playground	2.84
Sorensen Park	"M" Street	Playground	1.83
Newcastle Park	American Eagle Ave and Red Robin Drive	Playground, gazebo, benches	2.08
Golden Amber Park	Heartland Ranch Ave and Red Robin Drive	Playground	1.29
Autumn Royal Park	Heartland Ranch Ave and Red Robin Drive	Tot lot, picnic table	2.40
Tilton Park	James Burke Ave and Kestrel Drive	Playground, tot lot, picnic table	3.50
Blenheim Park	American Eagle Ave and Pipit Drive	Tot lot, gazebo	1.25
Sun Glow Park	American Eagle Ave and Kestrel Drive	Tot lot	1.94
Floragold Park	Shearwater Drive and American Eagle Ave	Playground	3.22
Ambercot Park	Creekside Drive and Alpine Creek Drive	Playground, gazebo, picnic tables	4.07
Goldbar Park	Samantha Creek Drive and Gold Creek Drive	Rock climbing, swings, gazebo, picnic table	3.80
Sungiant Park	Samantha Creek Drive and Snow Creek Drive	Basketball court, picnic tables	1.50
Tri Gem park	Steel Creek Drive and Snow Creek Drive	Basketball court, playground, gazebo	0.82
Rosette Park	Mendocino Creek Drive and Amador Creek Drive	Rock climbing, swings, gazebo, basketball court	1.04
Castlebrite Park	Toggenburg Street and Damara Court	Tot lot, picnic tables	0.53
Early Gold Park	Jersey Lane and Brangus Street	Basketball court, tot lot, playground, gazebo	1.26
Aprigold Park	Hackney Street	Playground, picnic tables, gazebo, tot lot, baseball diamond	3.89
Camas Lily Park	American Eagle Ave and Sperry Ave	Soccer field, benches, basin	2.55
No Name	Horizon Lane	Tot lot	0.69
Woodland Star Park	Azalea Drive and Scarlet Lane	Playground, rock climbing, gazebo	2.19
Blue Fiesta Park	Bella Flora Lane and Sweet Briar Drive	Water feature, gazebo	0.50
Meadow Rue Park	Tissot Drive and Garden Patch Way	Exercise equipment, baseball diamond, gazebo	2.85
Sports Complex	Ward Avenue	Baseball diamond, soccer field, playground, gazebo, picnic tables	25.52
Del Puerto Park	Del Puerto Ave and 5th Street	Bench	0.31
Subtotal			**76.83**
Other Facilities Used for Recreation (Including Drainage Basins)			
No Name	Logan Way and Walnut Ave	Basin	0.37
Aurora Park	Roadrunner Drive and Cliff Swallow	Basin	0.55
Mustang Clover Park	Calvinson Parkway and Bella Flora Lane	Volleyball court, basin	3.27
Valley Lupine Park	Sperry Ave and Las Palmas Ave	Basin	0.90

Table VI-12: Existing Park Facilities			
Name	**Location**	**Amenities**	**Acres**
No Name	Baldwin Road and Keystone Pacific Parkway	Pond/basin	9.09
No Name	Baldwin Road and Keystone Pacific Parkway	Basin	5.61
No Name	Keystone Pacific Parkway and Pacific Center Drive	Basin	2.30
No Name	Keystone Pacific Parkway and Pacific Center Drive	Basin	6.38
No Name	Keystone Pacific Parkway and Pacific Center Drive	Basin	2.44
Sunflower Park	Sunflower Drive	Basketball court, basin	1.63
Subtotal :			**32.54**
TOTAL:			**109.37**
Source: City of Patterson Department of Parks and Recreation, 2010			

Table VI-13 provides a summary of park and recreation acreage, and includes school facilities.

Table VI-13: Summary of Park Acreage in Patterson	
Facilities	**Acres**
Developed Parkland[1]	76.8
Other Facilities Used for Recreation	32.5
Undeveloped Land Dedicated for Park Use	90.0
TOTAL Existing and Planned City Facilities	**199.3**
School Facilities[2]	about 30
TOTAL All Existing and Planned Facilities	**about 230**

Notes:

1. Net developed acres (see Table 5.3-7)
2. Estimated

Parkland Acquisition

The City requires new development to dedicate its fair share of parkland, or to pay an in lieu fee as allowed by State law. The City also collects development impact fees from new development to develop park facilities. The City also uses a combination of impact fees and improvements negotiated through development agreements to construct other recreational facilities, which in the past has included a community center, senior center and aquatics center.

The Quimby Act (discussed below) provides a mechanism for the acquisition of parkland by local governments as a condition of subdivision approval. These fees may be used to develop new park facilities or to replace facilities at existing parks. The City's Park, Recreation and Other Facilities fee includes cost components for general park improvements as well as fees to fund the second phase of the TW Patterson community sports complex.

Recreation

The City's Recreation Department offers a number of recreational classes and activities at a nominal fee to cover costs. Such classes and activities include: youth soccer and baseball, volleyball, dance classes, swim lessons, gymnastics, yoga, karate, preschool story time, and a variety of other activities open to the public.

Schools

The City and the General Plan Study Area lie entirely within the boundaries of the Patterson Joint Unified School District (PJUSD). The District is bounded by the San Joaquin County line to the north, the San Joaquin River to the east, Marshall Road to the south, and Santa Clara and Alameda Counties to the west.

The schools within the PJUSD that serve Patterson, as well as enrollment at each school, are shown in Table VI-14.

Table VI-14: PJUSD, Patterson Area Schools Enrollment (2008-09)

School	Enrollment
Elementary Schools	
Northmead Elementary School	872
Las Palmas Elementary School	622
Apricot Valley Elementary School	750
Middle School	
Creekside Middle School	1,277
High School	
Patterson High School	1,609
Del Puerto High School	99
Total Enrollment	**5,229**

Source: Patterson Joint Unified School District, 2010.
http://www.patterson.k12.ca.us/sarcs.html

School enrollment rose from 2004 to 2007, but has declined somewhat since, which is likely a function of the economic recession that began in 2008 which resulted in home foreclosures that tended to affect families with school-age children. High school enrollment decreased by about 50-70 students in 2009 from the previous year.

The PJUSD currently has a loading policy of 20 students per K-3 classrooms, 25 students per 4-6 classrooms, and 30 students per 7-12 classrooms. To accommodate enrollment increases that may be expected in the future, the School District has added portable classrooms at most of its school sites.

The School District owns a 12-acre site along Ward Avenue within the Patterson Gardens project area that it plans to use for an elementary school, and a 56-acre site located on the corner of Baldwin Road and Zacharias Road that it plans to use for a new high school. In addition, the School District recently constructed a new school on the corner of Walnut Avenue and Hartley Street within The Villages of Patterson project to be used initially for a K-8 school and later for a middle school for students in grades 6-8.

The Yosemite Community College District also serves the Patterson area. The nearest community college is Modesto Junior College in Modesto, which has two campuses. The main campus is located on College Avenue, and Modesto Junior College West is located on Blue Gum Avenue. The two campuses offer a full program of courses suitable for transfer to a four-year college or university, as well as Associate of Arts degrees. The District has purchased a 10-acre site west of Ward Avenue and south of Sperry Avenue to construct a satellite campus in Patterson.

California State University, Stanislaus (CSUS), is located in Turlock, approximately 18 miles east of Patterson. CSUS offers a variety of four-year bachelor of arts and science degrees, and a limited number of masters of arts degrees. Chapman College in Modesto, a private college, also offers bachelors and masters degrees. A number of business and vocational schools are also located in Modesto. The John F. Kennedy Special Education Center in Modesto provides a complete range of classes for the trainable mentally retarded, developmentally handicapped, and multi-handicapped students, from 0 to 22 years of age. The center also provides vocational training and parent counseling.

Regulatory Setting

State Regulations

Leroy F. Greene School Facilities Act of 1998 (SB 50)

In 1998, the State Legislature enacted significant amendments to the statutory scheme for school fees with the adoption of the Leroy F. Greene School Facilities Act of 1998 (SB50). Senate Bill 50 included a $9.2 billion bond measure which was approved by the voters as Proposition 1A in the November, 1998 election. The approval of Proposition 1A made operative other provisions of SB 50 that amended the laws governing school impact fees and other mitigation of school facilities impacts.

More specifically, SB 50 amended Government Code Section 65995(a) to prohibit state or local agencies from imposing school impact mitigation fees, dedications, or other requirements in excess of those provided in the statute. The legislation also prohibits local agencies from denying or conditionally approving a project based on the inadequacy of local school facilities. SB 50 establishes the base amount of impact fees at $1.93 per square foot for residential construction and $0.31 per square foot for commercial construction. In certain circumstances, school districts may impose alternate fees for new residential construction as prescribed by Government Code Section 65995.5 and 65995.7. Section 65995.5 provides a formula and establishes the criteria under which a revised fee for school impact mitigation may be imposed by the governing body of the school district. Section 65995.7 provides the circumstances under which a school governing board may increase the fee if state funding is not available.

For many school districts, this fee is not sufficient to cover the actual cost of new school facilities generated by each new student. Other funding sources, such as the sale of school facilities bonds, have helped bridge this gap. Another approach is for school districts to enter into agreements with local jurisdictions (cities and counties) for additional mitigation, usually in the form of supplemental fees. Another option is the issuance of bonds to generate revenue for the construction of school facilities. Residents within the Patterson Joint Unified School District voted in May 2001 to approve a general obligation bond to generate $19.5 million for new school facilities construction.

The School District adopted its most recent School Facilities Needs Analysis on May 8, 2006. More recently, the District has prepared a draft fee justification study that it will consider for adoption in May, 2010[38]. The draft study sets forth the facilities needs for the District for through 2015 and establishes development impact fees to help fund the acquisition of land and the construction of new schools. The study concludes that justification exists for the District to levy Level II and Level III fees on new residential construction within the District. In accordance with State law, Level II fees are currently $4.25 per assessable square foot of residential construction and Level III fees are $8.50 per assessable square foot of residential construction.

Electricity, Natural Gas and Other Utilities

Electrical Power

Patterson lies within the electrical service area of the Turlock Irrigation District. During the summer of 2001, California experienced significant energy shortages that resulted in numerous requests for energy conservation and "rolling blackouts" in central and northern California. The energy shortage, which is likely to continue for several more years, also resulted in dramatic increases in the cost of electricity to many consumers throughout the state. In addition, two of the state's largest investor-owned utilities, Pacific gas and Electric Company (PG&E) and Southern California Edison have failed to meet their financial obligations. In April of 2001, PG&E filed for voluntary protection under Chapter 11 of the federal Bankruptcy Code.

An agreement for the sale to the Turlock Irrigation District of PG&E's distribution facilities in western Stanislaus County—including those serving the City of Patterson and surrounding area—was reached in 2001 and approved by both of the utilities, the California Public Utilities Commission, and other local, state and federal agencies, as well as the federal bankruptcy court. Electricity service is presently provided to the City and its sphere of influence by the Westside Power Authority, which is comprised of the Turlock Irrigation District and the Patterson Irrigation District. The Westside Power Authority service area consists of approximately 225 square miles, including the City and surrounding areas. The City anticipates that electric rates will decline upon the acquisition of the facilities by TID.

[38] Jack Shreder and Associates, Draft School Facilities Needs Analysis for the Patterson Joint Unified School District, April, 2009

TID produces up to 708 megawatts of electricity from eleven power generating plants that include hydroelectric, gas, wind and solar powered generating stations. In 2008 the District sold about 3.2 million megawatt hours of electricity to customers, of which about 60 percent came from the District's power plants and the remainder was purchased from electricity vendors.

Natural Gas

Natural gas is provided to the Study Area by Pacific Gas and Electric Company (PG&E). PG&E has adopted a similar strategy to the provision of natural gas as that applied for new electrical service by TID. That is, as areas with little or no natural gas service develop, transmission lines are constructed as needed to increase service capacity. Impacts associated with the extension of underground natural gas lines are comparable to those for the installation of underground electrical, water, and wastewater lines.

Telephone Service, Cable TV and Internet Providers

Evans Telephone Company provides telephone service to Patterson, In July 1988, Evans Telephone installed a new switching system as part of its expansion program for Patterson. The former switching station could serve a maximum of 3,500 access lines.

Global Valley Networks provides telephone and internet services to the communities of Patterson, Livingston, Guinda, San Antonio, Diablo Valley, Westley, Cressey, Grayson and Capay Valley.

NetVelocitē Inc. offers voice network (VoIP), related products and wireless broadband internet service for rural and remote communities. Presently NetVelocitē serves about 35 square miles in Stanislaus County, including Patterson.

Health Care

The City of Patterson and the General Plan Study Area lie within the boundaries of the Del Puerto Health Care District (DPHCD or District). The District was formed in 1947 for the purpose of funding hospital services in Patterson, and covers not only the city, but also the unincorporated portions of western Stanislaus County, west of the San Joaquin River. Unincorporated communities in the District include Westley, Crows Landing, Vernalis and Grayson.

Hospital/Healthcare Districts may exercise the following powers: to establish, maintain, and operate, or provide assistance in the operation of, one or more health facilities or services, including but not limited to outpatient programs, services and facilities; retirement programs; chemical dependency programs, services and facilities, or other healthcare programs, services, facilities, and activities at any location inside and outside the district for the benefit of the district and people served by the district; to acquire, maintain, and operate ambulances, or ambulance services inside and outside the district; and to establish a nurses' training school, or child care facility for the benefit of employees of the hospital or residents of the district (Health and Safety Code Section 32121). The following discussion was derived from the Stanislaus Local Agency Formation Commission draft Municipal Service Review and Sphere of Influence Plan for the Del Puerto Health Care District[39].

The District provided hospital services until 1998 when, for economic reasons, the hospital was forced to close. The District has maintained ambulance services since 1986, paid all outstanding debts, and as of June of 2003, provides outpatient care through the Del Puerto Health Center. Current services and programs include the following:

- The Patterson District Ambulance provides emergency medical services within the District. Ambulances are staffed with Paramedics and EMTs. Currently, one 24-hour and one 12- hour ambulance serve the District, as well as provide mutual aid to surrounding areas. As a service to area hospitals, the District offers long distance and critical care transports, which allow the Patterson Ambulance to assist with the overcrowded system. The District is able to provide 18 trips per week without straining resources.

- Del Puerto Health Center provides 6-day a week urgent/primary care to west Stanislaus County. The Center is open Monday through Friday 8:30 a.m. - 8:30 p.m. and Saturday 8:30 a.m. - 4:30 p.m. Services include primary care, women's health exams, obstetrics, family care, industrial medicine, drug screenings, physicals, workers compensation care, urgent care, etc. Specialized pediatric care is provided Monday through Friday 8 a.m. – 5 p.m. Other visiting specialists include cardiologists and neurologists. The Center also provides lab and X-ray services.

- The District promotes community education and outreach efforts, including but not limited to the following: providing nursing and paramedic scholarships; public service/education on topics such as: seatbelt safety, safe fireworks, stroke information, etc; as well as attends community events (e.g. Patterson Apricot Festival and Health Fairs). The District also sponsors Project FIITNESS (Fostering Individual Improvement Through Nutrition Exercise Student Specialists), a club for middle school students to prevent diabetes. Other sponsorships or collaborations include women's health events held twice a year (for breast exams, pap exams, and cholesterol screenings), and a heart healthy screening program in the spring. The District is currently applying for a comprehensive perinatal services program.

- The Patterson Ambulance staff provides CPR and first aid classes. This low cost service targets individuals, businesses, and those whose job requires certification. Five employees are trained to teach.

[39] Stanislaus Local Agency Formation Commission Draft Municipal Service Review and Sphere of Influence Update for the Del Puerto Health Care District, 2009

- The District is designated as a teaching facility. Staff training is not only provided, but periodically, the District partners with the Patterson Fire District and Westside Ambulance to provide mutual training and has hosted EMS Agency training. Senior paramedics precept paramedic and EMT interns. The District assists with the emergency medical system by training approximately 8 Paramedics a year and providing paramedic scholarships to District EMTs.

According to the District's Impact Fee Study, the estimated total service population for the District was 22,189 persons in 2005. The study projects a total service population of 55,511 in 2020. This estimate was made using a combination of data including, current population and employment, Stanislaus Council of Government's population projections, and information regarding approved developments, including those in the City of Patterson that have not yet been built-out (e.g. Villages of Patterson). In 2008, the District responded to over 1,500 ambulance calls (an average of 125 calls per month) and served approximately 6,500 patients and 26,000 visits at their Health Center.

The District created a Strategic Plan which covers all aspects of future medical care needs for the Westside. In 2008, it was determined that the Health Center is out of room and that instead of expanding to an additional space, the District plans to purchase or construct a building to house specialists, additional providers, and ancillary services. The District Board has chosen a location and is working towards the creation of a new health center.

Given the increased demand for healthcare services, the District's Health Center has outgrown its current location and it is anticipated to relocate in 2010. The District has negotiated to purchase a 30,000 square foot building, which would allow for the Health Center to more than double in size, providing more space for procedures, stress and echo testing, colo-rectal screenings, and additional space for specialists and family physicians.

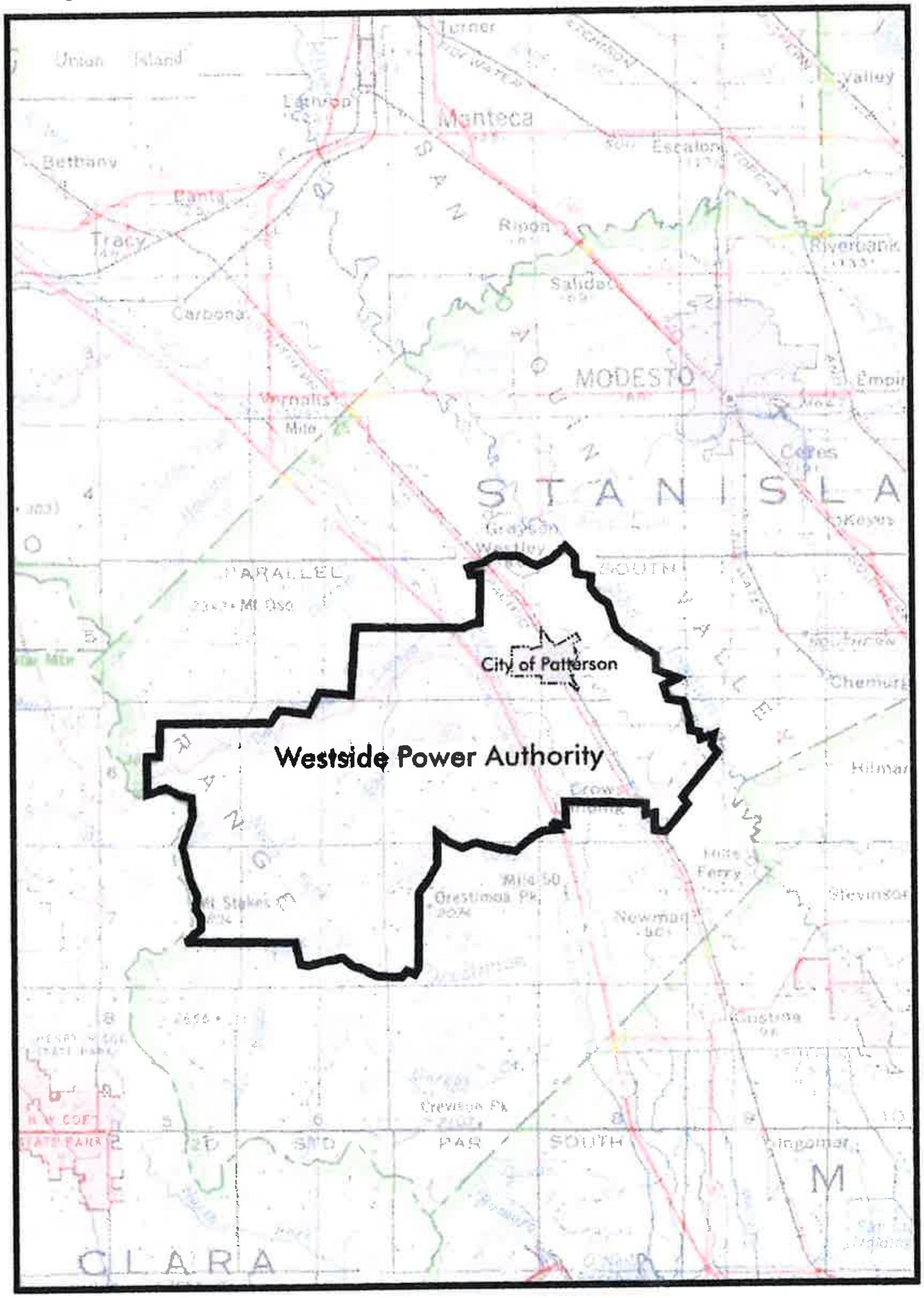
The District owns and maintains four ambulances and all equipment necessary to place the ambulances in service. The District also owns all equipment necessary to provide services to the Health Center.
Patterson Ambulance provides fire-standby for local and state fire agencies, and standby for sporting and other local events.

While there is no operating hospital in the DPHCD, the District continues to receive taxes within its boundaries, and is managed by a five-member board elected at large.

The private, non-profit Golden Valley Health Center at State Highway 33 and "C" Street serves underserved communities and is currently expanding its hours and services with a grant from the state's Healthy Families Program. The nearest acute care and emergency care medical facilities are regional facilities located in Turlock (19 miles), Modesto (21 miles), and Tracy (about 29 miles).

In 2010, the Health Care District is in the process of relocating their administrative offices and clinic to the Keystone Business Park.

Figure VI-17: Westside Power Authority Service Area



Solid Waste

The City of Patterson provides mandatory solid waste collection to all residents and businesses in the City, as well as unincorporated areas adjacent to the City. According to the California Integrated Waste Management Board's website, the City recycled about 61 percent of its solid waste in 2006, the most recent year for which data are available[40]. Recycling is by way of a green waste/garbage separation program, and through the operation of a recycling center.

The City has a franchise agreement with Bertolotti Patterson Disposal, which serves a majority of City residences with trash and curbside recycling collection services. These services include weekly collection for single family homes, mobile homes, and multi-family residences. Bertolotti Disposal also provides commercial and industrial waste pickup. Recycling containers are provided at no cost to interested participants.

The City's non-recyclable waste is disposed of at the Fink Road Landfill, located west of Crows Landing. The waste-to-energy facility at that location also burns refuse and provides electricity to PG&E. The landfill receives non-recyclable materials from all of Stanislaus County. The landfill capacity is 14.5 million cubic yards, and is currently operating at 31% capacity, leaving a remainder of 10 million cubic yards of capacity. The facility is permitted to receive 2,400 tons per day; at that rate of disposal, the landfill is expected to reach capacity by 2023[41] .

In 2007, the landfill received 134,574 tons of waste[42]. This translates to an average of 369 tons per day, which is a 17% reduction from the previous year, and considerably less than the permitted daily rate of disposal. The life of a landfill depends to a large extent on the density of the waste received, since the permit is based on the weight of the waste, not the volume. The lighter the waste, the more volume it will consume. Typically, solid waste density varies considerably, from as little as 220 pounds per cubic yard for auto tires, to as much as 2,400 to 3,000 pounds per cubic yard for various earth materials[43] . However, most household materials are within a range of 800 to 1,600 pounds per cubic yard.

Assuming an overall average of 1,200 pounds per cubic yard for all waste, and assuming the 2007 waste stream level of 369 tons per day continues into the future, the remaining life of the landfill would be about 45 years. Note that if the average density of waste were reduced to 1,000 pounds per cubic yard,

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[40] CIWMB, Facility/Site Summary Details: http://www.calrecycle.ca.gov/Profiles/Juris/JurProfile2.asp?RG=C&JURID=616&JUR=Patterson accessed March 2010

[41] http://www.calrecycle.ca.gov/Profiles/Facility/Landfill/LFProfile1.asp?COID=50&FACID=50-AA-0001

[42] http://www.calrecycle.ca.gov/Profiles/Facility/Landfill/LFProfile2.asp?COID=50&FACID=50-AA-0001

[43] http://www.calrecycle.ca.gov/SWFacilities/CDI/Tools/Calculations.htm

the remaining life would be reduced to 37 years. At the same time, continued diversion of waste to recycling may increase the lifespan of the landfill. Thus, the life of the landfill cannot be accurately known at this time, but for planning purposes it can be estimated to be from 35 to 50 years.

The next permit review for the Fink Road Landfill will be in August 2012, at which time capacity and possible expansion issues could be considered.

Waste Generation Rates

As reported to the California Integrated Waste Management Board, daily waste generation factors for Patterson were approximately 3.9 pounds per capita per day for residential uses and 12.2 pounds per employee per day for non-residential uses in 2008 [44]. Based on these waste generation factors, in 2009 the City generated approximately 82,793 pounds of residential waste per day or about 15,110 tons for the year (based on a population of 21,229), and 47,750 pounds of non-residential waste per day or about 8,714 tons for the year (based on 3,914 employees citywide). Overall, the City generated about 23,824 tons of solid waste in 2009. With a recycling rate of about 61 percent, an estimated 14,533 tons of Patterson's annual waste stream were diverted from landfills in 2009. This means about 9,291 tons of waste from Patterson enters the landfill annually. Assuming 1,200 pounds per cubic yard, an estimated 15,486 cubic yards per year enters the landfill from Patterson's existing development.

California Integrated Waste Management Act

The California Integrated Waste Management Act of 1989 (AB 939) requires every city and county in the state to prepare a Source Reduction and Recycling Element to its Solid Waste Management Plan that identifies how each jurisdiction will meet the mandatory state waste diversion goals of 25 percent by 1995 and 50 percent by 2000 and beyond. The purpose of AB 939 is to "reduce, recycle, and re-use solid waste generated in the state to the maximum extent feasible." The term "integrated waste management" refers to the use of a variety of waste management practices to safely and effectively handle the municipal solid waste stream with the least adverse impact on human health and the environment. The act has established a waste management hierarchy, as follows: source reduction; recycling; composting; transformation; and disposal.

California Integrated Waste Management Board Model Ordinance

Subsequent to the Integrated Waste Management Act, additional legislation was passed to assist local jurisdictions in accomplishing the goals of AB 939. The California Solid Waste Re-use and Recycling Access Act of 1991 (Sections 42900–42911 of the Public Resources Code) directs the California Integrated Waste Management Board (CIWMB) to draft a "model ordinance" relating to adequate areas for collecting and loading recyclable materials in development projects. Upon speaking with Annette Kwock, Solid Waste/Recycling Coordinator, the City passed a Construction and Demolition Ordinance which came into effect in December, 2008. AB 1327 California Solid Waste Reuse and Recycling Access Act The Solid Waste

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44 http://www.calrecycle.ca.gov/LGCentral/Tools/mars/DrmcMain.asp?VW=Disposal

Reuse and Recycling Access Act of 1991 required each jurisdiction to adopt an ordinance by September 1, 1994, requiring each development project to provide an adequate storage area for collection and removal of recyclable materials.

Stanislaus County Integrated Waste Management Plan

The Stanislaus County Solid Waste Management Plan was formulated jointly by the County and nine cities in the County, including Patterson. In accordance with State law, the Plan lists countywide waste management practices in order of priority; these are (a) source reduction; (b) recycling and composting; (c) environmentally safe transformation (burning waste to generate electricity); and (d) landfill (for waste that cannot be disposed of in any other manner).

The California Integrated Waste Management Board mandates review of all countywide solid waste management plans every five years. Accordingly, the Countywide Integrated Waste Management Plan was adopted in October 2007, which addresses the combined waste collection issues for the County and cities within the county, with the exception of the City of Modesto.

Findings

- Patterson is a general law city operating under a council/manager form of government.
- Until a new water supply alternative is adopted be the City, groundwater is assumed to remain the sole source of water for the City and its anticipated growth.
- Future development will be required to contribute its fair share of funding to assist in mitigating future wastewater system service and treatment deficiencies.
- As of 2007, Patterson had 93.36 acres of developed parklands and open space. This is short of meeting the City's standard of providing five acres of developed parkland per 1,000 residents: given current (2008) population numbers, the City is providing approximately 4.4 acres of developed parkland and open space per 1,000 residents.
- The Patterson Unified School District voted in 2001 to approve a general obligation bond to generate $19.5 million for new school facilities construction. Also, in 2006 the District established a Level II fee of $4.93 per square foot, and a Level III fee of $9.86 per square foot.
- The closing of the Del Puerto Hospital left a gap in healthcare services in Patterson.
- The City is not currently meeting State-mandated recycling requirements (50%), recycling only 28% of its waste in 2007.

Bibliography

Circulation Master Plan, TJKM.

City of Patterson General Plan, 1992, 2004.

City of Patterson General Plan Background Report, 1992.

City of Patterson General Plan Final EIR, 1992.

City of Patterson Redevelopment Plan, 1998.

City of Patterson Final EIR on the City of Patterson Redevelopment Plan, 1998.

City of Patterson Negative Declaration for the Walker Ranch I Project, 1998.

City of Patterson Negative Declaration for the Walker Ranch II Project, 2001.

City of Patterson Negative Declaration for the Creekside Meadows Project, 2001.

City of Patterson Negative Declaration for the Heartland Ranch Project, 1997.

Drainage Master Plan and 2001 Revisions, Stoddard & Associates

EDAW, Patterson Wastewater Master Plan and Diablo Grande Sewer Line Draft EIR, October, 2003.

Final Development Plan for The Villages of Patterson, 2006.

Goodwin Consulting Group, Analysis of Fiscal Impacts of The Villages of Patterson, November, 2006.

H2O Group, City of Patterson Water Supply Planning Study, April 2006

Michael Brandman Associates, Creekside Draft and Final EIR, 1993.

Stanislaus County General Plan, as amended through 1999.

Stanislaus County Local Agency Formation Commission Rules and Procedures.

The Meyers Group, February 2001, Market Analysis and Absorption Projection for the Mello Roos Financing District.

Turnstone Consulting, Draft Environmental Impact Report for the West Patterson Projects, 2002.

Turnstone Consulting, Draft Environmental Impact Report for The Villages of Patterson Project, 2006.

Water Master Plan and 2001 Revisions, prepared by Stoddard & Associates.

Wastewater Collection Master Plan and 2001 Revisions, Stoddard & Associates.

West Patterson Financing Authority Community Facilities District No. 2001-1, Wulff, Hansen & Co., 2002.

GLOSSARY

af - acre-feet
cfs - cubic feet per second
gpad -gallons per acre per day
gpcd -gallons per capita per day
gpd - gallons per day
gpm -gallons per minute
Infiltration/lnflow (III) - Infiltration is extraneous water that leaks into sewer lines from surrounding saturated ground through various means. Inflow is water that is channeled into the sewage collection system by storm water collection systems such as roof leaders, foundation drains, and storm sewers.
Insurance Services Office (ISO) - An agency which evaluates lire protection features for all fire departments for purposes of establishing rates for underwriters.
MGD - million gallons per day
PUSD - Patterson Unified School District
psi - pounds per square inch
Response time - The amount of time it takes police or fire units to arrive at the scene of an emergency incident.
USBR - U.S. Bureau of Reclamation
WSFD - West Stanislaus Fire District

VII. Cultural & Historical Resources

Introduction

Patterson has a wide variety of cultural and historic resources. These resources take various forms ranging from the contemporary city and its open space resources to the rich historic settlement and development periods, to the ethnography and archaeological resources of the Native American period.

Cultural Events

Apricot Fiesta

The largest cultural event in Patterson is the annual Apricot Fiesta. The first Apricot Fiesta was held in 1971, when the business association's board of directors decided to hold a weeklong series of fun events before the Fourth of July. The city proclaimed itself the "Apricot Capital of the World," and the rest is history. The following year the event was incorporated as the Patterson Apricot Fiesta, Inc. The Fiesta is governed by a board of directors that helps to organize the event each year.

Every year the Apricot Fiesta is held approximately four weeks prior to the Fourth of July, and provides three days of celebration. The main events include the crowning of "Miss Apricot" and "Little Miss and Mr. Apricot," a parade with motorized floats, the Lions Club barbecue, and a fireworks show. There is also a variety of entertainment and activities, including arts and crafts, food booths, historical drama, skydiving, and other exciting events.

Chili Cook-Off & Car/Motorcycle Show

The Patterson-Westley Chamber of Commerce sponsors a chili cook-off along with a car and motorcycle show during the fall. The purpose of the event is to give Patterson residents an opportunity to meet each other, see amazing cars and motorcycles, and taste great chili.

Historical and Archaeological Resources

Native Americans

The earliest known inhabitants of the Planning Area were members of the Yokut Tribe, whose earliest presence is estimated by archaeologists to have occurred at least 1,000 years ago. The Yokut's boundaries extended from the Tehachapi Mountains to present day Stockton. The Yokuts were probably attracted by the San Joaquin and Stanislaus Rivers and their tributaries. Most groups located their villages along the edges of permanent streams or watercourses. Yokut settlements tended to be larger and more permanent than in many parts of California.

The Yokut's subsistence in the area was based on gathering and processing of wild seeds, acorns, and other plants, fish and shellfish, and small game. They built tule boats to navigate the San Joaquin River and the Delta, and gained much of their livelihood from fishing.

The Yokuts maintained trade links with coastal villages where they traded furs and other materials for shells, such as abalone and clams. Shell disks and dentelium beads, as well as polished cylindrically-shaped magnesite rocks and bi-valves, were used as money.

Spanish-Americans

The first Europeans to arrive in the area, in 1769, were deserters from the Spanish military. In 1813, Spanish Franciscan friars, accompanied by soldiers, entered the San Joaquin Valley to round up the deserters, convert the Native Americans to Catholicism, and search for suitable mission sites. Although the Yokuts at first co-existed with the Spanish, they were eventually exploited by the newcomers and fought with the settlers.

Two of the most notable conflicts took place on the banks of the Stanislaus River about a mile and a half upstream from its confluence with the San Joaquin River. In the first battle on May 5, 1829, the combined Spanish forces from San Jose and San Francisco were defeated by the Yokuts, led by Chief "Estanislao." The Spanish later named the Stanislaus River after the Indian chief. General Vallejo returned to the area and on May 19, 1829, defeated the Yokuts, inflicting great losses.

In 1832, Colonel Warner, a member of a trapping expedition, reported finding numerous Indian villages along the San Joaquin River. Upon his return, however, he found the villages greatly depopulated due to a smallpox epidemic which took place in 1833.

Rancho Del Puerto

In 1824, Mexico won the Californias from the Spanish. A Mexican land grant for the Rancho Del Puerto was granted to Mariano and Pablo Hernandez in 1844. The original Mexican land grant was for land stretching east of present day Highway 33 to the San Joaquin River. The northern boundary was Del Puerto Creek, and the southern boundary was just south of present day Marshall Road. The Hernandez's built a house and corrals on the ranch. From 1844 to 1847, Indian raids in the area were common, as Indians that were freed from the missions returned to the area, especially along the banks of the San Joaquin River.

During the early 1840s to the 1860s, thousands of wild horses roamed the plains of western Stanislaus County and immense herds of deer, elk, and antelope were seen. Grizzly bears were common, and wild geese and ducks frequented the area each fall. The eventual shift to heavy agricultural use and alteration of the area for cultivation pressured both the wildlife and the remaining Indian population out of the valley.

In 1846, the United States acquired California from Mexico. Soon after, the Gold Rush of 1849 brought many changes. One of the most profitable occupations became cattle-raising. The stockmen settled along the river and ran their cattle over the vast plains. The pioneers turned to merchandising, and the towns of Hill's Ferry, Crows Landing, Grayson, and San Joaquin City were born. During periods of high water, freight was shipped by steamboat and barges. During the rest of the year, freight had to be hauled by teams over the road along the river.

A claim and patent for the Rancho Del Puerto were granted to Samuel G. Reed and Reuben S. Wade on May 22, 1855. The land grant is one of a very few that had ever been signed by President Abraham Lincoln. Lincoln signed the grant himself because Lincoln had given his clerk the day off. The land was sold to J.O. Eldredge in 1866 for $5,000, and two months later Eldredge sold the land to John D. Patterson for $5,400.

The building of the railroad in 1888 marked the abandonment of the river towns. Hill's Ferry moved to Newman, Crow's Landing to its present location, Grayson to Westley, and San Joaquin City to Vernalis. At the time, the Rancho Del Puerto was still John D. Patterson's ranch. He purchased additional land and raised wheat, cattle, purebred sheep, and draft horses on the land. Patterson farmed about 3,000 acres. Wheat was the major crop on the West Side. Stanislaus County was known as the banner wheat county of the state. The farmers had to depend entirely on the rainfall for their crops, however. When the rains failed to come, there was great hardship.

In 1877, the West Side Irrigation District was created. The district planned a project to irrigate the whole West Side from Tulare Lake to Antioch by means of a 100-mile long canal. However, the law creating the district was declared unconstitutional, and the project was abandoned. A number of irrigation projects were formed, including the Miller & Lux Canal on the south, extending from Mendota north to Crows Landing.

The Patterson Town and Colony

John D. Patterson died in 1902. He had no children and left his property to 13 heirs, mainly nieces and nephews. In order to settle the estate, the executors endeavored to sell the property, but were unable to do so for more than $30 an acre. Because the executors were unable to obtain their desired price for the land, it was decided that it should be developed. Two of the heirs, Thomas W. Patterson and John Patterson, bought out the others and incorporated the Patterson Ranch Company in 1908, with Thomas Patterson as president. The City of Patterson and the Patterson Colony are the outgrowth of Thomas Patterson.

Patterson first investigated all possible sources of irrigating the land. Learning that extension of the Miller & Lux canal north from Crows Landing would not be feasible, he set about developing his own irrigation system. Patterson conceived the idea of building a series of pump lifts to get water from the San Joaquin River into canals. Patterson risked over half a million dollars on the system, designed by Arthur L. Adams of Berkeley. The system was designed with a series of seven pump stations interconnected by reservoirs. The main canal was built with mules using Fresno scrapers. In 1910, the first water flowed through the canals, marking the completion of the first successful lift irrigation system in the world.

Patterson envisioned a town of beauty and distinction. Using Washington D.C. as his model, Patterson designed the city around the concept of creating a nearly complete circle in the center of town, its streets converging like the spokes of a wheel on the Plaza at the center. Parks were laid out along the railroad. At great expense, 484 palm trees were imported from Australia and alternated with eucalyptus trees, planted along the three miles of Las Palmas Avenue from the river to the town. Oleanders and sycamores were planted along the seven miles of Sycamore Avenue.

The Patterson Ranch Company subdivided the colony into 5-, 10-, and 20-acre plots. By fall 1911, 50 modem residences had been built. Patterson Irrigated Farms were advertised widely throughout the Midwest. The first two buildings in town were the Hotel Del Puerto and the Ranch Company office (the Plaza building). The Ranch Company office also housed the post office and the town's first bank. Cement sidewalks were laid in 1911, the Patterson Irrigator was first published, and Las Palmas Grammar School commenced construction. By the end of 1912, Patterson had a post office, railroad station, newspaper, school, library, Chamber of Commerce, electric lights and power, two lumber yards, telephone service, a hotel, two general merchandise stores and other shops.

In 1914, Thomas W. Patterson died. His cousin, John D. Patterson, came from Canada to help guide the town and colony. Although the town faced some difficult economic conditions following the onset of World War I, Patterson continued to grow. On December 18, 1919, residents of Patterson voted 136 to 47 to incorporate Patterson as a city. In the mid-1920s Patterson received both national and state recognition as one of the few model towns in the United States. It was also recognized as one of the few successful California colonization projects.

Modern Development (1950s-present)

Completion of the Central Valley Project and its Delta-Mendota Canal in the early 1950s, and the California Aqueduct a decade later, allowed for the continued expansion of diversified agricultural operations in the countryside surrounding Patterson. Although presently the development paradigm of small farmsteads has ceded to an increasingly large-scale agricultural pattern, farming remains at the forefront of Patterson's cultural identity and economy. In the 1970s, the town claimed the mantle of "Apricot Capital of the World," though currently its substantial agricultural base is dominated by almond and walnut orchards, as well as row crops including beans, tomatoes, broccoli, spinach, and melons[1].

With the completion of Interstate 5 in the late 1960s, and the subsequent development of Interstate 580, waves of ex-urban settlers have flocked to the

[1] Harrison 1977:18-20; The Gateway 1978

area, with the population more than doubling between 1998 and 2008; many new residents commute to the Bay Area. This population increase has infilled the town's core as well as expanded the community's borders, with several new housing developments, shopping malls, and business parks, pushing into former agricultural lands.

Despite the rapid growth of the past decade, the town of Patterson bears many of the distinctive attributes of its founding. The radial plan envisioned by the town's founder still remains the focal point of the town, as do some of its earliest buildings including the Ranch Company Office and the 1921 Carnegie Library. While the Del Puerto Hotel was destroyed by fire and demolished, its likeness is represented by the Patterson City Hall, built at the former hotel site on the Plaza. The palm tree-lined Las Palmas Avenue extends from this center to the San Joaquin River, crossing heavily cultivated fields and scattered farmsteads with residences, barns, and outbuildings from the earliest years of the town's development. Irrigation canals line the area, feeding these scattered farmsteads.

Other notable milestones in Patterson's history include the first Las Palmas Bridge across the San Joaquin River, completed in 1936. The Del Puerto Hospital began operation in 1950, made possible by the formation of the Del Puerto Hospital District in 1947. The Delta-Mendota Canal (part of the federal Central Valley Project) was completed in 1951. In 1967, Interstate 5 was completed as far south as Los Banos along with the California Aqueduct.

Historic Sites and Buildings

Patterson contains a number of homes and structures built in the 1920s and 1930s. Three landmarks have been designated as sites of local and county historic significance, and are listed on the State Inventory of Historic Places, and one on the National Register of Historic Places.

The Plaza building is located in the center of the Plaza circle. This structure was the original Patterson Ranch Company office and also housed the post office and the town's first bank. The Plaza building is presently used as the town's museum.

The Del Puerto Hotel, formerly located at 1 Plaza, was the town's first hotel where prospective land owners would stay while they were shown property of the Patterson colony. In 1997 the hotel was devastated by a fire which ultimately led to its demolition. The Patterson City Hall was constructed on the site in 2006 which was designed to recall the architectural character of the Del Puerto Hotel in honor of its historical significance. Although the new structure is not an exact replica, the site remains an historic location.

Las Palmas Avenue is a three-mile parkway lined with palm trees from Patterson to the San Joaquin River. Palm trees and eucalyptus trees were imported from Australia by TW Patterson and planted alternately along Las Palmas Avenue. Today, only the palm trees remain.

The Carnegie Library, located at 355 Las Palmas Avenue, was originally built as a City library with a Carnegie endowment. The building, now under private ownership, was renovated during 1990 and is operating as an office building. The Carnegie Library is listed on the National Register of Historic Places.

Archaeological Resources

Archaeological resources within the City's General Plan study area have been completed since 1992. Environmental documents prepared for the 1992 General Plan, the West Patterson Projects (located in the western region of the Study Area), and The Villages of Patterson (located in the eastern portion of the Study Area) investigated the potential for impacts to archeological resources.

The West Patterson Projects EIR, prepared in 2003, investigated cultural and archeological resources within the western portion of the Study Area. The study, conducted by Holman and Associates, determined that there were no prehistoric archeological sites within the project area or its vicinity. Despite the lack of resources identified in the archival record and during surface reconnaissance, such negative findings cannot preclude the possibility that buried prehistoric resources may still be present.

In 2006, The Villages of Patterson EIR, investigated the presence of archaeological resources within the eastern portion of the Study Area. The survey, conducted by Holman and Associates, revealed the presence of three refuse deposits containing potentially significant historic materials, such as pottery, glass, and metal that were scattered in debris fields (location withheld). It is believed that the material was deposited no earlier than 1909 (the year Patterson was founded), and has been spread around by historic plowing. Despite the presence of such materials from the early 1900s, there was no surface evidence of prehistoric cultural resources found within the Villages of Patterson project area.

In addition to the EIRs mentioned above, a records search for the Patterson Planning Area was conducted in 1986 through the Central California Information Center of the California Archeological Inventory. The search revealed no recorded archeological Native American sites located within the Study Area. Furthermore, field reconnaissance of an area beyond the city limits was performed in March 1985. Potential areas of impact were examined for evidence of cultural material. Particular attention was paid to the Salado Creek area. No surface evidence of historical or cultural materials was uncovered. The lack of observable surface evidence is attributed to the amount of agricultural cultivation that has taken place over the last 50 years. In addition, Salado Creek was filled in from Highway 33 to the San Joaquin River and is now piped.

Findings

- The City's Recreation Department offers a wide variety of adult and youth recreation classes, programs, and activities.
- The annual Apricot Fiesta is the City's largest cultural event, drawing residents and non-residents to Patterson for the activities.
- Patterson has a rich history associated with Thomas W. Patterson's formation of the town and colony of Patterson and its farming roots.
- Three historic sites in Patterson are listed in the State Inventory of Historic Places: the Plaza building in the center of town; the property on which the Del Puerto Hotel was located; and palm-lined Las Palmas Avenue. The Carnegie Library is listed on the National Register of Historic Places.
- Much of the Study Area has been surveyed for the existence of archaeological resources without such resources being located; however, portions of land at the outer edge of the Study Area remain unsurveyed. Sites along the San Joaquin River and watercourses are areas in which such resources are most likely to be located.

Regulatory Setting

State Regulations

California Environmental Quality Act

Under CEQA, public agencies must consider the effects of their actions on both "historical resources" and "unique archaeological resources." Pursuant to Public Resources Code Section 21084.1, a "project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment." Section 21083.2 requires agencies to determine whether proposed projects would have effects on "unique archaeological resources."

"Historical resource" is a term with a legally defined meaning (Public Resources Code, Section 21084.1 and State CEQA Guidelines, Section 15064.5 [a], [b]). As defined by state law, "historical resource" includes any resource listed in or determined to be eligible for listing in the California Register of Historical Resources (CRHR). The CRHR includes resources listed in or formally determined eligible for listing in the NRHP, as well as some California State Landmarks and Points of Historical Interest.

Properties of local significance that have been designated under a local preservation ordinance (local landmarks or landmark districts) or that have been identified in a local historical resources inventory may be eligible for listing in the CRHR and are presumed to be "historical resources" for purposes of CEQA unless a preponderance of evidence indicates otherwise

(Pub. Resources Code, Section 5024.1 and California Code of Regulations, Title 14, Section 4850).

Unless a resource listed in a survey has been demolished, lost substantial integrity, or there is a preponderance of evidence indicating that it is otherwise not eligible for listing, a lead agency should consider the resource to be potentially eligible for the CRHR. In addition to assessing whether historical resources potentially impacted by a proposed project are listed or have been identified in a survey process (Public Resources Code 5024.1 [g]), lead agencies have a responsibility to evaluate them against the CRHR criteria prior to making a finding as to a proposed project's impacts to historical resources (Public Resources Code, Section 21084.1 and State CEQA Guidelines, Section 15064.5 [a][3]). Following CEQA Guidelines Section 21084.5 (a) and (b) a historical resource is defined as any object, building, structure, site, area, place, record, or manuscript that:

a. Is historically or archeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political or cultural annals of California; and
b. Meets any of the following criteria:
    a. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
    b. Is associated with the lives of persons important in our past;
    c. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
    d. Has yielded, or may be likely to yield, information important in prehistory or history.

Archaeological resources may also qualify as "historical resources" and Public Resources Code 5024 requires consultation with the Office of Historic Preservation when a project may impact historical resources located on State-owned land.

For historic structures, State CEQA Guidelines Section 15064.5, subdivision (b)(3), indicates that a project that follows the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings, or the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings (1995) shall mitigate impacts to a level of less than significant. Potential eligibility also rests upon the integrity of the resource. Integrity is determined through considering the setting, design, workmanship, materials, location, feeling, and association of the resource.

CEQA also requires lead agencies to consider whether projects will impact "unique archaeological resources." Public Resources Code Section 21083.2, subdivision (g), states that "'unique archaeological resource" means an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
Has a special and particular quality such as being the oldest of its type or the best available example of its type.
Is directly associated with a scientifically recognized important prehistoric or historic event or person.

Treatment options under Section 21083.2 include activities that preserve such resources in place in an undisturbed state. Other acceptable methods of mitigation under Section 21083.2 include excavation and curation or study in place without excavation and curation (if the study finds that the artifacts would not meet one or more of the criteria for defining a "unique archaeological resource").

Advice on procedures to identify cultural resources, evaluate their importance and estimate potential effects is given in several official publications, such as the series produced by the Governor's Office of Planning and Research (OPR). The technical advice series produced by OPR strongly recommends that Native American concerns and the concerns of other interested persons and corporate entities, including, but not limited to, museums, historical commissions, associations and societies, be solicited as part of the process of cultural resources inventory. In addition, California law protects Native American burials, skeletal remains, and associated grave goods regardless of their antiquity and provides for the sensitive treatment and disposition of those remains.

Section 7050.5(b) of the California Health and Safety code specifies protocol when human remains are discovered. The code states: In the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains until the coroner of the county in which the human remains are discovered has determined, in accordance with Chapter 10 (commencing with Section 27460) of Part 3 of Division 2 of Title 3 of the Government Code, that the remains are not subject to the provisions of Section 27492 of the Government Code or any other related provisions of law concerning investigation of the circumstances, manner and cause of death, and the recommendations concerning treatment and disposition of the human remains have been made to the person responsible for the excavation, or to his or her authorized representative, in the manner provided in Section 5097.98 of the Public Resources Code.

State CEQA Guidelines Section 15064.5, subdivision (e), requires that excavation activities be stopped whenever human remains are uncovered and that the county coroner be called in to assess the remains. If the county coroner determines that the remains are those of Native Americans, the

Native American Heritage Commission must be contacted within 24 hours. At that time, the lead agency must consult with the appropriate Native Americans, if any, as timely identified by the Native American Heritage Commission. Section 15064.5 directs the lead agency (or applicant), under certain circumstances, to develop an agreement with the Native Americans for the treatment and disposition of the remains.

In addition to the mitigation provisions pertaining to accidental discovery of human remains, the State CEQA Guidelines also require that a lead agency make provisions for the accidental discovery of historical or archaeological resources, generally. Pursuant to Section 15064.5, subdivision (f), these provisions should include "an immediate evaluation of the find by a qualified archaeologist. If the find is determined to be an historical or unique archaeological resource, contingency funding and a time allotment sufficient to allow for implementation of avoidance measures or appropriate mitigation should be available. Work could continue on other parts of the building site while historical or unique archaeological resource mitigation takes place."

Senate Bill 18 (Gov. Code, Sections 65352.3 and 65352.4) requires that, prior to the adoption or amendment of a general plan or specific plan proposed on or after March 1, 2005, a city or County must consult with Native American tribes with respect to the possible preservation of, or the mitigation of impacts to, specified Native American places, features, and objects located within that jurisdiction. The City of Patterson initiated the consultation process on December 9, 2009 as required under these provisions of the Government Code. As of January 26, 2010 one response was received from Debra Grimes representing the California Valley Miwok Tribe.

Paleontological resources are classified as non-renewable scientific resources and are protected by state statute (Public Resources Code Chapter 1.7, Section 5097.5, Archeological, Paleontological, and Historical Sites and Appendix G). No state or local agencies have specific jurisdiction over paleontological resources. No state or local agency requires a paleontological collecting permit to allow for the recovery of fossil remains discovered as a result of construction related earth moving on state or private land in a project site.

BIBLIOGRAPHY

Association of California Water Agencies, 75-Year History, 1985.

City of Patterson General Plan, 2004.

City of Patterson General Plan Environmental Impact Report, 1992.

Patterson Apricot Fiesta & Historical Society website. http://www.patterson-ca.com/index.htm

Patterson-Westley Chamber of Commerce. http://www.patterson-westleychamber.com

Stanislaus County General Plan Support Documents, 1994.

The California Indians, by R.F. Heizer and M.A. Whipple. University of California Press. Berkeley. California. 1971.

The Gateway (A Patterson Township Historical Society Bulletin), Volume I. "A Town's Founding." Number I. June 1978.

"The Real Story and History of the Apricot Fiesta." Patterson Irrigator, May, 2003.

Turnstone Consulting, Villages of Patterson Final Environmental Impact Report, 2006.

Turnstone Consulting, West Patterson Projects Final Environmental Impact Report, 2003.

VIII. Natural Resources

Introduction

Natural resources in and around Patterson consist of water, agricultural lands, soils, vegetation, wildlife, and air. These resources play a crucial role by contributing to the City's economy, and help to provide a high quality of life for Patterson's residents. This chapter inventories and assesses the area's natural resources and identifies potential constraints to urban development.

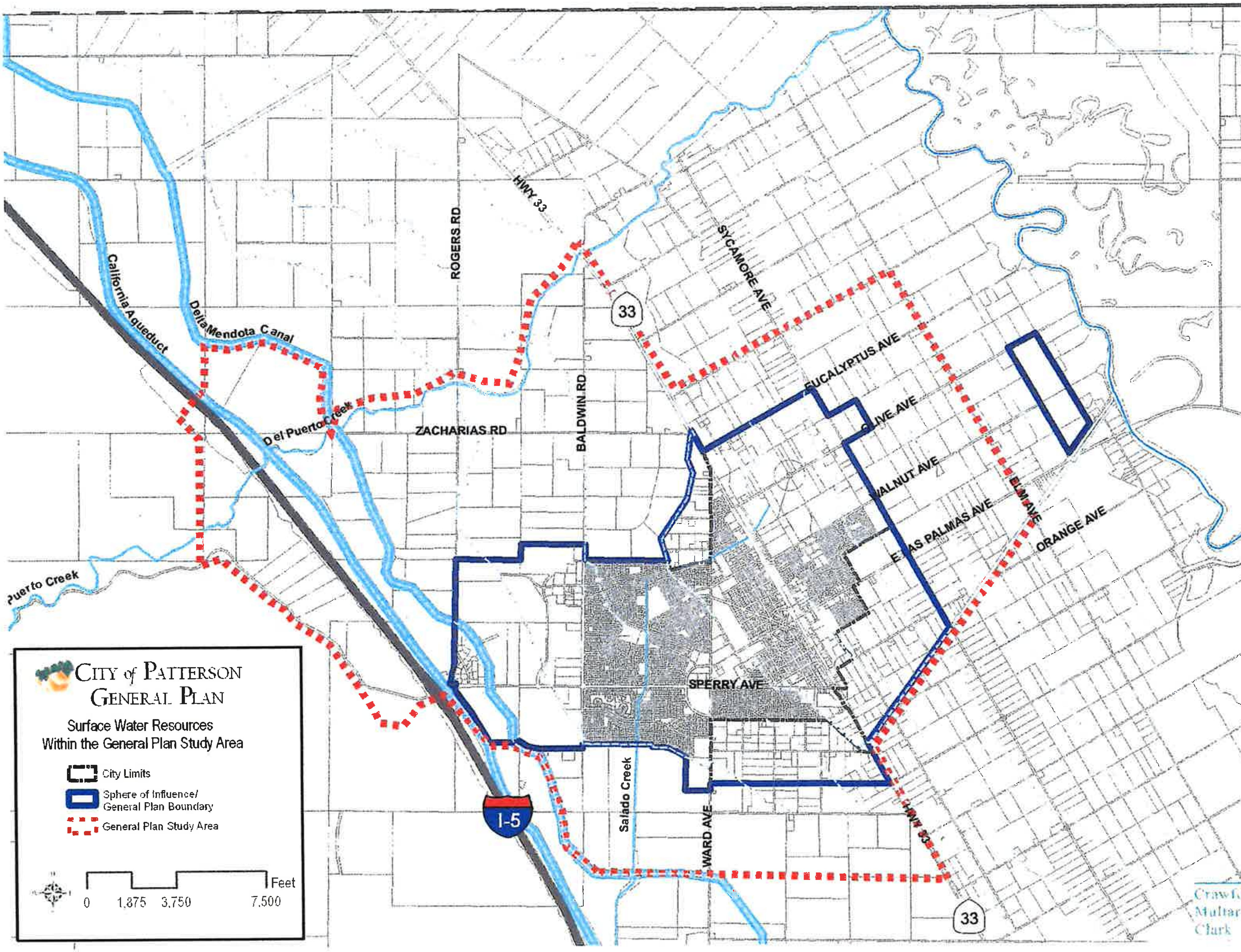
Water Resources

The quantity, quality, and availability of water are vital to both natural processes and human activities within any urban area. Water is essential to the development of housing, commerce, industry and agriculture, recreation, and the maintenance of high quality fish and wildlife habitats.

The Study Area is bordered on the east by the San Joaquin River, and on the west by the California Aqueduct. The Delta Mendota Canal, located just east of the Aqueduct, follows a similar path along the inside of the western border. Salado Creek and numerous irrigation canals pass through the Study Area. These water resources are shown in Figure VIII-1 below. Patterson also receives its potable water supply from the underlying groundwater basin.

Precipitation

The climate in Patterson is characterized as dry-summer subtropical (Mediterranean), with cool, rainy winters, and relatively warm, dry summers. During the summer months the San Joaquin Air Basin is influenced by a high pressure cell off the west coast. Within this cell, air descends almost continuously; the descending air is compressed, thereby raising its temperature and lowering the relative humidity. When this cell is dominant, there are neither major storms nor any region-wide precipitation. During the winter the influence of this high pressure cell is intermittent, resulting in alternate periods of stormy, unsettled weather and periods of stable, rainless conditions.


City of Patterson
General Plan
Surface Water Resources
Within the General Plan Study Area
City Limits
Sphere of Influence/
General Plan Boundary
General Plan Study Area
0
1,875
3,750
7,500
Feet
California Aqueduct
Delta Mendota Canal
Del Puerto Creek
Puerto Creek
Salado Creek
HWY 33
33
I-5
ROGERS RD
ZACHARIAS RD
BALDWIN RD
SYCAMORE AVE
EUCALYPTUS AVE
OLIVE AVE
WALNUT AVE
LAS PALMAS AVE
ELM AVE
ORANGE AVE
SPERRY AVE
WARD AVE

The mean annual precipitation for Patterson is approximately 11 inches.[1] Most of the precipitation occurs from December to April, while summer months are virtually rainless; however, Patterson occasionally receives rain during the summer months from thunderstorms. The lowest rainfall year on record for the Modesto-Patterson area is 1913, recorded as having only 4.3 inches of rainfall, while the highest recorded rainfall was 26.0 inches in 1983.[2]

San Joaquin River

The San Joaquin River is located on the eastern edge of the Study Area. The San Joaquin River provides water for agricultural, industrial processes, warm freshwater habitat for aquatic resources, habitat for fish spawning, migration routes for anadromous or other fish species, water supply and vegetative habitat for the maintenance of wildlife, and water and non-water contact recreation.

The watershed of the San Joaquin River is the southern San Joaquin Valley, which encompasses 11,000 square miles, extending west from the Sierra Nevada crest to the Coast Ranges, and south from the San Joaquin Delta to the drainage dividing the San Joaquin and Kings Rivers. Principal tributaries of the San Joaquin River include the Stanislaus, Tuolumne, Merced, Chowchilla, and Fresno Rivers. All of these rivers are regulated by reservoirs.

The main stem of the San Joaquin River originates high in the Sierra Nevada crest and flows westerly to Millerton Lake, which is impounded by Friant Dam. Releases in the San Joaquin system flow north toward Stockton. At Friant Dam, a major portion of the flow is diverted into the Central Valley Project canal system operated by the U.S. Bureau of Reclamation (USBR). The segment of the river from the Merced River confluence to Mossdale, near Manteca, is characterized by high flows resulting from the Merced, Tuolumne, and Stanislaus River inflows, although streamflow in the valley during the summer consists mostly of irrigation return flows.

Water quality monitoring and flow for the San Joaquin River in the Patterson Area is conducted at the Patterson Bridge station, while additional monitoring takes place downstream at the Vernalis monitoring station, located about 15 miles north of Patterson. The nearest station upstream from Patterson is located near Crows Landing.

[1] Western Regional Climate Center. Available at: http://www.wrcc.dri.edu/summary/lcd.html. Accessed April 2007.

[2] The City of Modesto, Engineering & Transportation Department, Capital Planning Division and the Modesto Irrigation District, *Urban Water Management Plan*, 2000.

San Joaquin River Water Quality

Waters at high elevations originate as snow melts and are of excellent quality, but irrigation drainage and waste discharges flowing into rivers on the valley floor continuously degrade water quality. Dissolved salts and nutrients in agricultural return flows, along with seepage from municipal and industrial percolation ponds, are the sources of water quality degradation. Low flows resulting from upstream diversion and regulation have virtually eliminated salmon runs in the basin streams and are endangering marshland wildlife.

Aqueducts

Located in the western portion of the Study Area are the primary features of the State Water Project (SWP) and the Central Valley Project (CVP), the Edmund G. Brown California Aqueduct and the Delta-Mendota Canal, respectively. Both features run north to south along the eastern fringe of the Coast Range. The Delta-Mendota Canal transfers water from the Sacramento-San Joaquin Delta area and distributes water to Central Valley water users, including those in the Patterson area. Although the California Aqueduct also distributes water to the Central Valley region, the California Aqueduct is distinguished by its capability to deliver water supplies to Southern California.

Salado Creek

Salado Creek originates in the Diablo Mountains south of Patterson, flows south to north across the City, and empties into the San Joaquin River to the northeast of the City. Salado Creek is an intermittent stream, flowing for short periods during and after rainfall events, and drains a watershed of approximately 25 square miles. Between State Route 33 and the San Joaquin River, Salado Creek runs underground through 96-inch and 36-inch pipelines. Although seepage from the unlined portions of the creek enters the groundwater regime, the infrequency of its flows makes the creek a minor contributor to local water supply.

No surface water quality data are available for Salado Creek. However, qualitative observations can be made about the expected water quality within the creek based on land uses within the watershed. With the exception of the Diablo Grande development in the upper portion of the watershed, Salado Creek drains sparsely developed lands in the uplands to the west. Cattle-grazing (with open access to the creek) was observed in the upland portion of the watershed. Direct access to the creek by cattle would be expected to result in elevated levels of nutrients, pathogens, and sediment in the creek water. In addition, Salado Creek receives discharges of return water from agricultural operations, and therefore may contain residual pesticides, herbicides, and nutrients from this source. Downstream of the Study Area the creek may receive additional agricultural runoff and urban pollutants (petroleum hydrocarbons, metals, sediment) from roadway and industrial site runoff through the City of Patterson storm drainage collection and conveyance system.

Groundwater

There are three physiographic regions within the San Joaquin Valley: 1) the western alluvial fan, the eastern alluvial fan, and the basin.[3] The Study Area is located within the western alluvial fan region in a sub-basin referred to as the Delta-Mendota Groundwater Basin (as designated by the California Department of Water Resources). The sediments in the western alluvial fan region are generally poorly sorted and derived from marine sedimentary rocks (with some continental sedimentary and volcanic rocks) of the Coast Ranges.[4] Groundwater occurs in the geologic materials underlying the site in discrete water-bearing zones or "aquifers". The uppermost zone (from the ground surface to a depth of about 250 feet) is composed of a heterogeneous mixture of gravel, sand, silt, and clay.[5] At a depth of approximately 250 to 300 feet below the surface, a lacustrine clay deposit known as the "modified E clay" or "Corcoran Clay" occurs in the vicinity of the site and acts as a confining layer (or aquitard) for the aquifer below. The City of Patterson, which relies almost exclusively on groundwater, operates six wells that draw groundwater from the confined aquifer (below the Corcoran Clay). This water contains elevated levels of salt,[6] averaging 900 mg/L. The levels of salts in water supplied by Patterson do not exceed state drinking water standards.[7]

Salt loading is a water quality issue of concern in the San Joaquin Valley. As stated in the Water Quality Control Plan (Basin Plan): [8] If current practices for discharging water containing elevated levels of salt continue unabated, the San Joaquin Valley can have a large portion of its groundwater severely degraded within a few decades.

Salts (generally measured as total dissolved solids [TDS]) are introduced into the basin with imported water supplies. Although the water may leave the basin by evaporation, evapotranspiration, or through the San Joaquin River, much of the salts stay behind, potentially leading to a build-up of salt in the soil and groundwater. Excessive salt loading can result in a degraded water supply, particularly if concentrations exceed the Secondary Drinking Water standard of 1,000 mg/L (upper limit). Salt loading of managed groundwater basins is an important issue throughout the San Joaquin Valley. In addition, many of the naturally-occurring deposits in the vicinity

[3] Dubrovsky, N.M., C.R. Kratzer, L.R. Brown, J.M. Gronberg, and L.R. Burow, Water Quality in the San Joaquin-Tulare Basins, California, 1992-95: USGS Circular 1159, 1998.

[4] Burow, K.R., Shelton, J.L., Dubrovsky, N.M., Occurrence of Nitrate and Pesticides in Ground Water Beneath Three Agricultural Land-Use Settings in the Eastern San Joaquin Valley, California, 1993-1995, U.S. Geological Survey, Water Resources Investigation Report 97-4284, 1998.

[5] Page, R.W., Geology of Fresh Ground-Water Basin of the Central Valley, California, with Texture Maps and Sections, U.S. Geological Survey Professional Paper 1401-C, 1986.

[6] The term "salt" refers to unspecified dissolved ions in water. The salt content is typically quantified as total dissolved solids (TDS) in mg/L or electrical conductivity in mhos/cm.

[7] Stoddard and Associates, Groundwater Management Plan for the Northern Agencies in the Delta-Mendota Canal Service Area and a Portion of San Joaquin County, April 1996.

[8] California Regional Water Quality Control Board Central Valley Region, The Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board Central Valley Region, The Sacramento River Basin and the San Joaquin River Basin, 1994, p. IV-2.00.

of the Study Area, particularly in the mountains to the west, are of marine origin and, therefore, have high salt content.

The contribution of human activities (e.g., agriculture, groundwater pumping, water transfers) to the salt balance has been investigated. A United States Geological Survey (USGS) study was conducted in the Sacramento Valley of California to determine whether human activities had affected groundwater quality through time.[9] Substantial increases in TDS and nitrates were observed since the 1950s, indicating that groundwater quality was degraded as a result of increasing application of agricultural chemicals and growth in urban populations. No similar studies for the San Joaquin Valley were reported, but "because agricultural practices in the San Joaquin Valley are similar to those of the Sacramento Valley, it is likely that groundwater quality in the San Joaquin Valley is also degrading as a result of human activity."[10]

A subsequent study conducted by the USGS on nitrate and pesticide trends in groundwater in the eastern San Joaquin Valley[11] indicates that groundwater drinking water supplies have been degraded by fertilizers and pesticides. Of approximately 100 various types of wells monitored, nitrate concentrations exceeded U.S. EPA drinking water standards about one-fourth of the time and pesticides were identified about two-thirds of the time (although mostly at low concentrations).

Due to degrading groundwater quality and increased growth, it is estimated that the City of Patterson will need to construct a water treatment facility in the future, or begin mixing its groundwater with higher quality surface water in order to continue meeting water quality standards.

Water Use

Water is used in the Study Area for residential, commercial, industrial, and agricultural purposes. A total of six domestic wells provide the potable water supply for the Study Area. The City's water system and demand are described in Chapter VI, "Public Services."

Agricultural Resources

Agriculture constitutes a major portion of Stanislaus County's economic base. Approximately 877,529 acres were harvested in the county during 2007, at a total estimated value of $2,413,571,000.[12]

Agriculture is the predominant land use in the Study Area outside the city limits. Nuts, fruit trees and row crops are the primary commodities, with vegetable crops also playing an important role.

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[9] Bertoldi, G.L., R.H. Johnston, and K.D. Evenson, Ground Water in the Central Valley, California - A Summary Report, U.S. Geological Survey Professional Paper 1401-A, 1991.
[10] Ibid.
[11] Dubrovsky, N.M., C.R. Kratzer, L.R. Brown, J.M. Gronberg, and L.R. Burow, Water Quality in the San Joaquin-Tulare Basins, California, 1992-95: USGS Circular 1159, 1998.
[12] Stanislaus County Agricultural Commission 2007 Agricultural Crop Report.

Soils

The Study Area lies in Stanislaus County, west of the San Joaquin River. Stanislaus County occupies a portion of the northern San Joaquin Valley, extending from the foothills of the Sierra Nevada to the ridge of the Diablo Range. Stanislaus County can be geologically divided into what is commonly referred to as the eastside (approximately two-thirds of the county) and the westside (approximately one-third of the county). This division is based on the two predominant types of soils. The San Joaquin River forms a natural divider between these two types of soils. All of the soils on the west side are of recent alluviums: loams, clay loams, and clays washed out from the coastal range of mountains. These soils are different from eastside soils because the parent material is fine-grained sandstones and shales. As a result, these soils tend to be fine textured as opposed to the coarser soils of the eastside.

Soil Classifications

The United States Department of Agriculture Storie Index evaluates the general suitability of soils for agriculture, based on four factors that represent the inherent characteristics and qualities of the soils. The California Revised Storie Index rates soil on a scale from 1 to 6, with 1 being the best. The Storie Index does not consider physical or economic factors, such as irrigation, that might determine the desirability of growing certain plants in a given area. There are a variety of soil types within the Study Area, and the ratings for the primary soil types are as follows: Vernalis Loam is rated "1,"[13] the Zacharias Clay Loam is rated "2,"[14] and the Capay Clay is rated "3."[15]

In 2002, a total of 260,730 acres in Stanislaus County were classified as prime farmland. With the exception of urban areas within the City of Patterson, the United States Department of Agriculture Natural Resources Conservation Service (NRCS) has classified the majority of the land between Interstate 5 and the San Joaquin River in the Study Area as prime farmland, as shown on Figure VIII-2. Prime farmland is defined in the United States Code as "*land that has the best combination of physical and chemical characteristics for producing ... agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion....*" Prime farmland does not include land already in, or committed to, urban development. Because nearly all undeveloped land that surrounds the developed areas of Patterson is classified and mapped as Prime Farmland, any expansion of the City's boundaries will result in the conversion of Prime Farmland.

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[13] In the area, soils in Grade 1 are well suited to intensively grown irrigated crops that are climatically adapted to the region.

[14] Grade 2 soils are good agricultural soils, although they are not so desirable as soils in grade 1 because of a less permeable subsoil, deep cemented layers (e.g., duripans), a gravelly or moderately fine textured surface layer, moderate or strong slopes, restricted drainage, low available water capacity, lower soil fertility, or a slight or moderate hazard of flooding.

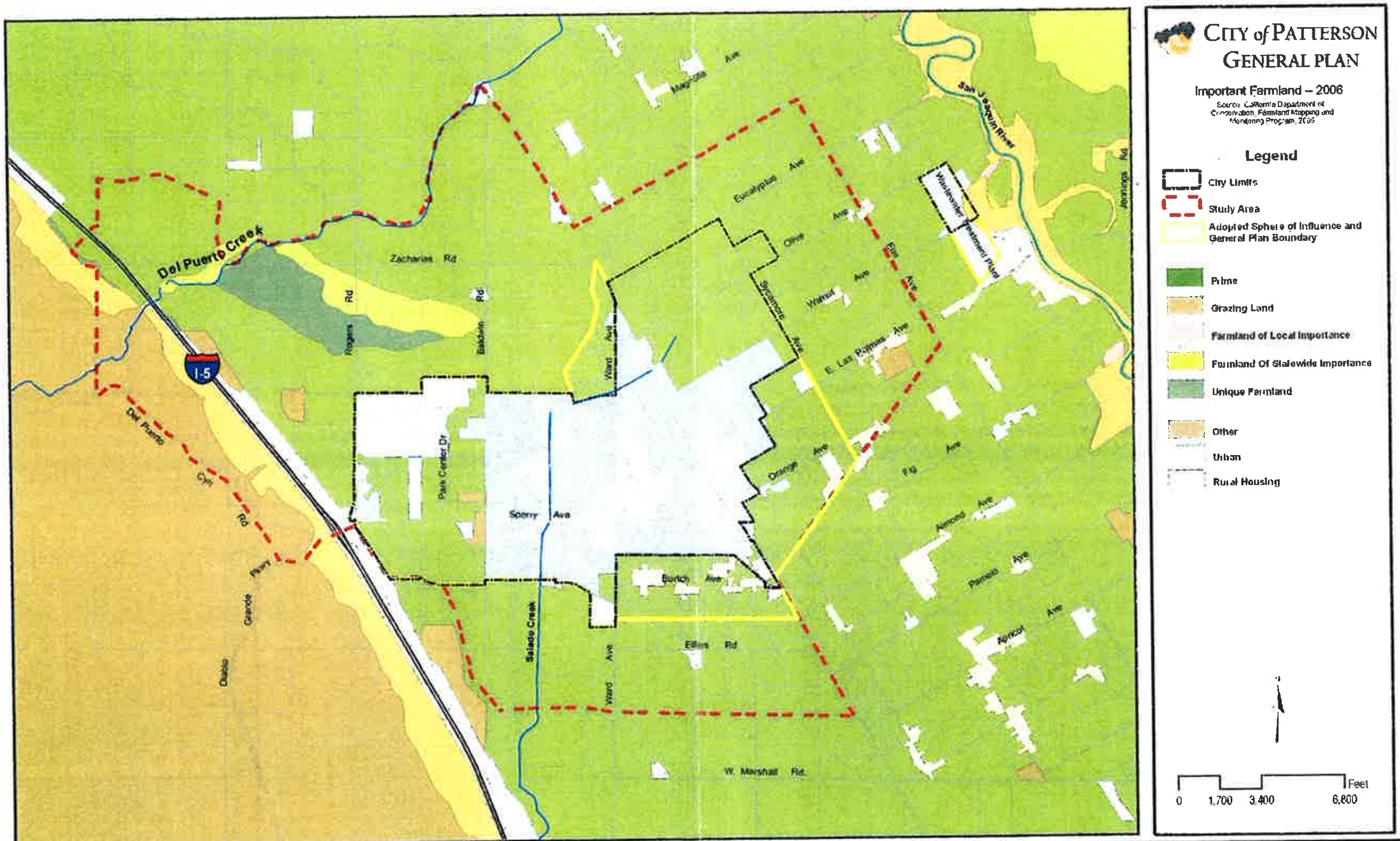
[15] Grade 3 soils are rated fair for agricultural use. They are more limited in their agricultural potential than the soils in grade 2 because of restrictions, such as a shallower depth; steeper slopes; poorer drainage; a less permeable subsoil; a gravelly, sandy, or clayey surface layer; channeled or hummocky microrelief; acidity.

The Natural Resources Conservation Service (NRCS) is the primary source of information concerning the suitability of soils for agricultural use. The NRCS has developed a "Land Capability Classification System" that organizes soils into eight categories rated one through eight. Arable lands are organized into Classes 1 through 4. Non-arable lands are those unsuited for long-term cultivation. Classes 5 through 8 contain non-arable lands. 95% of all soils in the Study Area are considered Class 1 or 2 when irrigated. However, without irrigation, none is considered better than Class 4. For this reason, water availability is crucial to agricultural capabilities within this area.

The California Division of Land Resource Protection uses another soils classification system: the Important Farmland Inventory (IFI), which is the source data for the State's Farmland Mapping and Monitoring Program. This program provides a source of information for state and local agencies concerned with agricultural land conversion. The IFI identifies five farmland categories: prime farmland, farmland of statewide importance, farmland of local importance, unique farmland, and grazing lands. The Prime Farmland designation is based on such factors as the availability of a reliable water supply, the area's temperature range, depth of the water table, soil permeability, and other considerations. Generally, soils receiving a Class 1 or 2 rating under the NRCS Land Capability Classification System (assuming that irrigation is feasible) are designated as IFI Prime Farmland.

Soil mapping for the Important Farmland Inventory has been completed throughout the state, and the results for the Patterson area are shown in Figure VIII-2.

Figure VIII-2: Important Farmland



The Williamson Act

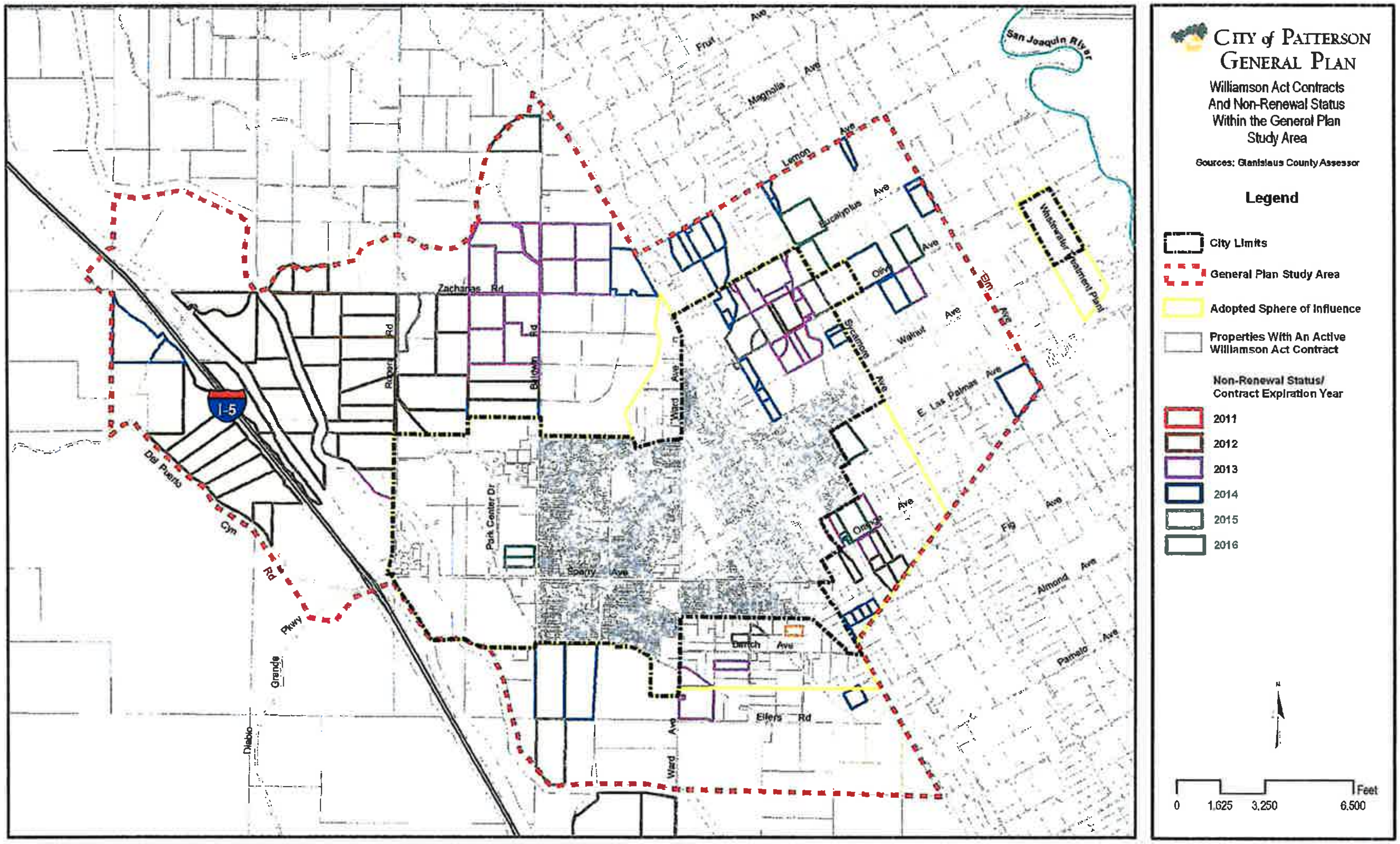
The California Land Conservation Act of 1965 (Williamson Act, Government Code, Section 51200 et seq.) encourages the conservation of agricultural lands by providing a property tax incentive to owners who restrict land uses to agriculture and compatible uses. It is a voluntary program administered through local governments, which are responsible for contracting with landowners. Properties subject to Williamson Act contracts must remain in agricultural use for the duration of the contract, a minimum of 10 years. The contracts are self-renewing unless the property owner or a city or county has filed a Notice of Non-renewal. Filing a Notice of Non-renewal initiates an approximately nine-year period, after which the contract expires.

A Williamson Act contract may also be terminated through contract cancellation. A local government may only approve a request for immediate cancellation of a contract by making specific findings under state law of either consistency with the purposes of the Williamson Act or as a cancellation in the public interest (Cal. Government Code, Section 51282(a)). The California Department of Conservation must be notified of a petition for cancellation. The Department may submit comments advising the local government on the required findings regarding the proposed cancellation and the local government must consider these comments before acting on the proposed cancellation (Cal. Government Code, Section 51284.1). According to the State CEQA Guidelines, projects resulting in cancellation of a Williamson Act contract for any parcel of 100 acres or more should be considered as being of statewide, regional or area-wide significance. (Only one Williamson Act parcel in the Study Area is over 100 acres in size, and the contract was set to expire in 2009.) Under Government Code Section 51243.5 where a Williamson Act contract was properly protested by the City upon its execution and such protest was upheld by LAFCO, the City may exercise its option not to succeed to the rights, duties and powers of a Williamson Act contract upon annexation of the property by the City. If the City exercises its option to not succeed to a contract, the City must record a certificate of contract termination with the county recorder at the same time as LAFCO files the certificate of completion under Section 57203. Parcels in the Study Area under Williamson Act contract, totaling 5,216 acres, are shown in Figure VIII-3.

Agricultural Water Supply

A second principal factor for agricultural productivity is the availability of water. Three water districts serve the Study Area: the Patterson Water District, West Stanislaus Irrigation District, and the Del Puerto Water District.

Figure VIII-3: Williamson Act Contracts



Vegetation and Wildlife Resources

Plant and animal resources in the Study Area occur in both natural and altered habitats. Natural habitats constitute a very small percentage of the Study Area and include the following vegetation and habitat types: riparian, river channels, and valley grassland. Natural habitats associated with water are found primarily along the San Joaquin River. Small amounts of valley grassland vegetation are scattered throughout the Study Area.

Altered habitats include cultivated and urban development areas. The vast majority of the Study Area is cultivated, grazed, or fallow. Although subject to human disturbance, these altered areas may still be valuable for wildlife.

Habitat Types

Five major habitat types have been identified in the Study Area. Characteristics of the five habitats and the kinds of vegetation and wildlife resources associated with each are described below.

Riparian

Riparian shrublands and woodlands are water-dependent habitats that occur along levees and banks of waterways. In relation to the Study Area, such vegetation can be found in close proximity to the San Joaquin River. Here, the understory consists of herbaceous plants and nonnative grasses, while an oak woodland savanna community occurs along the river's edge. This area is primarily open grassland, with scattered mature valley oaks. Larger stands in the Study Area have a denser upper story of Fremont's cottonwoods and red willow.

Typical bird species found in this type of habitat include: great blue heron, great egret, Swainson's hawk, red-tailed hawk, mourning dove, Anna's hummingbird, downy woodpecker, Nuttall's woodpecker, western kingbird, Cassin's kingbird, black phoebe, brown-headed cowbird, black-shouldered kite, California quail, Caspian tern, ash-throated flycatcher, European starling, house wren, Brewer's blackbird, and house finch.

Mammals that can be expected to be found in the riparian habitat are the hoary bat, striped skunk, raccoon, mink, and Botta's pocket gopher. Several reptiles and amphibians are also likely to occur, including the western fence lizard, valley garter snake, Pacific gopher snake, Pacific treefrog, and western toad.

River Channel

The river channel provides open water for many species of birds. Shallow water provides foraging habitat for shorebirds and wading birds, including great blue heron, great egret, killdeer, and spotted sandpiper. Deep water provides foraging habitat for Caspian and Forester's terns and various species of gulls.

Valley Grasslands

Valley grasslands in the Study Area occur along the San Joaquin River on lands not occupied by riparian vegetation, wetlands, or agricultural fields. Grasslands also occur in the foothills of the inner Coast Range along the western edge of the Study Area. Valley grasslands are dominated by many species of nonnative grasses and other herbaceous plants. Native species are also present but are now less abundant than they once were. Common plants of this habitat include bromes, wild oats, wild barley, and filaree.

Wildlife commonly found in valley grasslands include raptors (e.g., black-shouldered kite. northern harrier, Swainson's hawk, red-tailed hawk, American kestrel), songbirds (western kingbird, yellow-billed magpie, American crow, loggerhead shrike, and western meadowlark), and many others.

Agricultural Areas

Agriculture occupies most of the land surrounding, and at the edge of the Study Area. The value of this habitat to wildlife depends on several factors such as crop type, irrigation systems, pesticide use, farming practices, and the surrounding land use.

Many of the wildlife species found in valley grasslands, such as western meadowlark, red-winged blackbird, and mourning dove, also use agricultural fields. Swainson's hawks favor alfalfa fields for hunting. Orchards are used by many species of songbirds, including crow, magpie, scrub jay, and others.

Urban and Developed Areas

Residential and other developed areas occupy a large portion of the Study Area. Many species of animals use these areas, including American robin, scrub jay, yellow-rumped warbler, northern mockingbird, and Virginia opossum.

Special-Status Species

The Study Area is located within the general geographic ranges of several plant and wildlife species that are protected under state or federal endangered species law. Several species of special concern are also found in this region.

Surveys for special-status species were conducted using the 2006 California Natural Diversity Database (NDDB). The NDDB has shown that there are several state-or federally listed or candidate rare, threatened, or endangered plant or animal species in and around the Study Area. These species include San Joaquin Kit Fox, Swainson's Hawk, and Delta Button-Celery. In addition to the state and/or federally listed species, there are a number of species within the Study Area that are of special concern. Figure VIII-4 shows the location of species of special-status and those of special concern.

Plants

Big Tarplant. The Big Tarplant is a summer-flowering, annual tarplant that is typically found in valley and foothill grassland habitats at an elevation of 30-505 meters. Although it is not a state-or federally listed species, the Big Tarplant is still of special concern due to its rarity. A small area of potential habitat for the species is located just inside the Study Area's western boundary, while a larger habitat is located along the north-western edge of the Study Area (see Figure VIII-4).

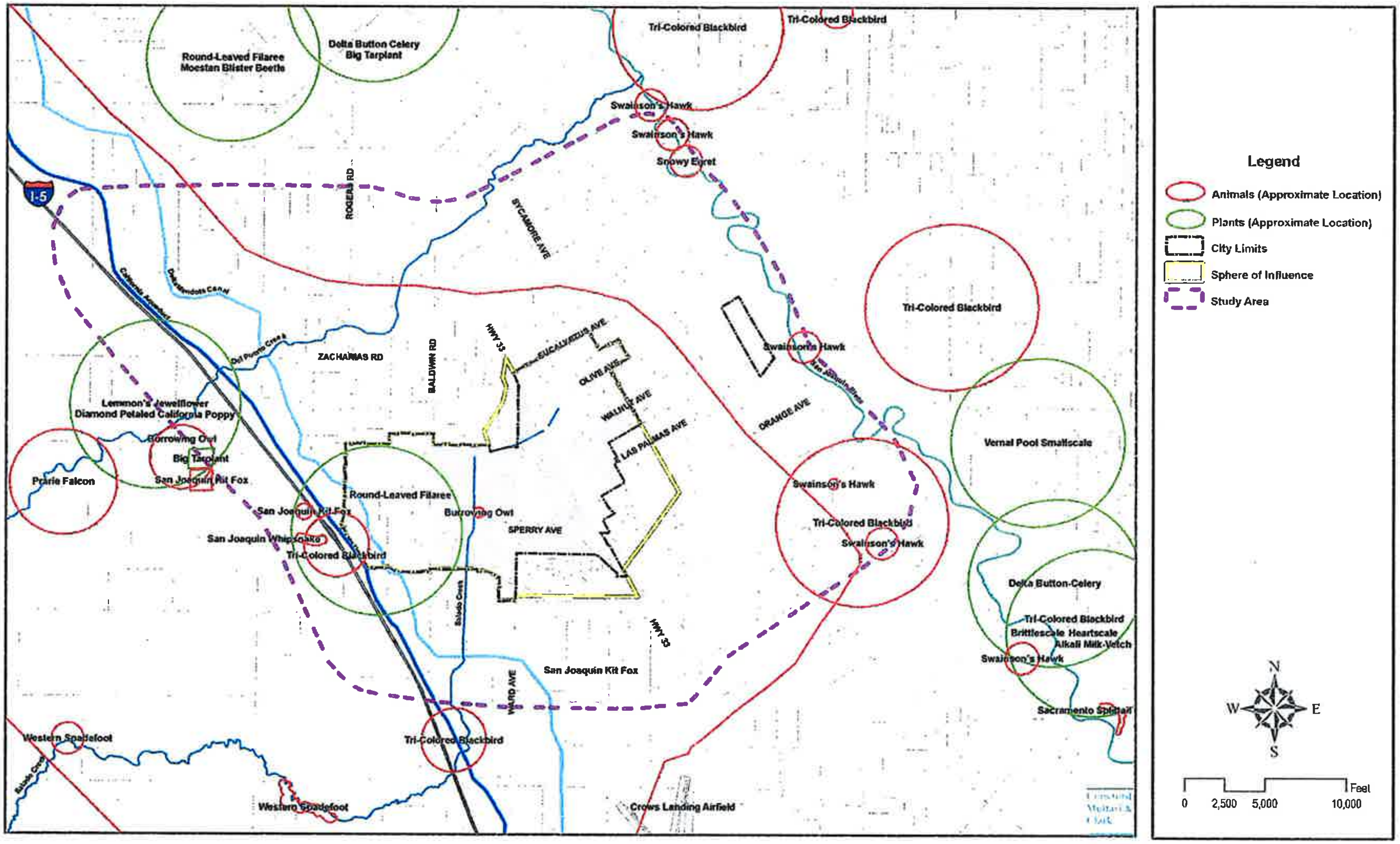
Delta Button-Celery. The Delta Button-Celery is a member of the carrot family that occurs on clay soils on sparsely vegetated margins of seasonally flooded flood plains and swales at an elevation of 3-30 meters. The species carries a state listing as an endangered species, but has yet to be federally listed. Potential habitat for the Delta Button-Celery can be found along the north-western edge of the Study Area, while additional habitat is located slightly east of the Study Area (see Figure VIII-4).

Diamond-Petaled California Poppy. The Diamond-petaled poppy occurs in valley and foothill grassland habitats at an elevation of 0-975 meters. The species can be found in the inner Coast Ranges from San Luis Obispo County to Contra Costa County. The species has declined because of grazing, competition from nonnative species, and habitat loss. Potential habitat for the Diamond-Petaled California Poppy is located along the western edge of the Study Area (see Figure VIII-4).

Lemmon's Jewelflower. The Lemmon's Jewelflower is a species most commonly found in pinyon and juniper woodland, and valley and foothill grassland, at an elevation of 80-1220 meters. The Jewelflower is an annual herb that can be found in counties throughout California. Potential habitat for the species is located along the western edge of the Study Area, just west of Interstate 5 (see Figure VIII-4).

Round-Leaved Filaree. The Round-Leaved Filaree is most commonly found in cismontane woodland, and valley and foothill grassland/clay. The species is an annual herb that can be found at elevations of 15-1200 meters, and blooms from March to May. Potential habitat for Round-Leaved Filaree is located within the western portion of the Study Area, with additional habitat located slightly north of the Study Area (see Figure VIII-4).

Figure VIII-4: Biological Resources in the Study Area



Animals

Aleutian Canada Goose. Aleutian Canada geese winter in the Central Valley of California. One of only several major wintering areas occurs at the junction of the Tuolumne and San Joaquin Rivers, near Modesto. These geese feed in pastures and grain fields in agricultural areas. One small area of potential habitat occurs along the north-eastern edge of the Study Area, along the banks of the San Joaquin River (see Figure VIII-4).

Swainson's Hawk. Several known habitats of the Swainson's Hawk occur along the eastern edges of the Study Area (see Figure VIII-4). The Swainson's Hawk has been listed by the State of California as a threatened species, but has not been federally listed. The species breeds in stands with few trees in riparian areas, oak savannah, and sometimes in suburban settings. The species often forages in grassland, pastures, and other appropriate agricultural fields. Such foraging habitat exists throughout the Study Area.

San Joaquin Kit Fox. The geographic range of the San Joaquin kit fox includes much of the Study Area (see Figure VIII-4). Preferred habitats include desert alkali scrub and annual grasslands. The San Joaquin Kit Fox may forage in agricultural habitats adjacent to the urban areas of Patterson, but the species is presumed absent. There is very low potential for occurrence due to marginal foraging habitat on agricultural lands. The NDDB (2006) places several areas of potential habitat within the western portion of the Study Area. The most probable habitat for the San Joaquin Kit Fox is a corridor located between the California Aqueduct and the Delta Mendota Canal; however, a qualified kit fox biologist conducted field surveys for San Joaquin Kit Fox in this area during October and November 2001, and March 2002, and was unable to find any specific evidence of San Joaquin Kit Fox.

Burrowing Owl. The Burrowing Owl is a small, terrestrial owl of open country. Burrowing Owls favor flat, open grassland or gentle slopes and sparse-shrub land ecosystems. These owls prefer annual and perennial grasslands, typically with sparse or nonexistent tree or shrub canopies. In California, Burrowing Owls are found in close association with California ground squirrels. Owls use the abandoned burrows of ground squirrels for shelter and nesting.

Burrowing Owls are known to be resident within the southern San Joaquin Valley and are likely to inhabit pastures, fallow fields, and canal and railway right-of-ways where ground squirrels have been allowed to invade. Known habitat and potential habitat that may become suitable for Burrowing Owls is located within the Study Area (see Figure VIII-4).

Loggerhead Shrike. This predatory songbird inhabits much of the lower 48 states of the United States of America. They prefer open habitats interspersed with shrubs, trees, poles, fences, or other perches from which they can hunt. Some populations of the Loggerhead Shrike, primarily those in eastern North America, have declined significantly over the last 40 years.

Other populations, including those in western North America, appear to be decreasing as well. Even with this trend, Loggerhead Shrikes are still considered a fairly common species in California. Though they are likely to be more common in less disturbed habitats, Loggerhead Shrikes are still found throughout the Central Valley.

Although not listed by the NDDB in the vicinity of the Study Area, Loggerhead Shrikes have been observed within the Study Area during field surveys. Suitable nesting and foraging habitat is preset within the Study Area at the edge of orchards and in some vegetation associated with residences.

Northern Harrier. Northern Harriers are commonly found in open grasslands, agricultural areas, and marshes. Northern Harriers nest on the ground in areas where long grasses or marsh plants provide cover and protection. Harriers hunt for a variety of prey, including rodents, birds, frogs, reptiles, and insects, by flying low and slow in a traversing manner, utilizing both sight and sound to detect prey items.

Although not listed by the NDDB in the vicinity of the Study Area, Northern Harriers have been observed foraging in the vicinity of the Study Area. While nesting habitat is absent from the Study Area, suitable foraging habitat does exist.

Tricolored Blackbird. Tricolored Blackbirds are found almost exclusively in the Central Valley and central and southern coastal areas of California. The Tricolored Blackbird is highly colonial in its nesting habits and forms dense breeding colonies of up to tens of thousands of pairs. This species nests primarily in tall, dense stands of cattails or tules, but also nests in blackberry, wild rose bushes and tall herbs. Nesting colonies are typically located near standing or flowing freshwater. Tricolored Blackbirds form large, often multi-species, flocks during the nonbreeding period and range more widely than during the reproductive season.

Nesting habitat for Tricolored Blackbirds is known to be present within the Study Area (see Figure VIII-4), and Tricolored Blackbirds are likely to occasionally forage in agricultural habitats within the Study Area such as orchards, alfalfa fields, and recently disked fields.

Air Resources

The city of Patterson lies within the San Joaquin Valley Air Basin (SJVAB), which is bounded by the coastal mountain ranges on the west and the Sierra Nevada range on the east. The Carquinez Strait is a sea level gap in the coastal range: the strait lies approximately 70 miles northwest of the Study Area, and the intervening terrain is flat. The prevailing wind direction in the Study Area is from the northwest, owing to marine breezes through the Carquinez Strait. During winter the sea breeze diminishes. Table VIII-1 presents climatological data for Stanislaus County.

Table VIII-1 - Historical Climate Data 1931-2006 - Modesto Monitoring Station													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temp. (F)	53.8	60.9	66.9	73.3	81.1	88.2	94.2	92.1	87.7	77.9	64.4	54.3	74.6
Average Min. Temp. (F)	37.8	40.9	43.5	46.9	51.8	56.5	60.0	58.8	56.0	49.7	41.8	37.8	48.4
Average Precipitation (in.)	2.38	2.12	1.95	1.09	0.48	0.09	0.03	0.04	0.20	0.63	1.34	2.12	12.46

Existing Local Air Quality Conditions

In contrast to other air basins in California, the air quality in the San Joaquin Valley Air Basin (SJVAB) is not dominated by a single large urban source, but by a number of moderately sized urban areas spread along the valley's main axis. While only 10 percent of California's population lives in the San Joaquin Valley, pollution sources in the region account for about 14 percent of the total statewide criteria pollutant emissions. With the exception of PM_{10}, emission levels in the SJVAB have been decreasing since 1990. This is primarily due to improved controls on motor vehicle emissions, which are the primary source of CO and NO_x. A large source of ROG in the region comes from the oil and gas production in the lower San Joaquin Valley. Particulate matter emissions are primarily from road dust, agricultural operation, residential fuel combustion, and waste burning.[16] The CARB and the District continually monitor the ambient concentrations of criteria pollutants including ozone, inhalable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), and carbon monoxide. The station nearest the Study Area is located approximately seven miles to the southeast on 14th Street in downtown Modesto. Table VIII-2: Ambient Air Quality Data, Modesto Monitoring Station summarizes the relevant data.

[16] California Air Resources Board, The California Almanac of Emissions and Air Quality, 2005 Edition.

Table VIII-2 - Ambient Air Quality Data, Modesto Monitoring Station

Ozone

Year	Days Over State 1-hr Std.	Max. 1-hr (ppm)	3 yr Ave. 4th Highest 1-hr Ave. (ppm)	Days Over Natnl. 8-hr Std.	Max. 8-hr Ave. (ppm)	3 yr Ave. 4th High 8-hr Ave. (ppm)
2000	7	0.131	0.131	4	0.101	0.090
2001	12	0.124	0.109	7	0.093	0.088
2002	14	0.120	0.109	6	0.096	0.088
2003	9	0.110	0.109	1	0.091	0.086
2004	2	0.104	0.106	0	0.084	0.083
2005	15	0.115	0.107	6	0.094	0.083

$PM_{2.5}$

Year	Est. Days Over Natnl. 24-hr Std.	Max. 24-hr Ave. ($\mu g/m^3$)	3-yr Ave. 98th Percentile (μ/m^3)
2000	15.1	77	–
2001	8.7	95	80
2002	8.4	83	70
2003	0	64	62
2004	0	53	54
2005	–	53	–

PM_{10}

Year	Est. Days Over Natnl. 24-hr Std.	Max. Natnl. 24-hr Ave. ($\mu g/m^3$)	Est. Days Over State 24-hr Std.	Max. State 24-hr Ave. ($\mu g/m^3$)
2000	0	112	68.3	119
2001	3	158	60.8	160
2002	0	83	76.3	86
2003	0	70	26.3	71
2004	0	80	36	79
2005	0	93	51.4	97

CO

Year	Days Over Natnl. 8-hr Std.	Max. Natnl. 8-hr Ave. (ppm)	Days Over State 8-hr Std.	Max. State 8-hr Ave. (ppm)
2000	0	5.98	0	5.98
2001	0	6.03	0	6.03
2002	0	4.46	0	4.46
2003	0	3.76	0	3.76
2004	0	2.98	0	2.98
2005	0	2.53	0	2.68

Source: San Joaquin Unified Air Pollution Control District

Air Quality Standards

National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) are standards that define the upper limits for ambient airborne concentrations of pollutants. The standards are designed to protect all aspects of the public health and welfare, with a reasonable margin of safety. At the national level, the federal Clean Air Act requires the U.S. Environmental Protection Agency (U.S. EPA) to establish NAAQS and designate geographic areas that are either attaining or violating the standards. In California, the task of air quality management and developing air quality regulations has been legislatively granted to the California Air Resources Board (CARB) and local air quality management districts. The CARB establishes CAAQS and designates the attainment status of each area in the state with the standards. The San Joaquin Valley Air Pollution Control District (District) coordinates the efforts to comply with these standards.

The NAAQS and CAAQS are established for "criteria pollutants." These are ozone, respirable particulate matter (PM10), fine particulate matter (PM2.5), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead. Ozone is an example of a secondary pollutant that is not emitted directly from a source (e.g., an automobile tailpipe). It is formed in the atmosphere by chemical and photochemical reactions. Reactive organic gases (ROGs), including volatile organic compounds (VOCs), and nitrogen oxides (NO_x), are monitored and regulated because they are precursors to ozone formation. Table VIII-3: State and Federal Ambient Air Quality Standards identifies the ambient national and state air quality standards.

Toxic air contaminants (TACs) are a category of air pollutants regulated separately from criteria pollutants. The TACs are suspected or known to cause cancer, birth defects, neurological damage, or death. There are no established ambient air quality standards for TACs. Instead they are managed on a case-by-case basis depending on the quantity and type of emissions and proximity to potential receptors. Their effects tend to be localized and directly attributable to certain sources.

The CARB is responsible for oversight of air quality management in the state. CARB's responsibilities include establishing emissions standards and regulations for certain mobile sources (e.g., autos, light-duty trucks) and overseeing the efforts of local air quality management districts. The District is responsible for demonstrating that attainment of the ambient air quality standards is either achieved or will be achieved through proper regional planning in the SJVAB. The District directly regulates stationary emission sources through its permit authority and indirectly manages emissions from mobile sources through coordination with regional municipalities and transportation planning agencies.

Table VIII-3 - State and Federal Ambient Air Quality Standards					
Pollutant	Averaging Time	California Standards		Federal Standards	
		Concentration	Method	Concentration	Method
Ozone (O_3)	1 Hour	0.09 ppm	Ultraviolet Photometry	–	Ultraviolet Photometry
	8 Hour	0.07 ppm		0.08 ppm	
Respirable Particulate Matter (PM_{10})	24 Hour	50 μg/m³	Gravimetric or Beta Attenuation	150 μg/m³	Inertial Separation and Gravimetric Analysis
	Annual Mean	20 μg/m³		–	
Fine Particulate Matter ($PM_{2.5}$)	24 Hour	No Separate State Standard		35 μg/m³	Inertial Separation and Gravimetric Analysis
	Annual Mean	12 μg/m³	Gravimetric or Beta Attenuation	15 μg/m³	
Carbon Monoxide (CO)	8 Hour	9.0 ppm	Non-Dispersive Infrared Photometry	9 ppm	Non-Dispersive Infrared Photometry
	1 Hour	20 ppm		35 ppm	
Nitrogen Dioxide (NO_2)	Annual Mean	–	Gas Phase Chemiluminescence	0.053 ppm	Gas Phase Chemiluminescence
	1 Hour	0.25 ppm		–	
Sulfer Dioxide (SO_2)	Annual Mean	–	Ultraviolet Fluorescence	0.03 ppm	Spectophotometry (Pararosaniline Method)
	24 Hour	0.04 ppm		0.14 ppm	
	3 Hour	–		–	
	1 Hour	0.25 ppm		–	

Source: CARB Ambient Air Quality Standards Table, Accessed 5/23/07.

Because of on-going violations of the NAAQS and CAAQS for ozone and PM_{10} in the SJVAB, the region is designated as a nonattainment area for these criteria pollutants, and these pollutants are therefore the most relevant to air quality planning and regulation in the SJVAB. The District manages these pollutants through a long-term attainment planning process that forecasts emissions and future concentrations depending on changes in source activity, regulatory programs, and meteorological conditions. The air quality plans for demonstrating attainment (one each for ozone and PM_{10}) are evolving documents that are updated approximately triennially to reflect the changing population, economic, land use, and transportation conditions in the San Joaquin Valley. The local transportation planning agencies (in this area, Stanislaus Council of Governments) and CARB provide the information needed to predict future on-road mobile source emissions. Programs for motor vehicle inspection and maintenance (smog check), fuel reformulation, encouraging use of transit, and stringent control of stationary sources are all triggered by the nonattainment status of the area. If violations of the ambient air quality standards in the region persist beyond the attainment dates predicted by District plans, federal transportation funds can be withheld, adversely affecting future transportation projects in the region. The region needs to meet the federal 8-hour ozone standard before 2013, and the PM_{10} standard by 2010.

Ozone

Effective June 15, 2005, the U.S. EPA revoked in full the federal 1-hour ozone ambient air quality standard, including associated designations and classifications, in all areas except 14 "early action compact areas" that do not include the SJVAB. On April 15, 2004, the U.S. EPA designated 15 areas in California, including the SJVAB, that violate the federal 8-hour ozone standard. Each nonattainment area's classification (marginal, moderate, serious, or severe) and attainment deadline are based on the severity of its ozone problem. The SJVAB is a serious nonattainment area. The attainment deadline for the 8-hour NAAQS is 2013 for the SJVAB.

The CARB submitted the 2004 Extreme Ozone Attainment Demonstration Plan to the U.S. EPA on November 15, 2004. The U.S. EPA is currently reviewing the plan. In coordination with CARB and other north/central California air quality management districts, preliminary work has begun on developing the 8-hour Ozone Attainment Demonstration Plan for SJVAB. A State Implementation Plan (SIP) demonstrating attainment of the new federal ozone standard must be adopted by the local air districts and CARB, and submitted to the U.S. EPA by June 15, 2007. CARB, air quality management districts, and other key stakeholders are coordinating development of the SIP through the Northern California 8-Hour Ozone SIP Working Group (Working Group). The Working Group provides a forum for the sharing of technical information and for ensuring that each area's SIP is consistent with attainment throughout the region.

Carbon Monoxide

On April 26, 1996, CARB approved the "Carbon Monoxide Redesignation Request and Maintenance Plan for Ten Federal Planning Areas" as part of the SIP for carbon monoxide. The nearest planning area was the Modesto Urban Area, which did not include the City of Patterson. Improvements in CO conditions were achieved due to improvements in motor vehicles and the use of reformulated fuels. The U.S. EPA approved this revision on June 1, 1998 and redesignated the ten areas to attainment. On October 22, 1998, CARB revised the SIP to incorporate the effects of the recent regulatory action to remove the wintertime oxygen requirement for gasoline in certain areas. On July 22, 2004, CARB approved an update to the SIP that shows how the ten areas will maintain the standard through 2018, revises emission estimates, and establishes new on-road motor vehicle emission budgets for transportation conformity purposes. The attainment status for each of the criteria pollutants, including CO, is summarized in Table VIII-2: Ambient Air Quality Data, Modesto Monitoring Station, above.

Particulate Matter

The District developed a PM_{10} Attainment Demonstration Plan in 2003 (PM_{10} Plan), and the PM_{10} Plan was adopted by CARB in June 2003 and approved by U.S. EPA in April 2004. The PM_{10} Plan was amended in December 2003. The PM_{10} Plan identifies aggressive steps that the District must implement to achieve attainment with the federal standards. Some of the control strategies include more stringent control of agricultural dust, road dust, and dust from construction activities. The District has also established an Indirect Source Mitigation Fee Program that would require new development projects to mitigate their indirect emissions (meaning emissions from motor vehicle trips generated by that project) or contribute to some type of mitigation fund that could be used to identify and pay for emission reduction projects. In February 2006, the District formally adopted the 2006 PM_{10} Plan, which was submitted to the U.S. EPA.

Fine particulate matter ($PM_{2.5}$) is also a pollutant of concern in the SJVAB. The NAAQS for $PM_{2.5}$ are being implemented through U.S. EPA rule-making and ambient monitoring to determine if the attainment status of the region is underway. Monitoring will likely reveal violations of the $PM_{2.5}$ NAAQS, which will trigger a separate long-range planning process for the District to identify and manage sources of this pollutant and its precursor pollutants.

Toxic Air Contaminants

Toxic Air Contaminants (TACs) are managed through a combination of source identification, risk characterization, control requirements, and avoidance of land use conflicts. All stationary sources of TACs are subject to the District's permitting requirements, which include an evaluation of potential TAC emissions and risks to nearby receptors. Stationary sources are screened for their potential to cause health risks using a facility prioritization score. The District does not require detailed assessments of facilities with prioritization scores below 1, because their emissions would not be likely to result in potential health risks. For new sensitive land uses (including residential areas and schools), it is the responsibility of the city or county to identify whether the new land uses would be located near existing sources of TACs. Management of the public's exposure to odors is also generally accomplished by avoiding land use conflicts with appropriate distance controls.

In 1998, CARB identified diesel engine particulate matter as a TAC. Mobile sources, such as trucks, buses, automobiles, trains, ships, and farm equipment are the largest source of diesel emissions. CARB estimates that 70 percent of the known statewide cancer risk from outdoor air toxics is attributable to diesel particulate matter.[17] Approximately 24 percent is attributed to on-road diesel-fueled vehicles. CARB recommends avoiding siting new sensitive land uses within 500 feet of freeways with 100,000 vehicles per day.[18] The State Highway 33 peak hourly traffic rate is 790 vehicles per hour.[19] Particulates from diesel exhaust are managed through vehicle emission control programs implemented on a state and federal level with the cooperation of fuel suppliers and vehicle and engine manufacturers. In September 2000, the Air Resources Board (ARB) approved a comprehensive Diesel Risk Reduction Plan (Plan) to reduce diesel emissions from both new and existing diesel-fueled engines and vehicles. The goal of the Plan is to reduce diesel PM emissions and the associated health risk by 75 percent in 2010 and 85 percent by 2020, through cleaner fuels, such as

[17] California Air Resources Board, The California Almanac of Emissions and Air Quality, 2005.

[18] California Air Resources Board, 2005, Air Quality and Land Use Handbook: A Community Health Perspective, March.

[19] Department of Transportation, 2003 traffic counts, http://traffic-counts.dot.ca.gov/2003all/r022-33i.htm

ultra-low sulfur diesel, new diesel tailpipe regulations, and regulations governing operations such as idling restrictions.[20]

On June 30, 2005, the CARB entered into a pollution reduction agreement with Union Pacific Railroad (UP) and BNSF Railway (BNSF). The railroads have committed to studying and reducing pollution risks from diesel emissions. The railroads have also agreed to the following:

- Phaseout non-essential idling within six months, and install idling reduction devices on California-based locomotives within 3 years.
- Identify and expeditiously repair locomotives with excessive smoke and ensure that at least 99 percent of the locomotives operating in California pass smoke inspections.
- Maximize the use of ultra low sulfur (15 parts per million) diesel fuel by January 1, 2007, six years before such fuel is required by regulation.
- Conduct health risk assessments for 17 major rail yards and use these studies to identify risk reduction measures.

Greenhouse Gas Emissions (GHGs)/AB 32

California's major initiatives for reducing climate change or greenhouse gas (GHG) emissions are outlined in Assembly Bill 32 (signed into law 2006), 2005 Executive Order and a 2004 ARB regulation to reduce passenger car GHG emissions. These efforts are aimed at reducing GHG emissions for the State to 1990 levels by 2020—a reduction of approximately 30 percent, and then an 80 percent reduction below 1990 levels by 2050.

City of Patterson 2009 Baseline Greenhouse Gas Emissions Inventory

A GHG inventory is a quantification of all GHG emissions and sinks within a selected physical and/or economic boundary. GHG inventories can be performed on a large scale, such as for global and national entities, or on a small scale, such as for a particular building or person. GHG emission and sink specifications are complicated by the fact that natural processes dominate the carbon cycle. Though some emission sources and processes are easily characterized and well understood, components of the way in which GHGs operate are not known with accuracy. As such, GHG protocols are currently under development and ad-hoc tools must be developed to quantify emissions from certain sources and sinks.

The baseline inventory includes the following major sources of greenhouse gas emissions:

- Vehicle trips with origins and destinations within the city, based on vehicle miles traveled (VMT);

[20] CARB, Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles, October 2000.

- Residential natural gas and electricity consumption, based on average county consumption rates established in the Energy Consumption Data Management System (ECDMS)21;
- Commercial natural gas and electricity consumption, based on average state- and nationwide consumption rates for nonresidential uses22;
- Waste produced within the city and send to landfill, based on disposal rates provided by CalRecycle and EPA's WARM model;
- Annual construction activities;

As discussed above, the inventory is restricted to energy, transportation, and waste analysis due to a lack of methodology or lack of reliable data (or both) to quantify the emissions from other sources. Accordingly, emissions from the following sources are excluded:

Off-road vehicle emissions
Propane emissions
Refrigerant emissions
Aircraft emissions
Sewage treatment emissions

As inventory protocol and methodologies advance, these sources can be incorporated into the baseline inventory. The current emissions sources are believed to comprise the vast majority of community-wide emissions. For compliance with the California Environmental Quality Act and Attorney General guidance, the baseline year for this inventory is 2009.

Point Sources

Throughout the SJVAB, agricultural operations and mobile sources account for the majority of ozone precursor and PM_{10} emissions. The majority of PM_{10} emissions in the San Joaquin Valley are attributed to farming operations and airborne dust from paved and unpaved roads.[23] Managing growth in emissions from agricultural operations and emissions from all types of motor vehicle activity is an important component of the regional air quality attainment strategy. Industry and other stationary sources make up the remainder of the human-generated emissions in the SJVAB.

Present land uses within the Study Area include agricultural production, residential dwellings, commercial/office space, and industrial uses. Major sources of air emission sources in and around the Study Area are on- and off-road equipment and farming activities, burning that can create substantial dust or soot emissions, and automobile travel.

[21] California Energy Commission 2008
[22] U.S. Energy Information Administration EIA 2005
[23] San Joaquin Valley Air Pollution Control District, Guide for Assessing and Mitigating Air Quality Impacts, Technical Document, Section 3, revised January 10, 2002.

Agricultural land uses present in the Study Area can also occasionally cause emissions of TACs from pesticide application.[24] A search of the stationary source facility database maintained by CARB16 indicated the following facilities are the major air pollutant emitters in the area: Designed Mobile Systems, Inc. - 800 S. Highway 33; Global Valley Networks Inc. - 25 El Circulo (now located in the Keystone Business Park); Unocal California Pipeline Co. - 2900 Oak Flat Road; and Vieira's Petroleum Company - 341 South First Street.

Of these facilities, the one emitting the largest mass of air pollutants is Designed Mobile Systems, Inc. Designed Mobile Systems, Inc. designs and builds modular buildings on 11 acres of land in the southern portion of the Study Area. The following is the 2002 emissions inventory for that facility in tons per year: Total organic gases - 13.2; ROG - 13.2; PM - 6.9; PM_{10} - 6.6; $PM_{2.5}$ - 6.4.

Mobile sources in the Study Area are the major source of air emissions. Traffic on State Route 33 and other on-road vehicles throughout the region's transportation network routinely emit ROG, NO_x, and CO. On- and off-road vehicles are also a major source of respirable particulate matter emissions (PM_{10} and $PM_{2.5}$) from entrained dust on the roadways. Exhaust from diesel train engines is another source of air emissions. There are active Union Pacific (UP) railroad tracks running through the Study Area, parallel to Highway 33.

Mineral Resources

The Study Area is not characterized with the soils or topography associated with mineral resources. No mineral-bearing geologic formations or sediments of economic value are known to exist.

[24] The California Department of Pesticide Regulation is updating its process to improve management of the chemicals that pose the greatest risks (risk assessment prioritization), January 2004. Available at: http://www.cdpr.ca.gov/.

Findings

- Water quality in the San Joaquin River has been degraded by urban runoff and agricultural irrigation water, which has reduced the suitability of this water for agricultural and domestic use.

- The city receives its potable water supplies from the groundwater basin. The groundwater levels underlying the Study Area are relatively high; however, groundwater elevations fluctuate from season to season. Due to increasing levels of contamination, it may become necessary for the City to either treat its groundwater or blend it with higher quality surface water, in order to continue meeting water quality standards.

- The Study Area consists almost exclusively of soils that are classified as prime agricultural land. A significant portion of these lands are under Williamson Act contract; however, many of these parcels have entered into the non-renewal process, which will eventually terminate their Williamson Act status. Buildout of the General Plan will reduce the amount of existing agricultural land.

- The Study Area supports the state and/or federally listed San Joaquin Kit Fox and Swainson's Hawk. Both species may utilize resources within the Study Area for foraging and nesting/shelter purposes. Loss of such habitat could be detrimental to the species.

- Several plants and animals of special concern may occur in habitats found in the Study Area. Loss of the habitats which support these species may result in significant impacts to biological resources, depending on the species present and levels of use.

- Surveys should be conducted during the proper seasons before approval of any new land-disturbing activities.

- As of 2007, Stanislaus County was determined to be in nonattainment of federal and state carbon monoxide standards. It is slightly over federal standards for ozone.

Bibliography

California Air Resource Board website. Accessed May, 2007. http://www.arb.ca.gov/homepage.htm

California Department of Fish and Game, Biogeographic Data Branch. *California Natural Diversity Database.* Accessed April, 2007. http://www.dfg.ca.gov/bdb/html/cnddb.html

California Department of Fish and Game, Habitat Conservation Planning Branch. *California's Plants and Animals.* Accessed May, 2007. http://www.dfg.ca.gov/hcpb/species/species.shtml

City of Modesto, Engineering & Transportation Department, Capital Planning Division and the Modesto Irrigation District, *Urban Water Management Plan*, 2000

City of Patterson General Plan. 1992.

H_2 0 Group, *City of Patterson Water Supply Planning Study.* April 2006.

Stanislaus County General Plan, *Conservation Element* and *Agricultural Element.* 1994.

Turnstone Consulting, *Villages of Patterson Final Environmental Impact Report*, 2006.

Turnstone Consulting, *West Patterson Projects Final Environmental Impact Report*, 2003.

U.S. Department of Agriculture, Natural Resources Conservation Service. *Web Soil Survey.* Accessed May, 2007. http://websoilsurvey.nrcs.usda.gov/app/

Western Regional Climate Center, Historical Climate Information. Accessed April, 2007. http://www.wrcc.dri.edu/summary/lcd.html

Glossary

Air Pollutant Emission - Discharges into the atmosphere, usually specified in terms of weight per unit of time for a given pollutant from a given source.

Air Pollution Control District (APCD) - A single or multi-county agency with legislative authority to adopt and enforce all rules and regulations necessary to control nonvehicular sources of air pollutants in the area.

Air Quality Standard - A health-based standard for air pollution established by the federal government and the state. Ambient Air Quality -The quality of the air at a particular time and place. ARB -California Air Resources Board

cfs - Cubic feet per second

CO - Carbon monoxide

DFG - California Department of Fish and Game

Habitat - The natural environment of a plant or animal

HC - Hydrocarbons

Land Capability Classification - The U.S. Soil Conservation Service's grouping of soils into classes (I through VIII), subclasses, and units according to their suitability for agricultural use, based on soil characteristics and climatic conditions

NBBD - California Natural Diversity Database, published by the California Department of Fish and Game

NO - Nitrogen oxides

PM10 - Particulate matter less than 10 microns in diameter

Riparian Habitat - The land and plants bordering a watercourse or lake SCS –U.S. Soil Conservation Service

USFWS - U.S. Fish and Wildlife Service

VELB - Valley elderberry longhorn beetle, a federally-listed threatened species

X. Scenic Resources & Urban Character

Introduction

This chapter describes the structure and appearance of Patterson's environment: both natural and human-made elements. The high visual quality of the rural landscapes and trees and the generally cohesive urban pattern are the major scenic resources in Patterson.

Setting

Patterson is located in California's Great Central Valley. The Central Valley is a vast, nearly flat depositional plain dominated by agricultural land uses. A geometric pattern of orchards, vineyards, row crops, pastures, roads, and canals dominates the landscape.

The towns and cities in the Central Valley form urban islands within the agricultural landscape. Due to the lack of topographic variation and the dense vegetation canopy in most of the older urbanized areas, smaller towns and cities are usually not very visible from outside their immediate boundaries. Concentrations of trees and high structures such as water towers and grain silos are often the only landmarks easily visible from beyond the urbanized areas.

The hills of the Diablo Mountains form the western edge of the General Plan Study Area, and slope gently down to the valley floor. Most of the Study Area is relatively flat. Interstate 5, which traverses the western edge of the Study Area, affords excellent views across the valley to the east. The San Joaquin River, which defines the eastern edge of the Study Area, and a number of irrigation canals are the primary surface hydrologic features. The visibility of these features is generally limited to localized foreground views due to the flat topography and vegetation screening.

Four distinct types of vegetation largely determine the aesthetic character of the Study Area:

- Agricultural croplands such as alfalfa, tomatoes, and other row crops;
- Orchards;
- The extensive tree cover within the developed portions of the city (parks, boulevards, and residential neighborhoods) accented by tall palm trees planted along major paths and activity nodes; and
- Riparian vegetation along the San Joaquin River.

Within the city, the extensive tree cover in the residential areas is the predominant scenic resource. The arrangement of these vegetation types forms a strong geometric landscape pattern characterized by a patchwork of broad open fields and highly enclosed orchards. The small isolated clusters of tall mature trees surrounding many of the older farm buildings add a random vertical punctuation to this otherwise strong, regular pattern. With very few exceptions, the edge of the urban area is visually screened by orchards. As a result, the surrounding agricultural landscape has a high degree of visual cohesiveness, and does not convey the sense of suburban encroachment common in the agricultural areas surrounding many valley towns and cities.

The Pattern of Urban Development

The original Patterson town site is roughly defined by four streets-First Street, C Street, 7th Street, and L Street. The city was planned in the early 1900s by the city's founder Thomas W. Patterson. Patterson envisaged a town of beauty and distinction and used the plan for Washington D.C. as a guiding design precedent. Thus the new town was given a very formal and distinctive urban pattern, with axial and diagonal boulevards emanating from a circular town center.

Outside the city center, these boulevards overlay a square grid which eventually gives way to the larger gridded township pattern of the surrounding agricultural landscape. The eastern portion of the town center abuts the Southern Pacific Railroad alignment and Second Street (Highway 33), the city's major thoroughfare.

The city's major boulevards lead to the downtown and span a gradient of city land uses, serving to unify the entire city.

The dense concentration of mature street trees is a positive urban design asset. The boulevard plantings of mature date palm trees give a magnificent visual quality to the eastern Portion of Las Palmas Avenue from First Street to the San Joaquin River and along Sperry Avenue west of Ward Avenue. These palms, planted along Las Palmas at the time of the town's founding, are a distinctive and valuable scenic and historical resource. In other parts of the city, the cover of mature street trees transforms residential streets into lush, shaded arcades. The City of Patterson has achieved high scenic quality and an uncommon degree of visual coherence by following a well-designed street tree plan.

North and South City Parks, which flank Las Palmas Avenue between Second Street and the Plaza circle, provide an excellent public recreation and visual amenity. The strategic location of this park area links Highway 33 and the downtown area, and thus serves as an important gateway to the city.

Regulatory Setting

Community Design Guidelines and Downtown Physical Design Plan

In 2002 the City adopted the Community Design Guidelines and Downtown Physical Design Plan to set forth the city's expectations for the qualities to be provided in the design of new development. The Guidelines are intended to build upon the historic architecture and urban design of Patterson and ensure that these features are incorporated in new development.

Development approved following adoption of the Guidelines includes the Patterson Gardens project, the Patterson Plaza commercial center and The Villages of Patterson project.

West Patterson Business Park Master Development Plan

Also in 2002 the City adopted the West Patterson Business Park Master Development Plan. The Master Development Plan provides area-specific development standards and design guidelines that are intended to create a desirable place to conduct business, which in turn is expected to attract additional investment in the area. As of 2007 several new industrial buildings have been constructed, including two large wholesale distribution centers, consistent with the design guidelines for Business Park.

The Downtown Area

The majority of the downtown commercial and civic area is defined by El Circulo Avenue. The circular town center contains a public park area and the Plaza building, the oldest structure in the city. The Plaza building currently houses the Patterson Museum and the Patterson-Westley Chamber of Commerce. A number of large palm trees tower over the area, providing flag-like landmarks visible from many parts of the city. This central plaza terminates views down the city's major boulevards, clearly marking the location of this city's central hub.

Plaza Street, which surrounds the plaza area, has a large expanse of street, parking and sidewalk pavement, with little visual relief.

Surrounding this central circle is a band of civic and commercial uses contained in eight triangular blocks. The two easternmost blocks (contiguous to the Southern Pacific Railroad line and State Highway 33) contain additional public parks. These areas are richly planted with mature palm trees and a variety of deciduous canopy trees, and provide an oasis of shade and greenery in the downtown area.

The remaining six triangular blocks contain commercial and civic uses including City Hall, the police and fire stations, the library, Municipal Court, post office and Water District office. Most buildings immediately adjacent to the central plaza occupy the comer of each triangular block, and thus have a strong street presence in the Plaza circle. They provide important three-dimensional definition to the central plaza area.

Most of these buildings are distinctive and visually appealing. The newly constructed City Hall has been designed to recall the old Del Puerto Hotel, which was especially richly designed and detailed, and provided an important visual and historical landmark.

Because of the strength and clarity of the downtown urban pattern, building patterns which do not conform to the overall pattern are particularly apparent and disruptive. There are a limited number of locations where this strong urban pattern and attractive aesthetic character is ill-defined or in need of improvement. One such location is the comer of Third Street and Salado where a relatively contemporary building has unfortunately been set back from the central plaza, effectively creating a "missing tooth" in the overall urban fabric.

An unscreened parking area occupies this strategic corner detracting from both its visual and urban design potential. There are also a number of parcels dispersed throughout this area which are currently undeveloped, and constitute gaps in the greater urban fabric. Many of these parcels, especially those immediately across from South Park, embody great potential. Strategic urban infill could significantly enhance the formal character of the downtown area, and greatly add to its overall coherence and scenic quality.

Community-Serving Area

The majority of this district surrounds the civic and commercial downtown. This area contains several churches, and a number of other community-serving facilities such as schools and medical offices. Since these blocks are generally irregular in shape. they provide added visual interest. These blocks contain intermediate-scale structures. thus this district serves as both a physical and functional transition area between the downtown and surrounding residential neighborhoods.

Residential Areas

Residential Areas are divided into three sub-districts: Historic Residential, Older Residential, and Recent Residential. These sub-districts reflect three general periods of development respectively; 1910 to 1940, 1940 to 1970, and 1970 to present. Each sub-district has a distinctive visual and urban character.

Historic Residential

This district was originally planned at the time of the town's founding, thus the street and block patterns in this area have been in place for many years. Residences in this district, however, have been built over a number of years, gradually filling in the established block pattern. While the earliest homes in the area date to the early 1910s, some homes were constructed within the last decade, This district also contains a variety of housing types and scales.

The distinctive block pattern is shaped by a very regular gridded street pattern, with well-defined blocks of similar size and orientation. The parcelization pattern is also highly regular, with almost all residential parcels of similar size and proportion. Nonetheless, variations in housing types and periods of construction have kept these neighborhoods rich in character. The overall orderly housing pattern is aesthetically pleasing with individual dwellings adding articulation and aesthetic diversity.

Each block is divided by an unpaved alley which provides access to a number of garage units and other backyard structures.

Mature street trees line the streets throughout these neighborhoods. These trees provide an important widespread scenic amenity, and also play an important role in unifying the aesthetic character of these neighborhoods.

Older Residential

The older residential areas within the city were developed generally during the 1940-1970 period. The homes in this district resemble many of the homes in the historic residential district, the block and street patterns, however, are generally less geometric. Although many streets are laid out in square blocks, there are also many which end in cul de sacs. This eroded grid pattern has circulation patterns that are quite different from those in the historic residential parts of the city.

These areas are generally well landscaped with mature trees and vegetation, however, the presence of street trees is not as strong as in the historic residential district. Street patterns in this district have only a weak relationship to the original city plan. They are generally not strongly linked to the city's major boulevards, and do not reflect the city's formal organization. As such, they exist somewhat independently of the larger urban patterns.

1970s Residential

The city contains several areas of recent residential construction. These areas of the city have a discernibly different urban pattern and aesthetic character from the older development patterns. The clearly organized, formal grid pattern of the historic residential districts is replaced by informal, irregular block patterns with curving streets and many cul de sacs. This street pattern, typical of much of the recent suburban development in California, lacks the strong sense of organization and orientation found in historic residential areas. It also lacks a sense of connection to the downtown and community at large.

The site planning of these areas is also characterized by an inward focus. Homes are generally oriented toward the inner portions of the development. Large walls and fences often line major access streets to these developments, augmenting the appearance of detachment from the rest of the city. Thus these development patterns tend to exclude rather than embrace the city as a whole.

Another attribute common to these areas is the lack of mature landscaping. Ironically, although some of these new subdivisions were sited in established orchards, none of the mature vegetation was retained in the new development.

Residential Development under the 1992 General Plan

Residential development since the late 1990s has incorporated neighborhood design features that are reflected in the older parts of the City, with tree-lined streets, a modified grid system of streets, neighborhood parks, schools and other amenities.

The 1992 General Plan designated areas for expansion between the town center and the I-5 freeway, beginning with the Heartland Ranch project west of Ward Avenue, and continuing west with the Walker Ranch and Creekside Meadows projects, and to the south of Sperry Avenue with the Patterson Gardens project. Each of these expansion areas provides a range of residential products arranged in neighborhoods formed by a modified grid system of streets. Within each neighborhood are parks, schools and pedestrian/bike connections.

Commercial Areas

Commercial strip uses in Patterson are confined to the west side of Highway 33 (Second Street). This area primarily accommodates agricultural and auto-related businesses. The density of buildings is low, and buildings themselves are generally unobtrusive. However, a number of large areas of deteriorated pavement detract from the area's visual quality.

More recent commercial development has incorporated design features aimed at complementing the existing architectural character of the City while emphasizing landscaping to reduce the prominence of parking areas and facilitate pedestrian circulation.

Industrial Areas

Patterson's first industrial area is contiguous to First Street, the railroad right-of-way and State Highway 33. This area is dominated by the Patterson Frozen Foods Company. Industrial structures such as silos and water tanks are prominent city landmarks. This industrial area constitutes an important element is the city's overall visual character because it is located along the primary entrances to town and has the largest structures in the city.

A second, smaller industrial area is contained in two pockets along Sperry Avenue and Poppy Avenue. Agricultural-related industrial uses predominate in this area.

In 2002 the City adopted the West Patterson Business Park Master Development Plan to govern development of an 820 acre industrial area located east of Rogers Road and west of Baldwin Road. The Business Park is discussed below.

Agricultural and Rural Residential

This district consists of lands in agricultural production as well as lands containing ranchettes and farmhouses. The transition between this district and tile urban uses takes several forms.

In much of this district the scenic quality is quite high. Although most agricultural operations are well maintained, even poorly maintained outbuildings have a picturesque character. Agricultural crops and orchards provide important scenic element sand the rural residences and farms give a sense of human scale to the district. Due to the flat topography and the height and density of the vegetation in much of this district, the urbanized portion of the Study Area is largely screened from view from these surrounding agricultural and rural lands.

The greatest spatial and visual contrast in the Study Area occurs in this district. Established orchards provide strong spatial enclosure and constitute visually-impermeable walls of vegetation. Since orchards provide' a near continuous ring around the urban areas, the screening they provide serves to visually contain urban development. Croplands, on the other hand, consist primarily of low-lying crops, creating the open quality of the Central Valley.

Both the orchards and row crops are characterized by strong geometric patterns. The heights, spacing, edges, colors, and textures of each field or orchard have a great deal of uniformity. As such, this landscape has a strong formal aspect not unlike the pattern of the city's original town site.

The small clumps and groves of mature trees which typically surround farm buildings accent and interrupt the otherwise strong geometric pattern of these croplands.

Primary Circulation Routes and City Entrances

Three major streets constitute the primary paths which define and serve the city's major districts: Highway 33 (Second Street), Las Palmas Avenue and Sperry Avenue.

The city's primary entrances along Highway 33 are dominated by industrial and strip commercial uses. Although these entry points are clearly marked by signs, the built environment does not support this clear sense of entry. The south city entry is dominated by an automobile dealership. The north city entrance is characterized by agricultural uses and open lands.

Conversely, the Las Palmas Boulevard entrance to the city from the east is strongly and beautifully marked with rows of mature palms on each side of the street. This entrance is, therefore, both clearly-defined and very aesthetically pleasing.

The primary vehicular entrance to the City is by way of Sperry Avenue from the interchange with I-5 adjacent to the Villa del Lago highway-serving commercial area. In 2007, the bridge over the Delta Mendota Canal is being widened consistent with the plan line for the Sperry Avenue right-of-way between the interchange and Ward Avenue. The Villa del Lago commercial center has provided a landscaped water feature on the north side of the street just west of the bridge. The roadway east of Baldwin Road has been extensively landscaped with date palms, similar to the East Las Palmas entrance to the City.

Scenic Highways

Scenic Highways are segments of federal, state, or local roads that have been designated by the state or local government as roads traversing scenic corridors and for which the state or local government has developed a program for protection of the scenic corridor. There are three levels of scenic highway designation: State Scenic Highways, County Scenic Highways, and Local Scenic Highways. Interstate 5 from the Merced County line to the San Joaquin County line is the only State designated Scenic Highway within the Study Area. Las Palmas Avenue warrants consideration for inclusion as a local or county scenic highway.

State Regulations

State Scenic Highway Program

In 1963, the California legislature created the Scenic Highway Program to preserve and protect scenic highway corridors from changes that would diminish the aesthetic value of lands adjacent to state highways. The state regulations and guidance governing the Scenic Highway Program are found in the Streets and Highways Code, Section 260 et seq. A highway may be designated scenic depending on how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the traveler's enjoyment of the view. Scenic corridors consist of land that is visible from the highway right of way, and is comprised primarily of scenic and natural features. Topography, vegetation, viewing distance, and/or jurisdictional lines determine the corridor boundaries. The city or county must also adopt ordinances, zoning and/or planning policies to preserve the scenic quality of the corridor or document such regulations that already exist in various portions of local codes. Interstate 5 in the vicinity of the Study Area has been designated as a state scenic highway.

Nighttime Sky – Title 24 Outdoor Lighting Standards

The California Legislature passed a bill in 2001 requiring the California Energy Commission (CEC) to adopt energy efficiency standards for outdoor lighting for both the public and private sector. In November 2003, CEC adopted changes to the Title 24, parts 1 and 6, Building Energy Efficiency Standards. These standards became effective on October 1, 2005, and included changes to the requirements for outdoor lighting for residential and nonresidential development. The new standards will likely improve the quality of outdoor lighting and help to reduce the impacts of light pollution, light trespass, and glare. The standards regulate lighting characteristics such as maximum power and brightness, shielding, and sensor controls to turn lighting on and off. Different lighting standards are set by classifying areas by lighting zone. The classification is based on population figures of the 2000 Census. Areas can be designated as LZ1 (dark), LZ2 (rural), or LZ3 (urban). Lighting requirements for dark and rural areas are stricter in order to protect the areas from new sources of light pollution and light trespass.

Findings

- Potential future problems with traffic operations and safety exist for roadways that cross the railroad tracks.
- Patterson's original town site is characterized by distinctive, clearly-defined, formal urban patterns. Composite street patterns (circular town center, axial and diagonal boulevards, and residential grid) give the city a strong sense of "place" and enhance the city's overall coherence.
- Uses within the city are clearly organized and contained in distinctive block configurations.
- The extensive cover of mature street trees provides a high quality scenic amenity and cohesive visual character. The City has a highly successful street tree program.
- The overall urban structure and visual character of Patterson benefits from its clearly-defined and focused commercial and civic area downtown.
- The downtown contains a number of distinctive and visually appealing buildings. Most commercial and civic buildings in this area are of a scale and character appropriate to the block and street pattern.
- The introduction of new building forms and patterns that do not conform to the city's existing urban configurations would be particularly apparent and disruptive.
- The downtown area contains a number of vacant lots, providing potential for urban infill.
- The central plaza functions as the focus, or "hub," of downtown, and as a visual terminus for views down the city's primary streets (view corridors).
- The Community Serving District provides a successful physical and functional transition between downtown commercial area and surrounding residential neighborhoods. Both the irregularly-shaped block patterns, and the scale and design of community serving facilities add visual interest and distinctiveness to this district.
- While the originally established block pattern of the Historical Residential District is clearly defined, bearing a strong, successful relationship to the city as a whole, the block/street patterns in the Older and Recent Residential Districts fail to achieve this.
- The majority of the city's strip commercial development is modest in scale and generally unobtrusive.

- The large industrial area located along Highway 33 constitutes an important element in the city's visual character. The visual relationship between this area and contiguous uses could benefit from additional landscape treatments, however.

- The city entrance at East Las Palmas Avenue is beautifully marked with rows of mature date palms, creating a delightful and memorable city entrance.

- North and south city entrances on Highway 33 warrant clarification and visual upgrading, primarily through landscape treatments such as that provided along Sperry Avenue between Baldwin Road and Ward Avenue.

- The agricultural lands that surround the city are highly scenic, characterized by their strong geometric patterns. Agricultural lands form a patchwork of open and closed landscapes. The orchards function as a visual container for the city by visually screening urban development and the croplands provide expansive views.