CHAPTER 3
Environmental Setting

This chapter describes the environmental setting for the City of Merced Wastewater Treatment Plant Expansion Project (Project). California Environmental Quality Act (CEQA) Guidelines Section 15125(a) requires an environmental impact report (EIR) to describe the physical environmental conditions of the Project area when the Notice of Preparation is published. This environmental setting constitutes the baseline physical conditions by which the City of Merced (City) will determine whether a potential environmental impact is significant.

3.1 Relationship of Project to Other Planning

This section describes the Project's relationship to and consistency with other applicable plans that may affect land use, water use and water quality, air resources, and public services such as the transportation system. These plans include those prepared by federal, state, and local authorities with jurisdiction over resources or lands in the vicinity of the wastewater treatment plant (WWTP) and its service area.

3.1.1 Water Quality Control Plans

Basin Plan

The preparation and adoption of water quality control plans is required by the California Water Code (Section 13240) and supported by the federal Clean Water Act. The Central Valley Regional Water Quality Control Board (CVRWQCB) has adopted the Fourth Edition of the Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins, which identifies the current and potential beneficial uses for surface and groundwater within the Central Valley region (CVRWQCB, 1998). The Basin Plan also contains water quality objectives that are intended to protect the specified beneficial uses. Together, the beneficial use of a water body and the corresponding water quality objective adopted to protect that use comprise the "water quality standard" for purposes of regulation under the National Pollutant Discharge Elimination System permitting program.

Beneficial uses applied to the surface waters of the San Joaquin River identified in the Basin Plan include municipal and domestic supply, agricultural irrigation, agricultural stock watering, industry process supply, water contact recreation, canoeing and rafting, other non-contact water recreation, warm freshwater habitat, warm fish migration habitat, and cold fish migration habitat, warm spawning habitat, and wildlife habitat. The beneficial uses for Hartley Slough are not specified in the Basin Plan. However, the Basin Plan states that the beneficial uses of any

specifically identified water body generally apply to its tributary streams. Therefore, beneficial uses applied to the San Joaquin River would also apply to Hartley Slough, even though Hartley Slough is an effluent dominated agricultural drain.

Water quality objectives for surface waters in the region have been set for bacteria, bioaccumulation, biostimulatory substances, chemical constituents, color, dissolved oxygen, floating material, oil and grease, pH, pesticides, radioactivity, salinity, sediment, settleable material, suspended material, sulfide, tastes and odors, temperature, toxicity, and turbidity.

As noted in Chapter 2, the City's WWTP currently discharges treated effluent that historically exceeded Basin Plan objectives for biochemical oxygen demand, dissolved oxygen, residual chlorine, nitrate, temperature, and pathogens. Proposed WWTP improvements are intended to bring the WWTP into compliance with applicable Basin Plan objectives and waste discharge requirements (WDRs) that may be assigned to the facility.

Watershed Management Plan

No watershed management plan has been prepared for the Merced Hydrologic Area, which includes the Project area. However, general watershed management priorities have been established for the San Joaquin River Hydrologic Basin, which includes the Merced Hydrologic Area, and are guided by the State Water Resources Control Board's (SWRCB) five-year Strategic Plan. A key component of the Strategic Plan is a watershed management approach for water quality protection; commonly referred to as the Watershed Management Initiative (CVRWQCB, 2002).

Under that watershed management approach, the CVRWQCB's overall goal for the San Joaquin River Basin is to implement point and nonpoint source programs in a manner that complements the activities and goals of other stakeholders in order to achieve water quality improvement and promote restoration of water resources. The Project would involve treatment upgrades at the Merced WWTP to reliably improve the quality of effluent it discharges. These upgrades would be consistent with the CVRWQCB's priorities associated with point source control efforts within the San Joaquin River Basin. The Project would not conflict with an adopted watershed management plan.

Area-Wide Wastewater Treatment Plan

No area-wide wastewater treatment plan has been prepared for the Merced area. Wastewater infrastructure needs have been identified as a critical barrier to accommodate the population's housing demands. As a consequence, the San Joaquin Valley Wastewater Task Force (Task Force) was convened in December 2000 for the purpose of identifying wastewater infrastructure needs of the San Joaquin Valley and strategizing potential solutions to these needs.

Through a grant-funded venture with the Merced County Association of Governments, the Task Force authored the August 2001 San Joaquin Valley Wastewater Needs White Paper. The paper gives an overview of Central Valley communities' challenges in balancing compliance with water quality regulations versus the environmental benefits and the economic costs of doing so, describes the history and decisions that have made these regulations important, and explains some of the unresolved issues.

3.1.2 Local Plans

All cities and counties in California are required by law to adopt a General Plan that establishes goals, policies, and implementation measures for guiding long-term development, protection from environmental hazards, neighborhood preservation, conservation of identified natural resources, and accommodating urban development (Government Code Sections 65100 *et seq.*).

The principal means of implementing the goals and policies presented in the General Plan is the corresponding zoning ordinance, which identifies use zones in the jurisdiction, the land uses allowed on a given site, and the standards for each allowed use according to zone. Local zoning ordinances are required by state law to be consistent with the General Plan.

The Project would be developed on lands mainly under the City's ownership and jurisdiction. However, the WWTP expansion area to the north and east of the WWTP would occur on lands within Merced County's (County) jurisdiction. These lands would be acquired by the City. The following discussion addresses the consistency of the Project with applicable General Plan goals and policies.

City of Merced General Plan

The City of Merced General Plan provides the goals and policy framework for providing wastewater services. Because County lands surround the project site, City polices governing land use compatibility are not applicable for these areas. Therefore, this consistency evaluation addresses whether the Project is consistent with the City's goals and policies related to the provision of public services and, more specifically, the provision of wastewater service.

The City is in the process of updating its General Plan. This process is expected to take until early 2008 and is expected to be complete after approval of this Project. Because the updated General Plan has yet to be adopted, the Project's consistency must be evaluated against the currently adopted General Plan Vision 2015 (City of Merced, 1997).

The planned population and development and service areas are defined by the Specific Urban Development Plan (SUDP) boundary. Figure 3-1 shows land use designations within the SUDP.

Goals contained in the Public Facilities Element of the General Plan support the improvement of the City's infrastructure and encourage the efficient and cost-effective delivery of public services. The following policies are provided in the Public Facilities and Services Elements as they relate to the Project.

- Policy P-1.1 Provide adequate public infrastructure and services to meet the needs of future development

- Policy P-1.2 Utilize existing infrastructure and public service capacities to the maximum extent possible and provide for the logical, timely and economically efficient extension of infrastructure and services.

- Policy P-1.3 Require new developments to provide or pay for its fair share of public facility and infrastructure improvements.
- Policy P-4.1 Provide adequate wastewater collection, treatment and disposal capacity for projected future needs
- Policy P-4.2 Consider the use of reclaimed water to reduce non-potable water demands whenever practical
- Policy 5.1 Provide effective storm drainage facilities for future development.

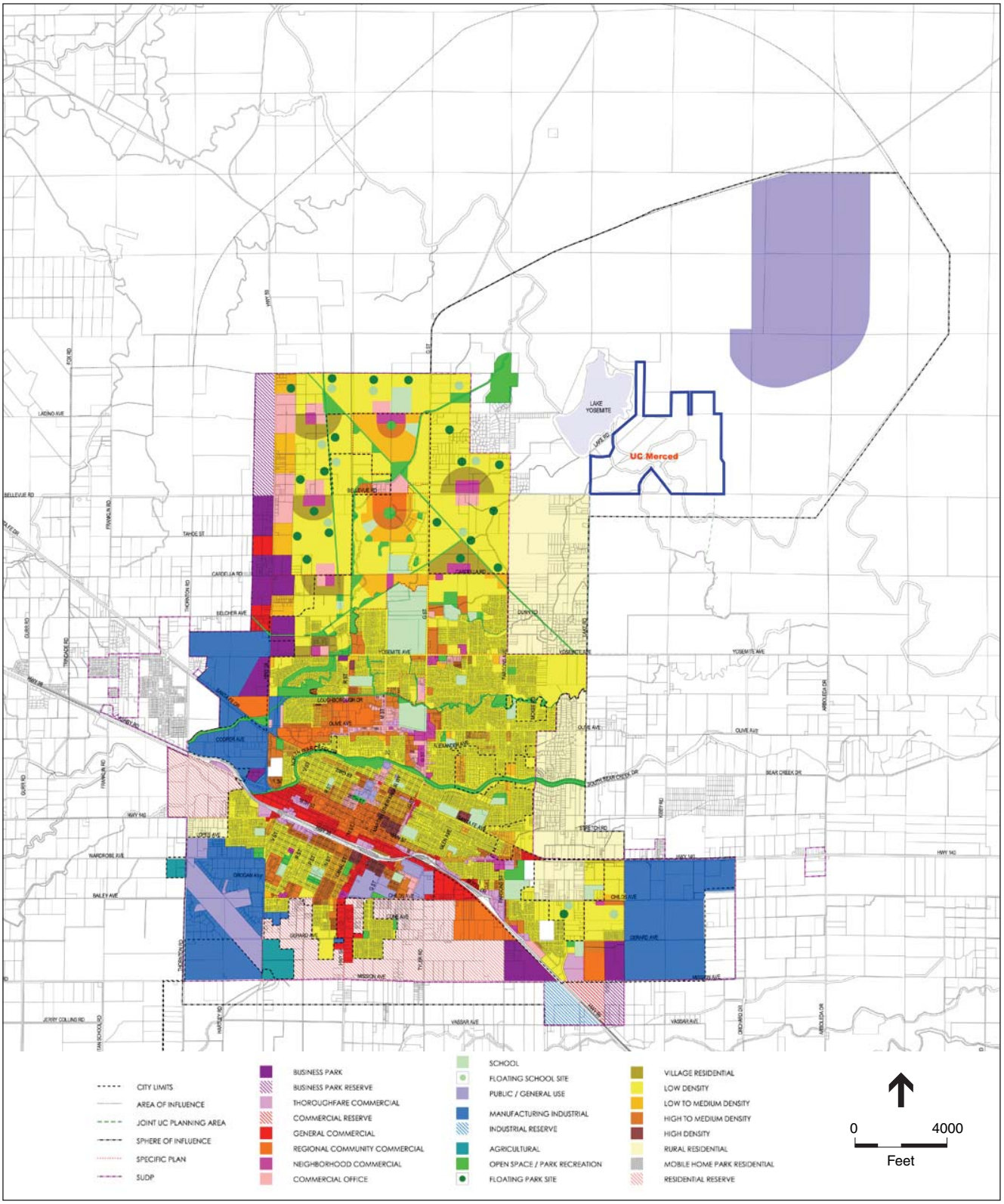
Merced County General Plan

The Merced County Year 2000 General Plan governs land use activities in unincorporated portions of Merced County, including lands located adjacent to the WWTP (Merced County, 2000). General Plan policies most relevant to the Project are contained in the Land Use and Agriculture Elements. The Land Use Element contains land use planning designations and describes the allowable uses for each designation. Much of the land base surrounding the City's property is designated for agricultural uses, according to the General Plan's Land Use Diagram (Merced County, 1990).

The Agricultural land use designation recognizes the value and importance of agriculture by acting to preclude incompatible urban development within agricultural areas. This designation establishes agriculture as the primary use but allows dwelling units, limited agriculture-related commercial services, agriculture-related light industrial uses, and other uses that, by their unique nature, are not compatible with urban uses, provided they do not conflict with the primary use. The Agriculture designation is also consistent with areas that the General Plan has identified as suitable for open space or recreational use and for ranchettes.

Agricultural land use goals and polices contained in the Merced County General Plan focus on avoiding the placement of urban-type land uses, which may be disruptive to the agricultural economy, near agriculturally zoned lands. Current activities at the WWTP are not disruptive to adjacent agricultural uses. The City's effluent discharge currently supports downstream agriculture by providing a consistent supply of irrigation water.

The Agricultural Element also emphasizes on reducing the interference urban land uses may have on agricultural lands and avoiding the placement of urban-type land uses that may result in the further conversion of farmland to nonagricultural uses. A supporting General Plan policy states, "Conversion of agricultural land into urban uses shall be allowed only where a clear and immediate need can be demonstrated …." In this instance, the City has a clear and immediate need to provide additional wastewater service capacity to serve planned development within the City and the University of California-Merced (UC-Merced) campus. While the expansion of the WWTP is intended to meet future wastewater loads, the City must proceed immediately with project development to ensure sufficient WWTP capacity is available as future demand arises. As shown in Chapter 2, Project Description, the City anticipates making available 15 mgd of WWTP capacity by mid-2008 and 20 mgd of WWTP capacity by the end of 2009. Therefore, to achieve these dates, expansion of the WWTP capacity must proceed as shown on Figure 2-8.



SOURCE: Merced County Association of Governments; and ESA, 2006

City of Merced Wastewater Treatment Plant Improvement Project . 205087

Figure 3-1
Land Use Designations

Local Agency Formation Commission

The Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000, as amended, established procedures for local government changes of organization, including city incorporations, annexations to a city or special district, and city and special district consolidations. LAFCOs have numerous powers under the Act, but those of primary concern are the power to act on local agency boundary changes and to adopt spheres of influence for local agencies. Among the purposes of LAFCOs are the discouragement of urban sprawl and the encouragement of the orderly formation and development of local agencies.

The expansion of the WWTP will require the City to acquire unincorporated lands that are presently within the jurisdiction of the County. These lands will not be annexed into the City. There are not plans to annex these lands to the City.

UC-Merced Long-Range Development Plan

The 2002 Long-Range Development Plan (LRDP) provides guidance for development of the campus of the University of California-Merced (UC-Merced) beyond the year 2028 (UC-Merced, 2002). The population that would be supported by the LRDP equals about 31,200 students and staff at full development of the campus. Figure 3-1 illustrates the UC-Merced campus planning area.

The area encompassed within the planning area totals over 7,000 acres. About 2,000 acres of the total lands will be developed into the main campus (910 acres), campus land reserve (340 acres), and campus natural reserve (750 acres). About 5,000 acres will remain in conservation easements as trust properties managed by the university.

As part of preparing and adopting the LRDP, UC-Merced prepared an EIR addressing the implementation of the LRDP and, more specifically, the first phase of campus development. The Phase 1 Plan involves the construction of the first set of buildings for the opening of the UC-Merced campus in 2004 and the provision of adequate space for envisioned programs until 2008. The Phase 1 academic core, upon opening, consists of a science and engineering building, a classroom building, and a library/information technology center.

Initial campus housing consists of 161 units located to the southwest of the academic facilities. Necessary utilities including a central plant and road infrastructure has also been constructed. Additional student housing and a campus support building at the southeastern portion of the site is being constructed at this time while a second science and engineering building will be constructed in 2007 and a social science and management building will be constructed in 2008.

The LRDP and associated EIR proposed that wastewater flows generated from the UC-Merced campus would be treated at the City's WWTP. The campus sewer has been connected to the City system. The sewer has sufficient capacity to serve Phase 1and future phased additions of the campus (UC-Merced, 2002).

3.1.3 Regional Transportation Plan

Merced County Association of Governments (MCAG) is a Joint Powers Authority consisting of Merced County and the six incorporated cities of Atwater, Dos Palos, Gustine, Livingston, Los Banos, and Merced. MCAG is Merced County's designated Regional Transportation Planning Agency, responsible for preparing and administering state and federal transportation plans for Merced County.

The Regional Transportation Plan (RTP) specifies the policies, projects, and programs necessary over a 25-year period to maintain, manage, and improve the region's transportation systems. The RTP is required to be developed as per California Government Code Section 65080 *et seq.*, of Chapter 2.5 and the U.S. Code, Title 23, Sections 134 and 135 *et seq*. The RTP provides a comprehensive long-range view of transportation needs and opportunities for Merced County. It establishes goals and objectives for the future system and identifies the actions necessary to achieve these goals. Finally, it describes a funding strategy and options for implementing the actions. The RTP is required to balance priorities with expected funding. Based on actions outlined in Chapter 2, Project Description, the Project is not expected to conflict with the implementation of RTP, but rather, contribute to its implementation by accommodating planned growth and urban development. This issue is discussed further in Chapter 6, Growth-Inducing Impacts.

The 2004 RTP and associated EIR identified Scenario C-2 as the preferred scenario for regional transportation development (MCAG, 2004a and b). Scenario C2 proposes the greatest investment in regional transportation improvements, including several new highway facilities and provides more financial resources for local street and road maintenance. This scenario improves transit to 30-minute frequencies in cities and minimizes future traffic congestion by providing additional road capacity. Scenario C-2 assumed that development and growth would continue corresponding to existing general plans. Because the Project would not induce population growth or development beyond the level specified in the City's General Plan or UC-Merced LRDP, or necessitate any additional roadway improvements not anticipated in the RTP, the Project would be consistent with the RTP. Further, as provided in Chapter 4.0, the Project would include mitigation to maintain existing roadway pavement conditions consistent with the goals of the RTP.

3.1.4 Regional Housing Allocation Plans

MCAG is mandated by California Government Code Section 65584 to determine current and projected regional housing needs for January 2001 through June 2008. It is also required to determine each local jurisdiction's share to satisfy the regional need for housing. Jurisdictions would then decide how they would address this need through the process of updating the Housing Elements of their respective General Plans.

The Regional Housing Needs Plan is a key tool for MCAG member jurisdictions to plan for growth anticipated through 2008; it does not necessarily encourage or promote growth, but rather allows communities to anticipate and, therefore, more effectively direct growth in ways that enhance the quality of life and improve access to jobs, transportation, and housing.

Because the Project would have no effect on housing allocations in Merced; much of the plan's content is not applicable to actions associated with the Project. Rather, the City has an adopted Housing Element, which includes amendments through June 24, 2004, to address housing allocation needs in Merced through 2015. Nonetheless, the Project would help to ensure that the necessary public facilities, in terms of sanitary sewer service, would be available to support housing allocation goals identified in the City's Housing Element.

3.1.5 Air Quality Management Plans

The federal Clean Air Act (CAA) requires each state to prepare an air quality control plan referred to as the State Implementation Plan (SIP). Amendments to the CAA have added requirements for states containing areas that violate national air quality standards to revise their SIPs and incorporate additional control measures to reduce air pollution. The SIP is a living document that is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of air basins as reported by the agencies with jurisdiction over them.

The U.S. Environmental Protection Agency (USEPA) is responsible for reviewing all state SIPs to determine if they conform to the mandates of the CAA, as amended, and will achieve air quality goals when implemented. If the USEPA determines a SIP to be inadequate, it may prepare a Federal Implementation Plan (FIP) for the non-attainment area and may impose additional control measures. Failure to submit an approvable SIP or to implement the plan within mandated time frames can result in sanctions being applied to transportation funding and stationary air pollution sources in the air basin.

The following are the current air quality plans that apply to the Project:

- *1998 Carbon Monoxide State Implementation Plan (SIP).* With the USEPA's redesignation of 10 urban areas in California (including four urban areas in the San Joaquin Valley Air Basin [SJVAB]) from non-attainment to attainment for carbon monoxide in 1998, the South Coast Air Basin is the only basin in the state currently considered non-attainment for this pollutant. The 1998 Carbon Monoxide SIP revision modifies the carbon monoxide maintenance plan for the 10 areas, including the urban areas of the SJVAB.

- *The Federal Ozone Attainment Demonstration Plan (adopted November 14, 1994 and amended 2001).* This plan established a regulatory framework to bring the SJVAB into compliance with the national standards for ozone and satisfied a required triennial review for state standards. This plan did not achieve its goal of meeting the national standards for ozone by 1999 (SJVAPCD, 1994).

- *2000 Ozone Rate of Progress Report (adopted April 20, 2000, and amended April 27, 2000).* This report demonstrates that target levels of emissions reductions mandated by the CAA for 1997 to 1999 (9 percent) and for 1990 to 1999 (24 percent) were achieved (SJVAPCD, 2000).

- *Triennial Progress Report and Plan Revisions 1997–1999*. This report states that all areas of the SJVAB have attained the state carbon monoxide standard and focuses on attainment of the state ozone standard, in light of the basin's "severe non-attainment" status under the California Health and Safety Code. The report reviews previously adopted and implemented Best Available Retrofit Control Technology measures and includes an adoption and implementation schedule for new measures to achieve additional emission reductions. Planned measures include new controls on stationary, mobile, and indirect sources, and plan revisions. This report was adopted March 15, 2001 (SJVAPCD, 2001a).

- *2001 Amendment to the 1994 Ozone Attainment Demonstration Plan*. These amendments to the 1994 plan commit the San Joaquin Valley Air Pollution Control District (SJVAPCD) to revise, add, or delete various Regulation IV rules pertaining to the use and storage of coatings and solvents and specific stationary sources (SJVAPCD, 2001b).

- *2002 and 2005 Ozone Rate of Progress Plan, (adopted May 16, 2002)*. In December 2001, the USEPA reclassified the SJVAB from serious to severe non-attainment for the national 1-hour ozone standard. The severe classification triggered a requirement for the SJVAPCD to prepare plans that demonstrate annual reductions of ozone precursors and attainment of the standard by 2005. The district has determined that it cannot reach attainment in 2005. This plan demonstrates rates of progress in emissions reductions in volatile organic compounds at the mandated average rate of 3 percent per year, based on three-year periods (i.e., 9 percent between 2000 and 2002 and an additional 9 percent between 2003 and 2005). The plan also satisfies the requirement of the CAA that non-attainment areas adopt all reasonably available control measures as expeditiously as possible.

- *2003 PM_{10} Plan: San Joaquin Valley Plan to Attain Federal Standards for Particulate Matter 10 Microns and Smaller.* This plan was adopted by the SJVAPCD Governing Board on June 19, 2003, and submitted to the California Air Resources Board (CARB), which also has approved and submitted it to the USEPA. The USEPA has not yet approved the plan. The USEPA must approve, disapprove, partially approve, or conditionally approve the plan within a year of finding the plan complete. The 2003 PM_{10} plan demonstrates attainment of the national PM_{10} standard at all monitoring stations within the air basin by 2010. It supersedes the SJVAPCD's previous plan, the *1997 PM_{10} Attainment Demonstration Plan*, which failed to meet the national standard by the 2001 target date and was withdrawn by the SJVAPCD.

- *PM_{10} Attainment Demonstration Plan Progress Report 1997-1990*. August 17, 2000. This report describes progress achieved by the SJVAPCD implementing the 1997 PM_{10} plan, including actions pertaining to stationary, area and mobile sources, research programs and revisions to Regulation VIII (Fugitive PM_{10} Prohibitions) that were then in progress.

The SJVAPCD's primary means of implementing the air quality plans listed above is by adopting and enforcing rules and regulations. Stationary sources within the jurisdiction are regulated by its permit authority over such sources and through its review and planning activities. In 2001, the SJVAPCD revised its Regulation VIII-Fugitive PM Prohibitions, in response to commitments made in the 1997 PM_{10} Attainment Plan to incorporate best available control measures (BACM).

The revision also includes new rules for open areas and agricultural operations. The provisions of the revised regulation took effect in May 2002. Regulation VIII consists of a series of dust control rules intended to implement the PM_{10} Attainment Demonstration Plan. The PM_{10} Attainment Demonstration Plan emphasizes reducing fugitive dust as a means of achieving attainment of the federal standards for PM_{10}.

The SJVAB currently does not meet the federal standard for ozone and is classified as a "serious" non-attainment area. Ozone at levels above the federal standard adversely affects public health, diminishes the production and quality of many agricultural crops, reduces visibility, degrades man-made materials, and damages native and ornamental vegetation. The San Joaquin Valley has also been classified as a non-attainment for particulate matter 10 microns or greater (PM_{10}).

The SJVAPCD is responsible for developing and adopting measures and methods for controlling ozone levels. Its Ozone Attainment Demonstration Plan identifies all possible control measures necessary to make attainment. This plan uses a computer model to simulate future air quality in the San Joaquin Valley while reflecting the effects of measures proposed to curb pollution. Within this plan are transportation emission budgets for each county.

Under the federal CAA, federal actions conducted in air basins out of attainment of the federal ozone standard (such as the SJVAB) must demonstrate conformity with the SIP. Conformity to a SIP is defined in the federal CAA as meaning conformity to a SIP's purpose of eliminating or reducing the severity and number of violations of the national standards and achieving an expeditious attainment of such standards. The SJVAPCD has published Regulation IX, Rule 9110 (referred to as the General Conformity Rule) that indicates how most federal agencies could make such a determination (SJVAPCD, 2004d).[1]

3.1.6 Habitat Conservation Plans

No Habitat Conservation Plan (HCP) or Natural Communities Conservation Plan (NCCP) has been adopted for the Project site or surrounding lands. Therefore, the Project would not directly conflict with any adopted HCP or NCCP.

In December 2001, the Merced County Board of Supervisors ordered that an NCCP and HCP be developed for eastern Merced County. The planning area included eastern Merced County from State Route (SR) 99 to the Stanislaus, Mariposa, and Madera County lines and included incorporated areas (Merced County, 2006).

The HCP/NCCP planning area includes portions of the WWTP service area. As a condition of the biological opinion issued by the U.S. Fish and Wildlife Service (USFWS) for the construction of the UC-Merced campus, the USFWS required that "the University should coordinate with the USFWS, California Department of Fish and Game [CDFG], the County, and private landowners to continue to participate in the development of an NCCP/HCP consistent with the Planning

[1] The SJVAPCD's Rule 9110 is consistent with the USEPA's General Conformity Rule, *Determining Conformity of General Federal Actions to State or Federal Implementation Plans* (40 CFR, Part 93.)

Agreement." After no progress since the late summer of 2002, the County stopped the preparation of the Merced HCP/NCCP in early 2004 (CDFG, 2005). Therefore, there is no NCCP/HCP that would cover private development within the WWTP service area.

3.1.7 Regional Land Use Plans

No regional land use plan has been adopted for the Project site or surrounding lands. For this reason, the Project would not conflict with an adopted regional land use plan.

3.2 Topography of the Region

The Project area is located at the eastern edge of the San Joaquin Valley, which is a broad plain lying between the Sierra Nevada foothills and the Coastal Range. The Project area is located in the midway portion of the valley, as traveled from north to south, and is relatively flat. Based on U.S. Geologic Survey topographic maps, elevations ranging from about 135 to over 150 feet above mean sea level (msl) are found in the vicinity of the WWTP.

The landscape slopes in a southwesterly direction**,** corresponding to the direction of surface water drainages located in the area. Because of natural topography and human grading, slopes have generally less than 1 percent gradient over most of the area.

3.3 Land Use and Zoning

Urban land uses are generally situated to the east and north of the WWTP in Merced and along SR 59 and SR 99. The newly developing UC-Merced campus is a new focal point for urban development located northeast of the City.

Land use within the vicinity of the WWTP is characteristic of rural portions of the central San Joaquin Valley and unincorporated sections of Merced County. Irrigated pasture, row crops, various agriculture-related structures, livestock and dairy operations, and scattered rural residences dominate the area surrounding the WWTP. All adjacent areas are zoned General Agriculture (Zone A1).

An abandoned landfill borders the northwestern corner of the City's property. The WWTP facilities are located at the northern end of the City's property. A series of sludge drying-beds and emergency stormwater ponds are located in the north-central portion of the property. A 450-acre industrial waste application area, located south of Miles Creek, has been used for the application of biosolids and food processing wastes. Immediately south, two large pond features comprise the Merced Wildlife Area. The City's General Plan designates the WWTP property as Public (P).

Figure 3-1 shows planned land uses within the City SUDP and the UC-Merced campus planning area.

3.4 Geology of the Region

The Project area is located in the Great Valley geomorphic province, a nearly flat alluvial plain extending from the Tehachapi Mountains in the south to the Klamath Mountains in the north, and from the Sierra Nevada Batholiths in the east to the Coastal Ranges in the west (Hackel, 1966). The valley is approximately 450 miles long and has an average width of 50 miles. Elevations across the alluvial plain generally range from a few feet below msl to about 400 feet above msl.

The San Joaquin Valley is a deep basin filled with a thick sequence of Jurassic to Holocene (last 10,000 years) alluvial deposits that had eroded from the eastern Sierra Nevada and the western Coastal Ranges. The sediments are transported to the valley primarily by tributaries of the San Joaquin River. A slight downslope gradient allows the valley to drain north into the Sacramento-San Joaquin Delta (Delta). Alluvial deposits, consisting of unconsolidated and semi-consolidated lake, terrace, and playa deposits from the Pleistocene epoch, form the central plain of the valley. Tertiary and Cretaceous outcrops border the central plain of the valley (Wagner et al., 1990).

The immediate Project area is underlain by what is commonly referred to as the Modesto Formation (Wagner et al., 1990). The Modesto Formation consists of Holocene and Pleistocene-aged (last 1.6 million years) alluvial deposits. The alluvium is typically interbedded with layers of gravel, sand, silt, and clay ranging in thickness from 100 to 300 feet (USGS, 1973).

3.4.1 Seismic Hazards

According to the Fault Activity Map of California (Jennings, 1994), the nearest faults to the site with historic displacement (activity within the last 200 years) are the Calaveras, San Andreas, and Hayward faults, located approximately 54, 58, and 78 miles away, respectively, from the western edge of the Project area. Portions of the Greenville fault zone also have been rated as being active within the last 200 years; these portions are approximately 72 miles northwest of the area. A major earthquake on any of these faults could induce ground shaking in the project area.

The only fault known in Merced County is the Ortigalita fault, located in the western quarter of Merced County, dissecting the Coast Ranges in a northwesterly direction. This fault has not been active in historic times. Table 3-1 provides a list of the active and potentially active faults in the vicinity of the Project area.

There are no active or potentially active faults within the boundaries of the WWTP or the surrounding area. As such, the Project would not be subject to fault rupture or any special development standards associated with Alquist-Priolo Earthquake Fault Zoning Act (formerly Alquist-Priolo Special Studies Zone) requirements.

3.4.2 Soils and Erosion Potential

The Modesto Formation and the Riverbank Formation, both of Pleistocene origin, underlie most of the Project area. Soil units within the area occur on slopes between 0 and 1 percent and some are slightly to moderately saline-alkali. Table 3-2 lists specific characteristics of Project area

soils. In general, the soils within the project area are well-drained; have slow to moderate permeability, slow runoff, and little or no erosion hazard. A clay hardpan is found from 4 to 12 feet below the surface.

TABLE 3-1
KNOWN FAULTS IN THE VICINITY OF THE WASTEWATER TREATMENT PLANT SITE

Fault Zone	Location Relative to Merced	Recency of Faulting[a]	Historical Seismicity[b]	Maximum Moment Magnitude[c]
San Andreas (Peninsula and Santa Cruz segments)	58 miles west	Historic	M 7.1: 1989 M 8.25: 1906 M 7.0: 1838 Many <M 6	7.3
Hayward	78 miles west-northwest	Historic	M 6.8: 1868 M 7.0: 1838 Many <M 4.5	6.9
Calaveras	54 miles west	Historic	M 6.1: 1984 M 5.9: 1979 Many <M 6.5	6.8
Concord–Green Valley	96 miles northwest	Historic	Active Creep[d]	6.9
Marsh-Greenville	72 miles northwest	Historic	5.8	6.9
Nunez (Coalinga area)	68 miles south	Historic	M 5.2-5.9: 1983	N/A
Ortigalita	33 miles west-southwest	Holocene	N/A	6.9

SOURCES: Jennings, 1994; Peterson et al., 1996.

[a] Historic: displacement during historic time (within last 200 years), including areas of known fault creep; Holocene: evidence of displacement during the last 10,000 years; Quaternary: evidence of displacement during the last 1.6 million years; Pre-Quaternary: no recognized displacement during the last 1.6 million years (but not necessarily inactive).

[b] Richter magnitude (M) and year for recent and/or large events.

[c] The Maximum Moment Magnitude is an estimate of the size of a characteristic earthquake capable of occurring on a particular fault. Moment magnitude is related to the physical size of a fault rupture and movement across a fault. Richter magnitude scale reflects the maximum amplitude of a particular type of seismic wave. Moment magnitude provides a physically meaningful measure of the size of a faulting event. Richter magnitude estimations can be generally higher than moment magnitude estimations.

[d] Slow fault movement that occurs over time without producing an earthquake.

N/A = Not applicable and/or not available.

3.5 Climate

Geography plays a significant role in weather patterns throughout California's Central Valley. The Central Valley, which extends from south of Bakersfield to north of Redding, is bounded by the Sierra Nevada on the east, the Coast Range on the west, the Tehachapi Mountains on the south, and the Cascade Range on the north. These mountain ranges tend to buffer the valley from the marine weather systems that originate over the Pacific and are drawn inland by the jet stream. The only breach in this barrier is the Carquinez Straits, which exposes the midsection of the valley to the Pacific Coast marine weather regimen. The San Joaquin Valley is noticeably affected by this marine influence, which moderates climatic extremes on the northern end. This is especially evident on summer evenings when cooling occurs as a result of the penetration of sea breezes.

The climate of the San Joaquin Valley is characterized by mild, wet winters and warm to hot, dry summers. The major climatic controls are (1) the Pacific high-pressure system over the eastern Pacific Ocean, (2) the Pacific Ocean, and (3) the local topography. The formation of a high pressure area over the Great Basin Region to the east also affects the area, although primarily in the winter.

TABLE 3-2
SOILS OF THE WASTEWATER TREATMENT PLANT SITE

Soil Series and Natural Resource Conservation Service Map Unit	Description	Erosion Potential	Prime Farmland
Lewis clay (0–1 percent slopes, slightly saline-alkali) Map Unit LgA	Imperfect drainage, very slow permeability, low water capacity, very slow to ponded runoff, little or no erosion hazard	Low	Yes
Lewis silty clay loam (0–1 percent slopes, slightly saline-alkali) Map Unit LoA and PpA	Imperfect drainage, moderately permeable in uppermost few inches and very slowly permeable below, low water capacity, very slow to ponded runoff, little or no erosion hazard	Low	Yes
Landlow clay (0 to 1 percent slopes, slightly saline-alkali) Map unit LbA	Imperfect drainage, very slow permeability, high water holding capacity, ponded to very slow runoff, ponds easily	Low	No
Landlow silt loam (0 to 1 percent slopes, slightly saline-alkali) Map unit LdA	Imperfect drainage, slowly permeable, high water holding capacity, ponded to very slow runoff, ponds easily	Low	No
Landlow silty clay loam (0 to 1 percent slopes) Map unit LeA and LfA	Imperfect drainage, upper layers are slowly permeable to the hardpan, high water holding capacity, ponded to very slow runoff, ponds easily	Low	No
Burchell silty clay loam (0 to 1 percent slopes, moderately saline-alkali) Map unit BrA and BpA	Imperfect drainage, moderate permeability, high water holding capacity, very slow runoff, intermittently ponded, no erosion hazard	Yes	No/Yes
Marguerite loam (0 to 1 percent slopes) Map unit MeA	Well-drained, moderately permeable, high water-holding capacity, surface runoff is slow, little or no erosion hazard	Low	Yes
Wyman clay loam (0–1 percent slopes, deep over hardpan) Map Unit WnA	Well-drained, moderate to low permeability, high water capacity, slow runoff, no erosion hazard	Low	Yes

SOURCE: Soil Conservation Service, 1991.

The Project is located in the northern portion of the San Joaquin Valley. In the summer, the area is characterized by warm to hot, dry days and cool nights with clear skies and no rainfall. In the winter, the area experiences mild temperatures and occasional rains, with frequent heavy fogs. About 30 days of fog is normal from December through January. On an annual basis, predominant winds are from the northwest; during the winter, drainage of cold air from the Sierra Nevada results in easterly winds.

Temperatures in the vicinity of the Project site (Merced Municipal Airport, 1961–1990) vary seasonally. The annual average monthly temperature is 61.7°F. The hottest month is July, with an average temperature of 78.6°F. The coldest month, December, averages 44.8°F. Monthly average temperatures range from 35.3°F to 96.9°F (NOAA, 1992).

Precipitation occurs mainly from November through April and is generally associated with the passage of Pacific-frontal winter storm systems. Any rainfall during the summer is usually light and associated with isolated showers or thundershowers. The annual average precipitation at the Merced Municipal Airport is 12.01 inches. The precipitation is seasonal, with nearly 90 percent of the area's rainfall occurring between November and April. January and February are the wettest months on average, receiving nearly 35 percent of the annual rainfall. Table 3-3 summarizes monthly average temperatures and precipitation.

TABLE 3-3
AVERAGE MONTHLY TEMPERATURE AND PRECIPITATION DATA, 1962-1990

	Normal Temperatures		
Month	Maximum (°F)	Minimum (°F)	Precipitation (Inches)
January	54.5	35.7	2.07
February	62.3	38.7	2.06
March	67.4	41.4	2.00
April	74.9	44.4	1.06
May	83.7	50.4	0.28
June	91.4	56.1	0.06
July	96.9	60.2	0.03
August	95.2	59.0	0.04
September	90.0	54.8	0.20
October	80.5	47.5	0.65
November	65.3	40.4	1.86
December	54.3	35.3	1.70
Annual Average	76.4	47.0	12.01

SOURCE: NOAA, 1992.

3.6 Air Quality

3.6.1 Air Basin

The City's WWTP is located within the SJVAB. Airflow in the SJVAB is primarily influenced by marine air that enters through the Carquinez Straits where the Delta empties into San Francisco Bay. The region's topographic features restrict air movement through and out of the basin. As a result, the SJVAB is highly susceptible to pollutant accumulation over time (SJVUAPCD, 2002). Frequent transport of pollutants into the SJVAB from upwind sources also contributes to poor air quality.

Wind speed and direction play an important role in dispersion and transport of air pollutants. During the summer, winds usually originate out of the north end of the San Joaquin Valley and flow in a south-southeasterly direction through the valley and Tehachapi Pass and into the neighboring Southeast Desert Air Basin. During the winter, winds occasionally originate from the south end of the valley and flow in a north-northwesterly direction. Also, during the winter, the valley experiences light, variable winds, less than 10 miles per hour (mph). Low wind speeds, combined with low inversion layers in the winter, create a climate conducive to high concentrations of certain air pollutants (SJVUAPCD, 2002).

The vertical dispersion of air pollutants in the San Joaquin Valley is limited by the presence of persistent temperature inversions. Air temperatures usually decrease with an increase in altitude. A reversal of this atmospheric state, where the air temperature increases with height, is termed an *inversion*. Air above and below an inversion does not mix because of differences in air density. Inversions in the valley can restrict air pollutant dispersal.

Merced County's major air quality problems occur from late spring through early winter. From May to October, high ozone levels are a recurring problem due to the region's intense heat and

sunlight. Pollution problems also occur from October through January due to frequent strong temperature inversions, which trap pollutants near the earth's surface. These stagnant air conditions can last for weeks at a time. During these periods, carbon monoxide levels rise. The presence of visibility-reducing particulates are a problem much of the year. Dust from spring winds and agricultural operations, including agricultural burning, account for most of the area's particulates.

3.6.2 Pollutants Affecting Regional Air Quality

The air pollutants of interest to the regulatory agencies for their potential adverse impacts on the environment and sensitive receptors are described below.

Criteria Air Pollutants

Ozone

Ozone, the main component of photochemical smog, is primarily a summer and fall pollution problem. Ozone is not emitted directly into the air but is formed through a complex series of chemical reactions involving other compounds that are directly emitted. Ozone problems are the cumulative result of regional development patterns rather than the result of a few significant emission sources. Mobile sources are the major source of ozone precursor emissions within the northern region of the SJVAB (SJVAPCD, 2003b). Short-term exposure to ozone can irritate the eyes and cause constriction of breathing passages. Besides causing shortness of breath, ozone can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema.

Carbon Monoxide

Ambient carbon monoxide concentrations normally are considered a local effect and typically correspond closely to the spatial and temporal distributions of vehicular traffic. Under inversion conditions, carbon monoxide concentrations may be distributed more uniformly over an area, some distance from vehicular sources. Although the SJVAPCD has been successful in achieving carbon monoxide standards, localized carbon monoxide concentrations warrant concern (SJVAPCD, 2002a).

Respirable Particulate Matter (PM_{10} and $PM_{2.5}$)

PM_{10} and $PM_{2.5}$ consist of particulate matter that is 10 microns or less in diameter and 2.5 microns or less in diameter, respectively. (A micron is one-millionth of a meter.) PM_{10} and $PM_{2.5}$ represent fractions of particulate matter that can be inhaled into the air passages and the lungs and can cause adverse health effects. Traffic generates PM_{10} and $PM_{2.5}$ emissions through entrainment of dust and dirt particles that settle onto roadways and parking lots. PM_{10} and $PM_{2.5}$ also is emitted by burning wood in residential wood stoves and fireplaces and open agricultural burning. The primary classes of PM_{10} and $PM_{2.5}$ sources in the SJVAPCD include geological material, ammonium nitrate, burning, motor vehicle exhaust, and sulfates. Geological material is the largest contributor annually, while ammonium nitrate constitutes the largest fraction during winter (SJVAPCD, 2003a).

Other Criteria Pollutants

The standards for nitrogen dioxide (NO_2), sulfur dioxide (SO_2), sulfates, and lead are being met in the SJVAB (CARB, 2003a). However, nitrogen dioxide is an ozone precursor and thus contributes to the formation of a non-attainment criteria pollutant. Automobiles and industrial operations are the main sources of nitrogen dioxide. Aside from its contribution to ozone formation, nitrogen dioxide can increase the risk of acute and chronic respiratory disease and reduce visibility.

Toxic Air Contaminants

Non-criteria air pollutants or toxic air contaminants (TACs) include both organic and inorganic chemical substances. They may be emitted from a variety of common sources including gasoline stations, automobiles, dry cleaners, industrial operations, and painting operations. The current list of TACs includes approximately 200 compounds, including particulate emissions from diesel-fueled engines.

Diesel particulate matter (DPM) is the most complex of diesel emissions. The basic fractions of DPM are elemental carbon, heavy hydrocarbons derived from the fuel and lubricating oil, and hydrated sulfuric acid derived from the fuel sulfur. Ambient exposures to diesel particulates in California are significant fractions of total TAC levels in California. TACs are capable of causing short-term (acute) and/or long-term (chronic or carcinogenic, i.e., cancer-causing) injuries or illnesses.

Odor

Because offensive odors rarely cause any physical harm and no requirements for their control are included in state or national air quality regulations, the SJVAPCD has no rules or standards related to odor emissions, other than its nuisance rule. Control actions related to odors are based on citizen complaints to local government agencies including the SJVAPCD. The SJVAPCD uses screening distances to determine the potential for odor impacts from various land uses.

3.6.3 Air Quality Standards

Regulation of air pollution is achieved through both national and state ambient air quality standards and through emissions limits on individual sources of air pollutants. Local air quality management districts and air pollution control districts are responsible for demonstrating attainment with state air quality standards through the adoption and enforcement of Attainment Plans.

Federal Standards

The CAA requires the USEPA to identify National Ambient Air Quality Standards (NAAQS; or national standards) to protect public health and welfare. National standards have been established for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, respirable particulate matter (PM_{10} and $PM_{2.5}$), and lead. These pollutants are referred to as "criteria" air pollutants because standards have been established for each of them to meet specific public health and welfare criteria set forth

in the CAA. California has adopted more stringent ambient air quality standards for the criteria air pollutants (referred to as State Ambient Air Quality Standards, or state standards) and has adopted air quality standards for some pollutants for which there is no corresponding national standard. Table 3-4 presents current national and state ambient air quality standards and provides a brief discussion of the related health effects and principal sources for each pollutant.

Pursuant to the 1990 CAA Amendments, the USEPA classifies air basins (or portions thereof) as "attainment" or "non-attainment" for each criteria air pollutant, based on whether or not the NAAQS had been achieved. Table 3-5 shows the current attainment status of the Project area. In summary, the Project area is non-attainment for state and federal ozone, PM_{10}, and $PM_{2.5}$ standards.

The CAA requires each state to prepare an air quality control plan referred to as the SIP. The amendments to the CAA added requirements for states containing areas that violate the NAAQS to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is a living document that is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of air basins as reported by the agencies with jurisdiction over them.

The USEPA has responsibility to review all state SIPs to determine if they conform to the mandates of the federal CAA and will achieve air quality goals when implemented. If the USEPA determines a SIP to be inadequate, it may prepare an FIP for the non-attainment area and may impose additional control measures. Failure to submit an approvable SIP or to implement the plan within mandated time frames can result in sanctions being applied to transportation funding and stationary air pollution sources in the air basin.

Regulation of TACs, termed Hazardous Air Pollutants (HAPs) under federal regulations, is achieved through federal, state, and local controls on individual sources. The SJVAPCD regulates TACs in its Policies 1905 and 1910 and in Regulation VII. The SJVAPCD recognizes all TACs as defined by the state. The SJVAPCD recognizes federal maximum achievable control technology standards for HAPs in District Rule 4002. The 1977 CAA Amendments required the USEPA to identify national emission standards for HAPs to protect public health and welfare. These substances include certain volatile organic chemicals, pesticides, herbicides, and radionuclides that present a tangible hazard, based on scientific studies of exposure to humans and other mammals.

TABLE 3-4
STATE AND NATIONAL CRITERIA AIR POLLUTANT STANDARDS

Pollutant	Averaging Time	State Standard	National Standard	Pollutant Health and Atmospheric Effects	Major Pollutant Sources
Ozone	1 hour 8 hours	0.09 ppm 0.070 ppm[b]	0.12 ppm[a] 0.08 ppm	High concentrations can directly affect lungs, causing irritation. Long-term exposure may cause damage to lung tissue.	Formed when reactive organic gases (ROG) and nitrogen oxides (NOx) react in the presence of sunlight. Major sources include on-road motor vehicles, solvent evaporation, and commercial and industrial mobile equipment.
Carbon Monoxide	1 hour 8 hours	20 ppm 9.0 ppm	35 ppm 9 ppm	Classified as a chemical asphyxiant, carbon monoxide interferes with the transfer of fresh oxygen to the blood and deprives sensitive tissues of oxygen.	Internal combustion engines, primarily gasoline-powered motor vehicles.
Nitrogen Dioxide	1 hour Annual Avg.	0.25 ppm ---	--- 0.053 ppm	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown.	Motor vehicles, petroleum refining operations, industrial sources, aircraft, ships, and railroads.
Sulfur Dioxide	1 hour 24 hours Annual Avg.	0.25 ppm 0.04 ppm ---	--- 0.14 ppm 0.03 ppm	Irritates upper respiratory tract; injurious to lung tissue. Can yellow the leaves of plants; destructive to marble, iron, and steel. Limits visibility and reduces sunlight.	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.
Respirable Particulate Matter (PM_{10})	24 hours Annual Avg.	50 µg/m^3 20 µg/m^3	150 µg/m^3 50 µg/m^3	May irritate eyes and respiratory tract, decreases in lung capacity, cancer and increased mortality. Produces haze and limits visibility.	Dust and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).
Fine Particulate Matter ($PM_{2.5}$)	24 hours Annual Avg.	--- 12 µg/m^3	65 µg/m^3 15 µg/m^3	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and results in surface soiling.	Fuel combustion in motor vehicles, equipment, and industrial sources; residential and agricultural burning; also formed from photochemical reactions of other pollutants, including ROG, NOx, and sulfur oxides.
Lead	Monthly Quarterly	1.5 µg/m^3 ---	--- 1.5 µg/m^3	Disturbs gastrointestinal system, and causes anemia, kidney disease, and neuromuscular and neurological dysfunction.	Present source: lead smelters, battery manufacturing and recycling facilities. Past source: combustion of leaded gasoline.

SOURCES: CARB, 2001, 2005a.

NOTE: ppm = parts per million; µg/m^3 = micrograms per cubic meter.

[a] On June 15, 2005, the 1-hour ozone standard was revoked for all areas except the 8-hour ozone non-attainment. Early Action Compact Areas are those that do not yet have an effective date for their 8-hour designations.

[b] This concentration was approved by the California Air Resources Board on April 28, 2005, and is expected to become effective in early 2006.

TABLE 3-5
SAN JOAQUIN VALLEY ATTAINMENT STATUS

Pollutant	Federal Standards	State Standards
Ozone – one hour	No Federal Standard[1]	Non-attainment/Severe
Ozone – eight hour	Non-attainment/Serious	No State Standard
PM_{10}	Non-attainment/Serious	Non-attainment
$PM_{2.5}$	Non-attainment	Non-attainment[2]
Carbon monoxide – Merced County	Unclassified/Attainment	Unclassified
Nitrogen dioxide	Unclassified/Attainment	Attainment
Sulfur dioxide - Merced County	Unclassified	Attainment
Lead (particulate)	No Designation	Attainment
Hydrogen sulfide	No Federal Standard	Unclassified
Sulfates	No Federal Standard	Attainment
Visibility-reducing particles	No Federal Standard	Unclassified

SOURCES: <www.valleyair.org/aqinfo/attainment.htm> (November 2005), and <www.arb.ca.gov/desig/adm/adm.htm>

[1] Federal One Hour Ozone National Ambient Air Quality Standards was revoked on June 15, 2005

[2] Non-attainment per the California Air Resources Board's website: <www.arb.ca.gov/desig/adm/s4_pm25.pdf>

State Standards

The CARB manages air quality, regulates mobile emissions sources, and oversees the activities of county and regional air pollution control districts and air quality management districts. CARB regulates local air quality indirectly by establishing state ambient air quality standards and vehicle emissions and fuel standards, and by conducting research, planning, and coordinating activities.

California has adopted ambient standards that are more stringent than the federal standards for some criteria air pollutants (e.g., PM_{10} daily and annual average standards), the California Ambient Air Quality Standards (CAAQS), pursuant to California Health and Safety Code [39606(b)]. In July 2003, new annual standards adopted by CARB for PM_{10} and $PM_{2.5}$ took effect. The annual PM_{10} standard was revised from 30 to 20 micrograms per cubic meter ($\mu g/m^3$), and the annual $PM_{2.5}$ standard was revised from 15 to 12 $\mu g/m^3$. The state standards are shown in Table 3-4.

Under the California Clean Air Act (CCAA), patterned after the federal CAA, areas have been designated as attainment or non-attainment with respect to the state standards (see Table 3-4). The project area is non-attainment for particulates (PM_{10} and $PM_{2.5}$) and ozone. The state must verify compliance with the SJVAPCD's plan for achieving attainment before inclusion in the SIP. Once the SIP is complete, the USEPA must verify the SIP's compliance with the federal CAA. If USEPA determines the SIP to be inadequate in verifying compliance, the USEPA may prepare a FIP, as described earlier in this section.

California state law defines TACS as air pollutants having carcinogenic effects. The State Air Toxics Program was established in 1983 under Assembly Bill (AB) 1807 (Tanner). A total of 243 substances have been designated TACs under California law; they include the 189 (federal) HAPs adopted in accordance with AB 2728. The Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB 2588) seeks to identify and evaluate risk from air toxics sources; AB 2588 does not regulate air toxics emissions.

TAC emissions from individual facilities are quantified and prioritized. "High-priority" facilities are required to perform a health risk assessment and, if specific thresholds are violated, are required to communicate the results to the public in the form of notices and public meetings. Depending on the risk levels, emitting facilities are required to implement varying levels of risk reduction measures. SJVAPCD implements AB 2588, and is responsible for prioritizing facilities that emit air toxics (SJVAPCD, 2002c).

In August 1998, CARB identified particulate emissions from diesel-fueled engines (DPM) as TACs. CARB developed the *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles* and the *Risk Management Guidance for the Permitting of New Stationary Diesel-Fueled Engines*. The Board approved these documents on September 28, 2000 (CARB, 2000). The documents represent proposals to reduce diesel particulate emissions, with the goal to reduce emissions and the associated health risk by 75 percent in 2010 and by 85 percent in 2020. The program aims to require the use of state-of-the-art catalyzed diesel particulate filters and ultra low sulfur diesel fuel on diesel-fueled engines.

Local Standards

The SJVAPCD is the primary local agency responsible for protecting human health and property from the harmful effects of air pollution in the SJVAB and has jurisdiction over most stationary source air quality matters in the SJVAB, including the New Source Performance Standards program. The SJVAPCD includes all of Merced, San Joaquin, Stanislaus, Madera, Fresno, Kings, and Tulare Counties, and the San Joaquin Valley portion of Kern County.

The SJVAPCD is responsible for developing attainment plans for the SJVAB, for inclusion in California's SIP, as well as establishing and enforcing air pollution control rules and regulations. The attainment plans must demonstrate compliance with federal and state ambient air quality standards, and must first be approved by CARB before inclusion into the SIP. The SJVAPCD regulates, permits, and inspects stationary sources of air pollution. Among these sources are industrial facilities, gasoline stations, auto body shops, municipal solid waste landfills, and dry cleaners.

While the State is responsible for emission standards and controlling actual tailpipe emissions from motor vehicles, the SJVAPCD is required to regulate emissions associated with stationary sources such as agricultural burning and industrial operations. The SJVAPCD also works with eight local transportation planning agencies to implement transportation control measures, and to recommend mitigation measures for new growth and development designed to reduce the number of cars on the road. The SJVAPCD promotes the use of cleaner fuels, and funds a number of public and private agency projects that provide innovative approaches to reducing air pollution from motor vehicles.

The WWTP site is located in the City of Merced within the SJVAB. The SJVAB is designated severe non-attainment for the federal 1-hour ozone standard and serious non-attainment for the federal PM_{10} standard. In April 2004, the USEPA approved the SJVAPCD's appeal to downgrade its federal 1-hour ozone non-attainment status from severe to extreme. While all criteria pollutants

are a concern of the SJVAPCD, and a project is considered significant if it violates any of the state air quality standards, ozone precursors, PM_{10} emissions, and toxic air contaminants are emphasized in the review of applications for an Authority to Construct/Permit to Operate. Federal and state air quality laws also require regions designated as non-attainment to prepare plans that either demonstrates how the region will attain the standard or that demonstrate reasonable improvement in air quality conditions. As noted, the SJVAPCD is responsible for developing attainment plans for the SJVAB, for inclusion into California's SIP.

The SJVAPCD's primary means of implementing the above air quality plans is by adopting and enforcing rules and regulations. Stationary sources within the jurisdiction are regulated by the SJVAPCD's permit authority over such sources and through its review and planning activities. In 2001, the SJVAPCD revised its Regulation VIII-Fugitive PM Prohibitions, in response to commitments made in the 1997 PM_{10} Attainment Plan to incorporate best available control measures. The revision also includes new rules for open areas and agricultural operations. The provisions of the revised regulation took effect in May 2002. Regulation VIII consists of a series of dust control rules intended to implement the PM_{10} Attainment Demonstration Plan. The PM_{10} Attainment Demonstration Plan emphasizes reducing fugitive dust as a means of achieving attainment of the federal standards for PM_{10}.

The SJVAPCD limits emissions of, and public exposure to, toxic air contaminants through a number of programs to include the risk reduction program. District Rules 1905, Risk Management Policy for Permitting New and Modified Sources and 1910, Toxic Best Available Control Technology for New and Modified Diesel Internal Combustion Engines, provide guidelines on permitting sources that emit TACs (also referred to interchangeably by the District as HAPs).

Additional SJVAPCD Rules applicable to the Project are described below:

- District Rule 2201 (New and Modified Stationary Source Review Rule). This rule applies to all new stationary sources and all modifications of existing stationary sources that are subject to the SJVAPCD permit requirements and after construction emit or may emit one or more affected pollutants.
- District Regulation VIII (Fugitive PM_{10} Prohibitions). Regulation VIII (Rules 8011-8081) is a series of rules designed to reduce PM_{10} emissions (predominantly dust/dirt) generated by human activity, including construction, road construction, bulk materials storage, landfill operations, etc. The Dust Control Plan threshold applies to projects that are 5.0 or more acres in size for non-residential sites.

  Regulation VIII specifically addresses the following activities:

  - Rule 8011: General Requirements
  - Rule 8021: Construction, Demolition, Excavation, Extraction and other Earthmoving Activities
  - Rule 8031: Bulk Materials
  - Rule 8041: Carryout and Trackout
  - Rule 8051: Open Areas

  - Rule 8061: Paved and Unpaved Roads
  - Rule 8071: Unpaved Vehicle/Equipment Traffic Areas
- District Rule 4641 (Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations). If asphalt paving will be used, then paving operations on this project will be subject to Rule 4841. This rule applies to the manufacture and use of cutback asphalt, slow cure asphalt, and emulsified asphalt for paving and maintenance operations.
- District Rule 4102 (Nuisance). This rule applies to any source operation that emits or may emit air contaminants or other materials. In the event that the project or construction of the project creates a public nuisance, it could be in violation and subject to SJVAPCD enforcement action.
- District Rule 4311 (Flares). This rule applies to any major source that owns and operates flares.
- District Rule 4625 (Wastewater Separators). This rule applies to wastewater separators, which are any device or equipment used to remove oil and associated chemicals from water, or any device, such as a flocculation tank, clarifier, etc. that removes petroleum-derived compounds from wastewater.

On December 15, 2005, SJVAPCD Rule 9510 Indirect Source Review (ISR) was adopted to fulfill the SJVAPCD's emission reduction commitments in the PM_{10} and Ozone Attainment Plans. Rule 9510 requires the submittal of an Air Impact Assessment (AIA) application no later than applying for a final discretionary approval with the public agency. The assessment will be the information necessary to calculate both construction and operational emissions of a development project.

Section 6.0 of the Rule outlines general mitigation requirements for developments that include reduction in construction emissions of 20 percent of the total construction nitrogen oxide emissions, and 45 percent of the total construction PM_{10} exhaust emissions. Section 6.0 of the Rule also requires the Project to reduce operational nitrogen oxide emissions by 33.3 percent and operational PM_{10} emissions by 50 percent.

3.6.4 Existing Air Quality

The CARB and the SJVAPCD regional air quality monitoring network provide information on ambient concentrations of non-attainment criteria air pollutants. The closest monitoring stations to the WWTP and the only ones in Merced County are located on South Coffee Avenue (monitors ozone) and on M Street (monitors PM_{10} and $PM_{2.5}$) in the City of Merced. The next closest carbon monoxide monitoring site is in Turlock (in Stanislaus County), approximately 40 miles to the northeast. Table 3-6 presents a five-year summary of air quality data collected at the monitoring stations for ozone and particulate matter, the two pollutants for which the SJVAB remains "non-attainment." Table 3.6 also includes a comparison of monitored air pollutant concentrations with the state and national ambient air quality standards.

TABLE 3-6
AIR QUALITY DATA SUMMARY (2001–2005) FOR THE CITY OF MERCED AREA

Pollutant	Standard[c]	Monitoring Data				
		2001	2002	2003	2004	2005
Ozone[a]						
Highest 1-Hour Average (ppm)[d] Highest 1-Hour Average, ppm[c]		**0.113**	**0.138**	**0.122**	**0.114**	**0.100**
Days over State Standard Exceedances[d]	0.09	26	55	54	14	6
Days over National Standard	0.12	0	2	0	0	0
Highest 1-Hour Average (ppm)[d] Highest 1-Hour Average, ppm[c]		**0.105**	**0.125**	**0.110**	**0.109**	**0.093**
Days over National Standard Exceedances[d]	0.08	29	56	54	15	3
Particulate Matter (PM_{10})[b]						
Highest 24-hour average ($\mu g/m^3$)[d] Highest 8-hour average, ppm[c]		**113**	**85**	**75**	**57**	55
Est. Days over State Standard[e] Exceedances	50	N/A	85	44	12	N/A
Est. Days over National Standard[e]	150	0	0	0	0	0
State Annual Average ($\mu g/m^3$)[d, f]	20	**33**	**34**	**33**	**29**	N/A
Fine Particulate Matter ($PM_{2.5}$)[b]						
Highest 24-hour average ($\mu g/m^3$)[d] Highest 8-hour average, ppm[c]		**80**	**66**	**47**	**53**	N/A
Est. Days over National Standard[e]	65	1	1	0	0	N/A
National Annual Average ($\mu g/m^3$)[d, g]	15	14.5	**18.8**	**15.7**	**15.2**	N/A

SOURCE: CARB, 2006

NOTE: Values in **bold** exceed applicable standard.

NA = Not Available.

[a] Samples collected at Merced-S. Coffee Avenue.
[b] Samples collected at Merced-2334 M Street.
[c] Generally, state standards are not to be exceeded and national standards are not to be exceeded by more than once per year.
[d] ppm: parts per million; $\mu g/m^3$: micrograms per cubic meter.
[e] Particulate matter is not measured every day of the year. Estimated days over the standard are based on 365 days per year.
[f] State annual average, which is the geometric mean of all measurements; in July 2003 the averaging method was revised from geometric to arithmetic mean.
[g] National annual average, which is the arithmetic mean of the four arithmetic quarterly averages.

3.7 Major Botanical Features and Important Fish and Wildlife

Biological resources were identified using pertinent literature, database queries, and reconnaissance field surveys of the Project site on August 3, November 15–17, and December 6, 2005. Wildlife habitats and plant communities were mapped using aerial photograph interpretation and verification on the ground in November 2005.

The wildlife habitats identified in this section generally follow those described in CDFG's *A Guide to Wildlife Habitats of California* (Mayer and Laudenslayer, 1988), which generally correlate with plant communities. Plant communities are assemblages of plants found growing together (Daubenmire, 1968) and are defined by the presence and composition of dominant plant species. Where appropriate wildlife habitat descriptions were not available, general plant

community types are provided. **Figure 3-2** shows the locations of the major habitats and plant communities identified at the Project site. **Appendix D** contains a list of plant species, including common and scientific names, observed onsite.

Annual Grassland

Approximately 24.1 acres of annual grassland occur adjacent to a segment of Hartley Slough in the Project study area (**Figure 3-2**). This area was formerly used as a peach pit disposal site and standing dead peach trees occur sporadically along the eastern edge of this plant community. Thick deposits of peach pits are present in some areas. Dominant plant species include soft chess, foxtail barley, ripgut brome, common tarweed, and scattered big saltbush shrubs also occur. More ruderal areas are dominated by non-native forbs including shortpod mustard, milk thistle, perennial pepperweed, and prickly lettuce. In low-lying areas of the floodplain of Hartley Slough, the vegetation is generally taller and more diverse with an assemblage of native perennial species including salt grass, creeping wildrye, Baltic rush, and alkali heath. These stands of native perennials are interspersed with annual grasses including soft chess, foxtail barley, and ripgut brome. The grassland area also has occasional bare depressions edged by rabbitsfoot grass, rusty molly, and salt grass. A small stand of mature Goodding's willow trees with an understory of annual grasses, milkthistle, and dense, homogenous stands of perennial pepperweed occur within the floodplain as well.

Field mice (*Peromyscus maniculatus*), California vole (*Microtus californicus*), and a variety of birds such as northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), and goldfinches were noted using the annual grassland habitat.

Alkali Scrub

Approximately 48.0 acres of alkali scrub occur in the former peach pit disposal site and standing dead peach trees are scattered throughout this plant community (Figure 3-2). After the area was no longer used as a disposal site, the CDFG planted it with big saltbush and Arizona cypress to create wildlife habitat. This plant community is characterized by dense thickets of big saltbush shrubs with little to no understory. Cover ranges from continuous to intermittent. Associated shrub and small tree species include peach trees, coyote brush, and blue elderberry. Canopy openings between shrubs are dominated by homogenous stands of poison hemlock or annual grassland. In grassland openings, grasses such as soft chess, foxtail barley, and salt grass are prevalent along with perennial herbaceous species such as shortpod mustard, milkthistle, and common tarweed. A few Goodding's willows and Arizona cypress occur within this plant community as well. An area approximately 15 feet wide, between the edge of this vegetation and access roads, has been recently disked and lacks vegetative cover.

SOURCE: GlobeXplorer, 2002; and ESA, 2006

City of Merced Wastewater Treatment Plant Improvement Project . 205087

Figure 3-2

Habitats and Plant Communities

Wildlife species using this alkali scrub habitat include coyote (*Canis latrans*), black-tailed jackrabbit (*Lepus californicus*), cottontail (*Sylvilagus audubonii*), feral cat (*Felis domesticus*), and several bird species including western scrub jay (*Aphelocoma californica*), white-crowned sparrow (*Zonotrichia leucophrys*), Lincoln's sparrow (*Melospiza lincolnii*), and loggerhead shrike (*Lanius ludovicianus*).

Eucalyptus

Approximately 20.6 acres of eucalyptus occur in the Project study area (**Figure 3-2**). This habitat is characterized by a closed canopy of mature blue gum trees with a sparse understory of annual grasses and non-native forbs. Understory components include blue gum saplings, milkthistle, prickly lettuce, poison hemlock, and grasses including salt grass, ripgut brome, and foxtail barley. The northern portion of this habitat was recently burned and lacks an understory. The remaining understory appears to have been mowed sometime during the growing season. This area is being cleared and approximately one-third of the original stand has been removed.

Wildlife species using this habitat are mainly bird species which feed, roost, and nest in the eucalyptus trees. Several red-tailed hawks (*Buteo jamaicensis*) were observed in the trees.

Fresh Emergent Wetland

Approximately 8.0 acres of fresh emergent marsh occur at the Project study area within the ordinary high water mark of Hartley Slough (**Figure 3-2**). Common plant species observed in this habitat included common tule, broad-leaved cattail, stinging nettle, common water smartweed, and common rush. This type of vegetation is also currently established within the agricultural drainage ditches in the study area; however, these features are periodically maintained to remove vegetation. Therefore, the establishment of this plant community in ditches is ephemeral in nature and not a permanent feature.

Wildlife using the fresh emergent marsh largely includes wading birds and waterfowl species such as great blue heron, great egret, American coot (*Fulica americana*), and mallard (*Anas platyrhynchos*). Several black-crown night herons (*Nycticorax nycticorax*) were observed roosting in the tule growth. Red-winged blackbirds (*Agelaius phoeniceus*), and aquatic reptiles and amphibians such as garter snake (*Thamnophis* sp.), pond turtle (*Clemmys marmorata*), and frogs (*Rana* sp.) also use this habitat.

Seasonal Wetland

Approximately 2.7 acres of low-lying floodplain adjacent to Hartley Slough support a nearly continuous cover of seasonal wetland vegetation (**Figure 3-2**). The basin lies between the levee berm of Hartley Slough and the elevated adjacent annual grassland and alkali scrub habitats. This floodplain acts as a detention basin for over-the-bank flows during severe storms. The vegetation within the basin ranges from dense homogenous stands of perennial pepperweed to mixed stands of perennial pepperweed, common tule, and narrow-leaved milkweed and areas dominated by

Baltic rush, common tarweed and rabbitsfoot grass. A few mature edible fig trees and scattered areas of bare ground also occur in this wetland feature.

Seasonal wetlands may support a variety of wildlife. A diversity of birds, invertebrates, some amphibian, and few reptiles may use ponded areas for food, cover, and/or breeding. Given the abundance of tall vegetation in the seasonal wetland habitat in the Project study area, species such as red-winged blackbird and northern harrier are likely to be seen.

Riverine

Hartley Slough is a perennial drainage channel that is characterized by both open water and fresh emergent marsh habitat (**Figure 3-2**). While the total average channel width is approximately 30 feet within the Project study area, the area of open water is only approximately 15 feet due to the fresh emergent marsh along the edge of the slough. Therefore, approximately 2.1acres (6,048 linear feet) of open water habitat occurs in Hartley Slough in the Project study area. This steep-sided channel flows in a southwesterly direction. One beaver dam was observed in Hartley Slough, and the presence of this feature likely contributes to the upstream establishment of emergent wetland species within the channel.

Informal surveys for aquatic macroinvertebrates were conducted in Hartley Slough on August 8, and December 6, 2005 to characterize the general aquatic populations, diversity, and structure in the waterway upstream and downstream of the WWTP effluent discharge. Three sampling locations were used: (1) where Gove Road crosses Hartley Slough, near the entrance to the WWTP; (2) upstream from the confluence of Miles Creek and Hartley Slough; and (3) downstream from the confluence of Miles Creek and Hartley Slough. Generally, species diversity and abundance of macroinvertebrates appeared to increase from upstream to downstream sampling locations. Invertebrates collected included mayflies, water boatmen, damselflies and dragonflies, and various midges, all of which are important indicators of water quality. Chironomid midges and water boatmen were the most abundant taxa in the samples. In general, the results indicate that Hartley Slough supports a diverse population of macroinvertebrates indicative of non-degraded water quality, both upstream and downstream of the existing effluent discharge.

Several common carp (*Cyprinus carpio carpio*), mosquitofish (*Gambusia affinis*), and Sacramento pikeminnow (*Ptychocheilus grandis*) have been observed in the slough and channels at the Project study area. Garter snakes may also use this habitat. Great-horned owls have been observed roosting in the fig trees on the edge of the seasonal wetland habitat.

Developed Habitats

Approximately 113.5 acres of the Project study area are developed and include the WWTP facilities, paved and unpaved roads, and parking lots (**Figure 3-2)**. The majority of the developed are is composed of sludge drying beds located south of the WWTP. The roads are sparsely to densely vegetated along the edges by ruderal species including poison hemlock, prickly lettuce,

Johnson grass, and everlasting cudweed. Landscaped areas within WWTP facilities include a solid groundcover of iceplant, a row of oleander shrubs, scattered ornamental pines, and lawn.

Diversity of wildlife species in developed areas is typically low and limited to those species that are associated with human activity, including rock pigeon (*Columba livia*), American crow, house finch (*Carpodacus mexicanus*), and house sparrow (*Passer domesticus*). Several California ground squirrels (*Spermophilus beecheyi*) were observed along the edge of the iceplant where the ground slopes down into a basin. Several ground squirrel burrows were noted in this area and along the roads as well.

Ruderal

Approximately 7.7 acres of ruderal habitat occur throughout the Project study area (**Figure 3-2**). Ruderal areas are generally in disturbed or maintained areas and are characterized by a predominance of invasive non-native plant species. Dominant species are generally tall-growing invasive species such as poison hemlock, perennial pepperweed, prickly lettuce, and shortpod mustard interspersed with annual grasses such as Italian ryegrass, foxtail barley, and soft chess. The ruderal area between the alkali scrub and eucalyptus stand appears to have been recently mowed and the dominant species include fiddle dock (*Rumex pulcher*), prickly lettuce, and milkthistle. Scattered big saltbush shrubs and blue elderberry are also present. This area has a large brush pile surrounded by dense stand of milkthistle. The ruderal area adjacent to the landfill is characterized by a dense stand of milkthistle and shortpod mustard with some downed eucalyptus trees and debris piles. Areas closer to Hartley Slough are dominated by Italian ryegrass and poison hemlock. The ruderal area in the northernmost portion of Project study area has a few mature Goodding's willow trees with open grassy areas dominated by wild oats, Italian ryegrass, common tarweed, milkthistle, and shortpod mustard. This area appears to be an illegal dump and a significant quantity of trash is scattered about in this area.

Wildlife species that use ruderal habitat are varied and may include American crow (*Corvus brachyrhynchos*), morning dove (*Zenaida macroura*), lizards, and several species of songbirds and burrowing owl that forage in the weedy vegetation.

Disked Field

Approximately 35.0 acres of disked fields occur in the Project study area (**Figures 3-2**). During the site visit, it was noted that these fields had been disked sometime during the growing season and lacked vegetation. Disked fields in the northeastern portion of the project area, adjacent and outside of the current WWTP footprint, are in current agricultural production and had been recently disked. Other areas within the WWTP site had been disked to prevent vegetation overgrowth. In these areas, the vegetation cover ranges from 10 to 60 percent and includes ruderal species such as poison hemlock, Bermuda grass and amaranth. The disked field immediately south-southwest of the existing WWTP plant facilities serves as an emergency overflow retention pond that is rarely needed. The eastern half of this field is characterized by a mostly continuous cover of Italian ryegrass with associated species such as cheeseweed, goosefoot, fiddle dock, and mustard; the center of this area has a few large bare areas. The western half of this field has approximately

45 percent vegetation cover with dominants including Johnson grass, field bindweed, cheeseweed, goosefoot, and common knotweed.

Frequently-disked fields typically provide foraging habitat for wildlife species such as great-egret (*Ardea alba*), great-blue heron (*Ardea herodus*), northern harrier, red-tailed hawk, killdeer (*Charadrius vociferus*), white-tailed kite (*Elanus leucurus*), and burrowing owl.

Landfill

Approximately 3.7 acres of the Project study area is a previous landfill that has been capped and is currently used for surface debris storage (**Figure 3-2**). The area is lined by a gravel base and is characterized by numerous piles of concrete and asphalt rubble. Some vegetation has become established both within the landfill area and along its edges. Established vegetation is dominated by ruderal species including milkthistle, blue gum saplings, yellow starthistle, Italian ryegrass, prickly lettuce, wild oats, foxtail barley, and shortpod mustard. Fence lizards and a feral cat were observed in this area.

Drains and Channels

WWTP Effluent Channel

The effluent channel along the eastern and southern border of the Project study area is a maintained open water channel, which solely carries the treated effluent discharge from the WWTP to Hartley Slough (**Figure 3-2**). Approximately 3.8 acres (8,217 linear feet) of this effluent channel occur in the Project study area. The eastern segment of this channel is slightly wider than the southern segment; its average width is approximately 20 feet. The banks of the effluent channel are maintained and very little vegetation is established. Approximately 80 percent of the channel banks along the eastern segment are bare soil. Where vegetation is present, the dominant plants are generally ruderal species including slender willow herb and prickly lettuce. Portions of the banks of the southern segment of the channel are lined with concrete rubble with only approximately 10 percent vegetation cover. Johnson grass, slender willowherb, common water smartweed, and water cress were observed the southern segment.

Agricultural Ditches

Approximately 1.3 acres (7,756 linear feet) of agricultural drainage ditches occur in the Project study area **(Figure 3-2)**. These ditches are periodically maintained; however, accounts of existing vegetation are provided below for descriptive purposes.

Ditch D-1 extends along Gove Road in the northern portion of the Project study area. Approximately 0.1 acre (548 linear feet) of this feature occurs in the Project study area. The ditch averages 5 feet in width. The channel has continuous cover of dense emergent vegetation both within the channel and on the channel banks. Dominant species include Johnson grass, slender willow herb, panicgrass, common water smartweed.

Ditch D-2 (Hartley Lateral), which is confluent with Hartley Slough, is approximately 0.4 acre (1,714 linear feet) and ranges in cover of fresh emergent marsh vegetation. The ditch's average

width is 10 feet. The northern segment of this ditch is maintained and supports a sparse cover of emergent marsh vegetation along its lower banks. Dominant plant species include broad-leaved cattails, panicgrass, mustard, and common monkeyflower. The channel's upper banks are dominated by the ruderal species field sow thistle. In the middle segment, vegetation cover is dense and dominant species within the channel and on the channel banks include common tule, common water smartweed, and common rush. In its southern extent, where the ditch flows through a stand of blue gum eucalyptus, emergent vegetation is sparse and primarily restricted to channel banks. Dominant species in this segment of the drainage include common rush, tall flatsedge, dallis grass, Goodding's willow saplings, and common tule.

Ditch D-3 (Paden Drain), which is also confluent with Hartley Slough, is approximately 10 feet wide in the Project study area and varies in the amount of emergent vegetation cover along its extent. Approximately 0.5 acre (2,205 linear feet) of this feature occurs in the Project study area. In the channel segment adjacent to the landfill, the ditch has approximately 50 percent cover of emergent marsh vegetation. The dominant emergent species within this segment of the channel include common tule, common rush, and broad-leaved cattail. The upper channel banks are lined by scattered mature riparian trees including Oregon ash, Goodding's willow, and edible fig with an almost continuous understory of poison hemlock and milkthistle. The segment of this drainage that parallels the existing WWTP facility has been recently maintained and supports little emergent vegetation. Only the lowest portion of the channel banks has vegetation cover consisting primarily of tall flatsedge and mustard.

Ditch D-4 is approximately 5 feet wide in the Project study area and varies in the density and amount of emergent vegetation cover throughout its extent. Approximately 0.4 acre (3,289 linear feet) of this feature occurs in the Project study area. The ditch generally supports sparse emergent vegetation in its northern extent and continuous cover of emergent vegetation in its southern extent near its confluence with Miles Creek. The drier northern segment has tall flatsedge established within the channel and ruderal species such as prickly lettuce on the channel banks. The wetter southern segment is characterized by dense emergent vegetation both within the channel and on the channel banks including common water smartweed, tall flatsedge, slender willowherb, mugwort, and Johnson grass.

3.8 Threatened or Endangered Species

Special-status species are those plants and animals that, because of their recognized rarity or vulnerability to various causes of habitat loss or population decline, are recognized by federal, state, or other agencies as deserving special consideration. Some of these species receive specific legal protection pursuant to federal or state endangered species legislation. Others lack such legal protection, but have been characterized as "sensitive" on the basis of adopted policies and expertise of state resource agencies or organizations with acknowledged expertise, or policies adopted by local governmental agencies such as counties, cities, and special districts to meet local conservation objectives. These species are referred to collectively as "special-status species" in this report because of their federal or state designation or other regulatory status as follows:

- Listed species or candidates for listing, in accordance with the Federal Endangered Species Act
- Listed species in accordance with the California Endangered Species Act, or fully protected species in California as designated by the CDFG
- Species identified as Species of Concern by CDFG or USFWS
- Species protected by the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act
- Species included in the California Natural Diversity Database (CNDDB)
- Species that meet the definition of "Rare" in accordance with CEQA Section 15380

A list of regionally occurring special-status plant and animal species was compiled (Appendix C) based on a review of pertinent literature and sources. For each species, range and habitat requirements were assessed and compared to the habitats present at the Project study area. Based on this review, the Project study area has potential habitat for 10 special-status plant species and 17 special-status wildlife species. Those special-status species which have a medium or high potential to occur on the Project study area are listed in Table 3-7 (see Appendix C for definitions of "Potential for Occurrence"). Figure 3-3 depicts habitat for several special-status species whose habitat requirements do not overlap with plant communities mapped in Figure 3-2.

3.9 Critical Habitats

Of the federally-listed species listed in Table 3-7, critical habitat is designated for several species, including the valley elderberry longhorn beetle (FR 45:52803), and conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, Hoover's spurge, and Colusa grass (FR 68:46683). However, the WWTP site is not located within designated critical habitat for these species. The critical habitat of the valley elderberry longhorn beetle only occurs on the American River in the vicinity of Sacramento, California. The closest vernal pool crustacean and plant critical habitat is about 17 miles east of the WWTP site in eastern Merced County; while other identified habitat is found about 10 miles northeast of the WWTP near the UC-Merced campus.

3.10 Wetlands and Other Waters of the U.S.

A wetland delineation of the WWTP site was conducted in accordance with the U.S. Army Corps of Engineers' (Corps) Wetlands Delineation Manual (Environmental Laboratory, 1987). This delineation has not yet been verified by the Corps, but it is the professional opinion of the delineators that not all of the ditches or channels are jurisdictional waters of the United States. A total of 13.7 acres of jurisdictional waters of the United States were found to occur within the WWTP site consisting of 10.7 acres of wetlands and 3.0 acres of other waters of the United States.

TABLE 3-7
SPECIAL-STATUS SPECIES POTENTIALLY OCCURRING IN PROJECT AREA

Scientific Name Common Name	Listing Status (Federal/ State/CNPS)	Blooming Period	General Habitat	Potential for Occurrence
Plants				
Atriplex cordulata Heartscale	FSC/--/1B	April - October	Alkali scrub, alkali seasonal wetlands and grassland. Often found in sandy soils of alkaline flats and scalds in the Central Valley; up to 1,200 feet in elevation	Medium: Potential habitat in alkali scrub, seasonal wetland, and grassland.
Atriplex depressa Brittlescale	FSC/--/1B	May - October	Alkali scrub, meadows and seeps, playas, valley and foothill grassland, and vernal pools with alkaline and clay soils; up to 1,100 feet in elevation	Medium: Potential habitat in alkali scrub, seasonal wetland, and grassland.
Atriplex minuscula Lesser saltscale	FSC/--/1B	May - October	Alkali scrub, playas, and valley and foothill grassland with sandy, alkaline soils; up to 650 feet in elevation	Medium: Potential habitat in alkali scrub and grassland.
Atriplex subtilis Subtle orache	SLC/--/1B	June - October	Valley and foothill grassland; up to 350 feet in elevation	Medium: Potential habitat present in the grassland.
Cordylanthus mollis ssp. *hispidus* Hispid bird's-beak	FSC/--/1B	June - September	Meadows and seeps, playas, and valley and foothill grassland with alkaline soils; up to 500 feet in elevation	Medium: Potential habitat in grassland and seasonal wetland.
Delphinium recurvatum Recurved larkspur	FSC/--/1B	March - May	Alkali scrub, cismontane woodland, and valley and foothill grassland with alkaline soils; up to 2,500 feet in elevation	Medium: Potential habitat in alkali scrub and grassland.
Navarretia nigelliformis ssp. *radians* Shining navarretia	--/--/1B	May - July	Cismontane woodland, valley and foothill grassland, and vernal pools; up to 3,300 feet in elevation	Medium: Potential habitat in grassland.
Navarretia prostrata Prostrate navarretia	FSC/--/1B	April - July	Coastal scrub, valley and foothill grassland with alkaline soils, and vernal pools or mesic areas; up to 2,500 feet in elevation	Medium: Potential habitat in grassland and seasonal wetland.
Phacelia ciliata var. *opaca* Merced phacelia	FSC/--/1B	February – May	Valley and foothill grassland, often associated with adobe or clay soils of valley floors, open hills, or alkaline flats; up to 500 feet in elevation	Medium: Potential habitat in annual grassland.
Sagittaria sanfordii Sanford's arrowhead (=Valley sagittaria)	FSC/--/1B	May - October	Marshes and swamps, assorted shallow freshwater features; up to 2,000 feet in elevation	Medium: Potential habitat present in Hartley Slough.
Invertebrates				
Desmocerus californicus dimorphus Valley elderberry longhorn beetle	FT/--/--		Breeds and forages exclusively on blue elderberry shrubs (*Sambucus mexicana*) below 3,000 feet in elevation.	High: May occur in the 30 elderberry shrubs detected onsite during 2005 surveys.

TABLE 3-7
SPECIAL-STATUS SPECIES POTENTIALLY OCCURRING IN PROJECT AREA

Scientific Name Common Name	Listing Status (Federal/ State/CNPS)	Blooming Period	General Habitat	Potential for Occurrence
Reptiles				
Emys (=Clemmys) marmorata Western pond turtle	FSC/CSC/--		Ponds, marshes, rivers, streams, and irrigation ditches with aquatic vegetation. Requires basking sites and suitable upland habitat for egg-laying.	Medium: May occur in Hartley Slough or adjacent effluent conveyance ditch.
Gambelia (=Crotaphytus) sila) sila Blunt-nosed leopard lizard	FE/SE, CFP/--		Occurs in open valley and foothill grasslands, valley saltbush scrub, and alkali playa communities of the San Joaquin Valley, Carrizo Plain, and Cuyama Valley. Uses small mammal burrows for refuge.	Medium: May occur in alkali scrub.
Thamnophis gigas Giant garter snake	FT/ST/--		Freshwater marsh, low gradient streams, drainage canals, and irrigation ditches; uplands within about 200 feet of aquatic habitat.	Medium: May occur in Hartley slough or within adjacent Miles Creek.
Birds				
Agelaius tricolor Tricolored blackbird	FSC/CSC/-- (nesting colony)		Largely endemic to California, most numerous in the Central Valley and nearby vicinity. Requires open water, protected nesting substrate, and foraging grounds within vicinity of the nesting colony.	High: May breed or forage in Project area. Observed in Project vicinity (CDFG unpublished data).
Athene cunicularia Burrowing owl	FSC/CSC/-- (burrow sites)		Open, dry annual or perennial grasslands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals.	Medium: May breed or forage in irrigation ditches and agricultural fields surrounding the Project area.
Buteo regalis Ferruginous hawk	FSC/CSC/-- (wintering)		Uncommon wintering species throughout the Central Valley. Forages for rodents over open country.	Medium: May occur in winter in grasslands and agricultural lands in Project area and its vicinity.
Buteo swainsoni Swainson's hawk	FSC/ST/-- (nesting)		Forages in grasslands and open agricultural fields. Breeds in oak savanna and riparian areas.	High: May breed or forage in Project area. CNDDB (2005) documents 7 active nests within 10 miles of Project area. Nearest recently active nest is 4.5 miles from Project area.
Charadrius montanus Mountain plover	FSC/CSC/-- (wintering)		Winters in barren agricultural fields and grasslands with sparse vegetation between September and March.	Medium: May occur in agricultural fields surrounding the Project area.

TABLE 3-7
SPECIAL-STATUS SPECIES POTENTIALLY OCCURRING IN PROJECT AREA

Scientific Name Common Name	Listing Status (Federal/ State/CNPS)	Blooming Period	General Habitat	Potential for Occurrence
Elanus leucurus White-tailed kite	FSC/CFP/-- (nesting)		Nests in dense oak, willow, or other tree stands near open grasslands, meadows, farmlands, and emergent wetlands for foraging.	High: May breed or forage in eucalyptus and agricultural fields surrounding Project area. Observed during November 2005 reconnaissance survey.
Grus canadensis tabida Greater sandhill crane	--/ST, CFP/-- (nesting, wintering)		Winters in the Central Valley within annual and perennial grasslands, croplands, and freshwater emergent wetlands.	High: May occur in winter on Project area in annual grassland and agricultural lands. Observed during November 2005 reconnaissance survey.
Lanius ludovicianus Loggerhead shrike	FSC/CSC/-- (nesting)		Nests in dense shrub or tree foliage; forages in scrub, open woodlands, grasslands, and croplands.	High: May breed or forage in Project area. Observed during November 2005 reconnaissance survey.
Mammals				
Dipodomys heermanni dixoni Merced kangaroo rat	FSC/--/--		Subspecies of Heerman's kangaroo rat. In annual grassland, coastal scrub, mixed and montane chaparral, and open/sparse valley foothill woodland.	Medium: Potential habitat in annual grassland in Project area.
Perognathus inornatus inornatus San Joaquin pocket mouse	FSC/--/--		Typically found in grasslands and blue oak savanna; needs friable soils.	Medium: Potential habitat in annual grassland in Project Area.
Taxidea taxus American badger	--/CSC/--		Occurs in a wide variety of open forest, shrub, and grassland habitats that have friable soils for digging.	Medium: Potential habitat in annual grassland in Project area.
Vulpes macrotis mutica San Joaquin kit fox	FE/ST/--		Annual grasslands or grassy open stages with scattered shrubby vegetation. Requires suitable prey base and loose-textured soils for burrowing.	High: Known to occur in western San Joaquin Valley near Project area. CNDDB (2005) documents five occurrences within 10 miles of Project Area.

Approximately 8.0 acres of fresh emergent marsh (bulrush vegetation series) occur within Hartley Slough (**Figure 3-2**) at the Project study area. These wetlands are seasonally to permanently flooded, depending on the frequency of flow and water levels within the slough, and are characterized by erect, rooted herbaceous hydrophytes. These emergent wetlands are within the channel bed and along the channel's lower banks.

SOURCE: GlobeXplorer, 2002; and ESA, 2006

City of Merced Wastewater Treatment Plant Improvement Project . 205087

Figure 3-3

Special-Status Species Habitats

Emergent marsh extends along the lower bank within the channels ordinary high water mark. The width of emergent marsh varies from a few feet to approximately 20 feet. The dominant marsh species is the common tule; associated species include broad-leaved cattail, common rush, and stinging nettle. The Hartley Slough's upper banks are dominated by non-native invasive species, including poison hemlock and perennial pepperweed. While the slough lacks a riparian corridor, scattered trees and shrubs have established along its edge including Goodding's willow, blue gum, edible fig, tobacco tree, and northern California black walnut hybrid.

One segment of channel has a closed canopy overstory of blue gum eucalyptus with lower channel banks dominated by common rush and tall flatsedge and upper banks dominated by salt grass. The small segment of Harley Slough in the northernmost portion of the Project study area on the west side of Gove Road has a dense swath of emergent vegetation along its southern bank that is approximately 15 feet wide and dominated by common tule with occasional broad-leaved cattail and stinging nettle. However, the northern bank appears to be maintained and generally lacks emergent vegetation. The sparse vegetation on the northern bank includes common tarweed, shortpod mustard, and milkthistle; small scattered common tule is present. The slough channel on the east side of Gove Road is well maintained and has little instream vegetation. This segment has pockets of common tule within the channel, but the channel banks are dominated by ruderal species including Johnson grass, common water smartweed, slender willowherb, and dallis grass.

Approximately 2.7 acres of seasonal wetland occur at the Project study area (Figure 3-2). One seasonal wetland feature occurs in the floodplain of Hartley Slough within a low-lying basin that likely retains overbank flow from Hartley Slough. Plant species observed in this habitat are described in Appendix C.

A total of approximately 3.0 acres (10,015 linear feet) of other waters of the United States were identified in the Project study area including Hartley Slough and three agricultural ditches (Figure 3-2). These features are described in detail in Appendix C.

3.11 Designated Wild and Scenic Rivers

No designated wild and scenic rivers occur in the Project area or would be affected by expansion of the WWTP.

3.12 Water Resources

3.12.1 Surface Water Features

The WWTP site is located within the 2,665-square-mile Merced Hydrologic Area (USGS Cataloging Unit 1804-0001), part of the San Joaquin River Basin. The basin covers 15,880 square miles, with its major river systems consisting of the San Joaquin River and its larger tributaries, the Cosumnes, Mokelumne, Calaveras, Stanislaus, Tuolumne, Merced, Chowchilla, and Fresno Rivers (CVRWQCB, 1998). Within this basin, both groundwater and surface water (streams and

reservoirs) are significant water sources for both urban and agricultural users. The San Joaquin River drains to the Delta and subsequently empties into San Francisco Bay.

Surface waters within the immediate vicinity of the WWTP site drain into Hartley Slough. Hartley Slough borders the western perimeter of the WWTP site and flows in a southwesterly direction to Owens Creek; eventually flowing to Deep Slough and the San Joaquin River. Flows in Hartley Slough are influenced by irrigation return flows, stormwater runoff, WWTP treated effluent, and groundwater base flows.

During the summer, water levels within Hartley Slough near the WWTP are at their highest because of a surface water diversion/impoundment downstream of the WWTP. The channel retains some natural features (e.g., riparian vegetation, bank) along the City's property. However, north of Gove Road Bridge, Hartley Slough is channelized and regularly maintained. To the City's knowledge, no flow data are available for Hartley Slough; however, it is thought that the City's effluent discharge is a major contributor during much of the year.

The natural drainage pattern of surface waterways within the vicinity of the WWTP has been highly modified by the installation of an extensive agricultural drain system. As a consequence, surface water in the immediate area travels though a network of canals, laterals, and drains operated by Merced Irrigation District. These canals vary from unimproved dirt ditches to concrete-lined canals. The modified hydrologic regime through this system provides water for a variety of beneficial uses including agriculture, municipal and industrial, and recreation uses.

The existing WWTP site has two main drain systems. One drain system conveys stormwater, basin, and plant drainage from the WWTP facilities to the existing influent box, near the headworks. The second drain system pumps drainage water from the reactor basins, secondary clarifiers, and chlorine contact basin to the emergency retention pond, located to south of the WWTP.

3.12.2 Groundwater Resources

The WWTP overlies a portion of the Merced Groundwater Subbasin, which is part of the larger San Joaquin Groundwater Basin that extends north and south through the Central Valley. The Basin consists of unconsolidated sediments derived from the Coast Ranges and the Sierra Nevada (DWR, 2004). Groundwater flow is primarily to the southwest, following the regional dip of basement rock and sedimentary units. The California Department of Water Resources (DWR) (2000) data show two groundwater depressions south and southeast of the City of Merced during 1999 likely associated with groundwater pumping (DWR, 2004).

The Merced Subbasin contains three water-bearing zones: an unconfined/semi-confined aquifer, located in alluvial deposits, at depths up to 50 feet; at depths between 100 feet and a confined aquifer located in alluvium that is separated from the previous aquifer by a layer of Corcoran Clay, at a depth of 100 to 200 feet; Mehrten formation, 200 to 1,000 feet which is the source of the City's domestic water supply, and a saline groundwater zone located beneath the fresh water deposits in the older marine sediments and rocks (DWR, 2004).

Groundwater levels in the vicinity of the WWTP tend to be relatively shallow. Well data obtained from DWR (Well No. 08S13E09R001M) indicate that generally, depths to groundwater across the Project site average from less than 2 feet to greater than 12 feet below the ground surface (DWR, 2005).

The groundwater in the Merced Subbasin is characterized by calcium-magnesium bicarbonate at the basin interior, sodium bicarbonate to the west, and calcium-sodium bicarbonate to the south. Levels of total dissolved solids range from 100 to 3,600 mg/L, with a typical range of 200 to 400 mg/L. The Department of Health Services, which monitors Title 22 water quality standards, reports TDS values in 46 wells ranging from 150 to 424 mg/L, with an average value of 231 mg/L. For 10 wells, values for the electrical conductivity range from 260 to 410 micromhos per centimeter (µmhos/cm), with an average value of 291 µmhos/cm. Available water quality data for the subbasin indicate that there are localized areas of high hardness, iron, nitrate, and chloride. (DWR, 2004)

Eleven groundwater monitoring wells are located on the City's WWTP property and extend from the existing sludge drying beds south to the Merced Wildlife Management Area. Local monitoring data collected from 1999 through 2003 are summarized in Appendix E-1 and provide the average, minimum, and maximum concentrations detected for a variety of constituents at each of the 11 monitoring wells. In summary, the data for monitoring wells MW-5, MW-6, and MW-7 show elevated levels of selected constituents within the vicinity of the unlined drying beds. Constituents that exhibit the highest elevated concentrations when compared to offsite wells (e.g., MW-11 that is northeast of the WWTP site) included heavy metals (arsenic, copper, iron, manganese, nickel, and selenium), specific conductance, total dissolved solids, and total organic carbon.

3.12.3 Receiving Water Quality

Hartley Slough

Hartley Slough is identified as an effluent-dominated water body (SWRCB, 2000). Prior to the construction of the existing WWTP and discharge of irrigation-return flows from agricultural areas, Hartley Slough consisted of an ephemeral surface water feature that conveyed surface runoff during rain events and was generally dry during the summer. With the introduction of irrigated agriculture, Hartley Slough began to experience higher flows during the summer irrigation season when it became dominated by irrigation return flows (agricultural drainage). With the addition of effluent discharges from the existing WWTP, flows within Hartley Slough were further augmented resulting in year-round flows downstream of the existing WWTP outfall.

The City routinely monitors surface water quality within Hartley Slough, upstream and downstream of the existing effluent discharge for pH, dissolved oxygen, turbidity, and temperature. Table 3-8 presents the City's 2001-2004 data for these parameters. The tendency is for dissolved oxygen, turbidity, and pH decrease and water temperature increases downstream from the WWTP's effluent discharge. Table 2-2 summarizes average daily discharges from the WWTP.

TABLE 3-8
WATER QUALITY OF HARTLEY SLOUGH
UPSTREAM AND DOWNSTREAM FROM WWTP EFFLUENT DISCHARGE

	pH		Water Temperature (°F)		Turbidity (NTU)		Dissolved Oxygen (mg/L)	
	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream
2001								
Jan	7.9	7.2	47	51	80	92	7.6	7.0
Feb	7.9	7.4	53	57	40	27	8.0	8.5
Mar	7.8	7.4	60	60	41	50	7.9	7.4
Apr	7.8	7.5	61	61	20	37	8.3	7.8
May	7.8	7.5	71	70	113	52	7.9	7.1
Jun	7.9	7.5	70	68	45	45	9.0	7.1
Jul	7.8	7.5	71	71	56	65	8.1	6.1
Aug	7.6	7.5	72	71	58	64	7.5	5.7
Sep	8.0	7.6	69	69	40	42	7.2	6.1
Oct	7.9	7.5	64	65	47	43	7.8	6.3
Nov	7.6	7.5	56	61	98	101	6.8	4.4
Dec	7.7	7.4	51	55	47	14	6.9	7.5
2002								
Jan	7.8	7.4	48	53	24	19	8.7	7.4
Feb	8.0	7.1	50	54	12	10	8.2	7.2
Mar	7.8	7.3	54	59	120	117	8.5	9.1
Apr	7.5	7.1	62	63	79	20	6.8	6.2
May	7.5	7.4	65	65	30	84	7.5	5.3
Jun	7.6	7.3	73	72	84	71	8.2	6.9
Jul	7.8	7.3	74	73	112	78	7.0	6.5
Aug	7.5	7.3	70	71	68	82	6.3	6.0
Sep	7.4	7.3	70	71	87	52	6.4	6.4
Oct	7.3	7.2	62	65	46	28	4.1	7.3
Nov	7.7	7.4	56	62	49	21	4.5	6.4
Dec	7.8	7.6	48	52	19	35	8.9	9.1
2003								
Jan	8.2	7.5	52	58	20	14	9.6	8.1
Feb	7.8	7.5	53	56	40	9	8.5	7.8
Mar	7.8	7.5	56	60	39	19	7.8	7.7
Apr	7.5	7.5	61	62	40	20	5.2	5.9
May	7.5	7.5	69	70	43	32	5.9	6.4
Jun	7.9	7.5	71	71	63	53	6.6	6.2
Jul	7.6	7.4	7.4	7.4	63	58	6.3	5.3
Aug	7.6	7.5	72	74	78	62	5.4	5.8
Sep	7.7	7.5	71	72	116	44	7.3	7.4
Oct	7.6	7.5	66	72	49	16	4.3	7.0
Nov	7.7	7.4	54	54	28	9	5.1	7.9
Dec	7.4	7.4	50	54	27	12	4.3	7.0
2004								
Jan	7.8	7.6	49	59	89	30	5.3	7.9
Feb	7.4	7.4	52	59	68	41	6.8	6.7
Mar	7.5	7.6	60	65	42	24	5.1	7.2
Apr	7.4	7.4	65	70	40	23	6.4	7.0
May	7.7	7,6	67	71	141	69	7.1	7.5
Jun	7.6	7.6	70	71	112	75	7.1	5.7
Jul	7.6	7.4	73	74	121	93	7.2	5.7
Aug	7.4	7.2	70	72	132	79	7.1	5.6
Sep	7.6	7.4	65	69	99	48	6.3	5.6
Oct	7.5	7.5	63	66	106	165	5,9	6.2

Source: ECO:LOGIC, 2006

Notes:
°F = degrees Fahrenheit
NTU = nephelometric turbidity unit
Mg/L = milligram per liter

Water quality data from Hartley Slough show exceedances of the City's WDRs for dissolved oxygen, pH, and temperature. Turbidity concentrations in Hartley Slough do not exceed WDRs, but rather indicate high turbidity level upstream of the City's current discharge point. Documented exceedances of the current WDRs for the City's WWTP are attributed to: (1) large variations in pH upstream of the City's effluent channel and (2) low dissolved oxygen levels and elevated temperatures in the City's effluent.

In addition to regularly monitored water quality parameters, the City has conducted composite sampling for the 126 Priority Pollutants. Data are provided in Appendix E-2. As discussed in Chapter 2.0, Project Description, the City is currently operating under a Mandatory Penalty Complaint for violations of its WDRs for residual chlorine and total coliform bacteria. Additionally, four contaminants, including cyanide, chloroform, dichlorobromomethane, and dibromochloromethane, have been detected in the receiving waters and attributed to the use of chlorine as an effluent disinfectant. The latter three contaminants are commonly referred to as disinfection by-products and are identified as constituents of concern for the Delta by CALFED.

During 2003 and 2004, the City performed toxicity testing of its effluent. The CVRWQCB directed the City to use laboratory water for chronic bioassays involving effluent blending because Hartley Sough water was found to be more toxic than the effluent to the sensitive species used in the bioassays. Current background toxicity of Hartley Slough should not be considered an appropriate basis for planning and analysis of present and future effluent discharges (ECO:LOGIC, 2006).

Impaired Water Body Designation

The SWRCB, in compliance with the Section 303(d) of the Clean Water Act (33 USC 1313(d)) prepared and the USEPA approved a 2002 list of "impaired" water bodies for California. The list includes a priority schedule for the development of total maximum daily loads (TMDLs) for each contaminant or "stressor" affecting the water body. Hartley Slough and Owens Creek are not identified as impaired water bodies according to the list and the TMDL Priority Schedule. However, downstream of the WWTP, the San Joaquin River is identified as an impaired water body for the following contaminants: boron, chlorpyrifos, DDT (dichlorodiphenyltrichloro ethane), diazinon, electrical conductivity, Group A pesticides, mercury, and unknown toxicity (USEPA, 2003).

Beneficial Uses of Hartley Slough

Hartley Slough water quality is currently suitable for a variety of beneficial uses including agricultural irrigation and warm freshwater habitat. As noted in Section 3.7, macroinvertebrate species observed in Hartley Slough, both upstream and downstream of the WWTP effluent discharge, indicate conditions suitable for supporting macroinvertebrate species.

3.12.4 Water Supplies for the Service Area

The area surrounding the WWTP site is served solely by Merced Irrigation District (MID) for agricultural water supplies. Domestic water supplies are obtained from local wells.

3.13 Agricultural Land

3.13.1 Local Farmlands

The Important Farmland map for Merced County produced by the California Department of Conservation's Farmland Mapping and Monitoring Program indicates that a vast majority of the land surrounding the WWTP is classified as Farmland of Statewide Importance or Prime Farmland (CDOC, 2002).[2] Smaller areas of Unique Farmland are also scattered throughout the Project area. Table 3-9 provides farmland conversion statistics for the Project area from 1998–2000. Data provided for Merced County indicate that approximately 4,929 acres of agricultural land were lost to non-agricultural use as of 2002 (CDOC, 2002).

TABLE 3-9
FARMLAND CONVERSION IN MERCED COUNTY, 2000 AND 2002

	Total Acres Inventoried		
Land Use Category	**2000**	**2002**	**Acreage Change**
Prime Farmland	287,160	286,054	-1,106
Farmland of Statewide Importance	157,936	158,405	+469
Unique Farmland	96,355	100,749	+4,394
Farmland of Local Importance	47,621	41,772	-5,849
Grazing Land	581,729	578,892	-2,837
Agricultural Land Subtotal	**1,170,801**	**1,165,872**	**-4,929**

SOURCE: CDOC, 2002

3.13.2 Williamson Act

California's Land Conservation Act of 1965 is designed to preserve agricultural and open space lands by discouraging premature and unnecessary conversion to urban uses. The Act creates an arrangement whereby private land owners contract with counties and cities to voluntarily restrict their land to agricultural and compatible open-space uses. The vehicle for these agreements is a rolling term 10-year contract (i.e., unless either party files a "notice of nonrenewal," the contract is automatically renewed for an additional year.). In return, restricted parcels are assessed for property tax purposes at a rate consistent with their actual use, rather than their potential market value.

[2] Four categories of farmland, Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance, are considered valuable.

Lands within the proposed WWTP expansion area are not covered by Williamson Act contracts. A majority of the agricultural properties to the west and south of the WWTP property are covered under active Williamson Act contracts.

3.13.3 County Agricultural Zoning

Lands included within the proposed WWTP expansion area and those surrounding the remainder of the City's property are currently designated by Merced County as A-1, General Agricultural use. Section 18.02.020 of Merced County's zoning code outlines allowable land uses and permit requirements for the A-1 zone.

3.13.4 Present Use

The proposed WWTP expansion area and the surrounding lands are currently in agricultural use.

3.14 Cultural Resources

This description provides a brief overview of the prehistory, ethnography, and history of the WWTP site and the surrounding region.

3.14.1 Prehistory

Although the Great Central Valley may have been inhabited by humans as early as 10,000 years ago, the evidence of early human use is mostly buried by alluvial deposits that have accumulated during the last several thousand years. The greatest exception to this has been the prolific discoveries at Tulare Lake,[3] which has yielded evidence of the earliest occupation of California. Nonetheless, later periods are better understood because there is more representation in the archaeological record.

3.14.2 Ethnographic Background

This portion of Merced County was originally inhabited by the Northern Valley Yokuts. Because of the early decimation of the aboriginal populations in the San Joaquin Valley, most information regarding this group is gleaned from the translated accounts of Spanish military and missionaries. A summary of these sources has been compiled by Wallace (1978), and it is on his work that this discussion is based.

Northern Valley Yokuts territory is defined roughly by the crest of the Diablo Range on the west, and the foothills of the Sierra Nevada on the east. The southern boundary is located approximately where the San Joaquin River bends northward; the northern boundary is roughly

[3] An example of the pluvial lakes and marshes (now dry) that covered much of the California interior during the late-Pleistocene and early Holocene (or between about 1 million and 10,000 years ago).

half way between the Calaveras and Mokelumne Rivers. The Yokuts may have been fairly recent arrivals in the San Joaquin Valley, perhaps being pushed out of the foothills approximately 500 years ago.

Population estimates for the Northern Valley Yokuts vary from 11,000 to more than 31,000 individuals. Populations were concentrated along waterways and on the more hospitable east side of the San Joaquin River. Villages, or clusters of villages, made up "miniature tribes" (tribelets) lead by headmen. The number of tribelets is estimated at 30 to 40; each tribe spoke their own dialect of the Yokuts language. Combined with the Southern Valley Yokuts and the Foothill Yokuts dialects, these tongues formed the Yokutsan linguistic family of the Penutian Stock (Shipley, 1978).

Principal settlements were located on the tops of low mounds on or near the banks of the larger watercourses. Settlements were composed of single family dwellings, sweathouses, and ceremonial assembly chambers. Dwellings were small and lightly constructed, semi-subterranean, and oval. Public structures were large and earth covered. Sedentism was fostered by the abundance of riverine resources in the area.

Most Northern Valley Yokuts groups had their first contact with Europeans in the early 1800s, when the Spanish began exploring the interior of California. The gradual erosion of the Yokuts culture began during the mission period. European diseases played a large role in the decimation of the native population. With the secularization of the mission and the release of neophytes, tribal and territorial adjustments were set in motion. People returned to other groups, and a number of polyglot "tribes" were formed.

The final blow to the aboriginal population came with the Gold Rush and its aftermath. In the rush to the southern mines, native populations were pushed out of the way and out of their existing territories. Settlement in the San Joaquin Valley applied further pressure to the native groups and altered the landforms and waterways of the valley. Many Yokuts resorted to wage labor on farms and ranches. Others were settled on land set aside for them on the Fresno and Tule River Reserves.

3.14.3 Historic Setting

After an epoch of exploration and colonization by the Spanish, Russians, and, later, Mexicans, the missionization of the indigenous population and the development of presidios and civilian ranchos and pueblos throughout California created unprecedented landscape and social change. The burgeoning secular influence on the political affairs of California in the 19th century led to the sale of lands to non-Hispanics by the early 1830s.

The land south of Sacramento, by 1850, was dominated by Mariposa County, encompassing 30,000-square miles and all of present-day Merced, Madera, Fresno, Kings, Tulare, and Kern Counties. The statewide trends toward greater secularization and Gold-Rush inspired settlement were also a boon for Mariposa County. Present-day Merced County would be organized in 1855. Gabriel Moraga's 1806 expedition originally passed through the county and named the Merced River (*El Rio de Nuestra Senora de la Merced*); later, trappers and explorers, such as John C. Fremont and Jedediah Strong Smith passed through (Marschner, 2000).

The majority of Merced County was settled within three ranchos: *Rancho San Luis Gonzaga, Rancho Panocha de San Juan y Los Carrisalitos,* and *Rancho Sanjon de Santa Rita.* The largest and most interesting is *Rancho San Luis Gonzaga,* which was owned by Juan Perez Pacheco and extended into Santa Clara County. A well-worn trail used by the Yokuts in their trade with coastal Indians served as the main trail between the San Joaquin Valley and the Santa Clara Valley for miners and cattle ranchers. This trail is known as Pacheco Pass today.

Merced County did not truly grow into the agriculturally dominate county it is today until Henry Miller and the Miller and Lux cattle operations became established in the 1860s.

3.14.4 Existing Cultural Resource Conditions

No archaeological deposits were identified during the site survey. No potentially historic buildings or structures exist within the City's WWTP property or surrounding area.

3.15 Coastal Zone Jurisdiction

The Project is located in the interior of California and is not within the jurisdiction of any federal or state Coastal Zone Management Program.

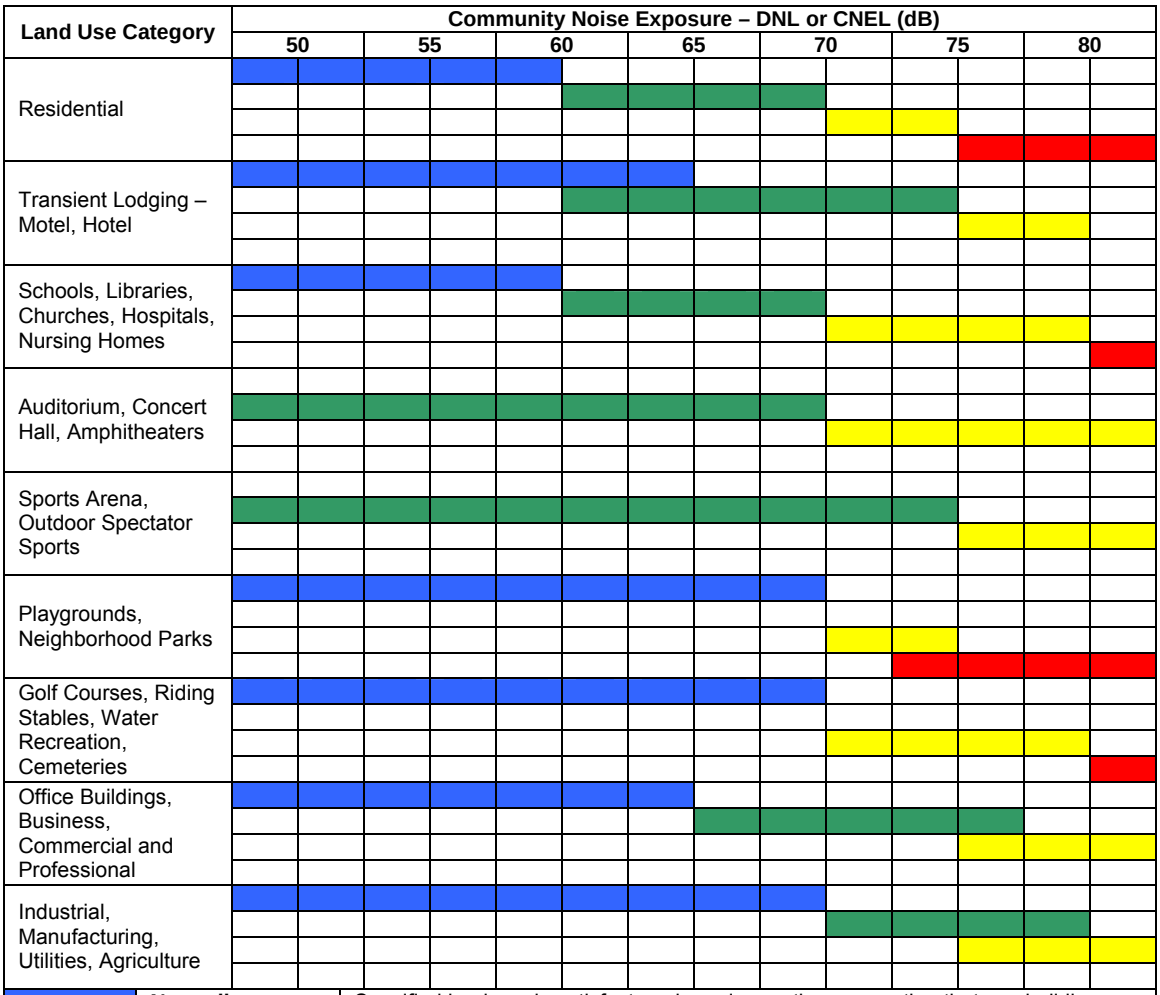
3.16 Floodplain Delineated by FEMA

The Federal Emergency Management Agency designates flood hazard and frequency for cities and counties on its Flood Insurance Rate Maps. Map 06047C042E was developed for the area surrounding the WWTP and indicates that the area is classified as Zone A or areas subject to 100-year flooding (FEMA, 1995). Flood flows would be expected to originate from Hartley Slough, Miles Creek, and Owens Creek. The exception is the WWTP, which is protected by a perimeter levee that rises approximately 6 to 10 feet above the surrounding landscape. The WWTP site is classified as Zone X, which corresponds to areas outside the 100-year floodplain.

3.17 Noise

Noise is defined as unwanted sound. Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) which is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing and 120 to 140 dB corresponding to the threshold of pain.

In practice, the level of a sound source is conveniently measured using a sound level meter that includes an electrical filter corresponding to the A-weighting curve, corresponding to human sensitivity to various sound frequencies. Some representative noise sources and their corresponding A-weighted noise levels (A-weighted decibels [dBA]) are shown on Figure 3-4. All of the noise levels reported herein are A-weighted unless otherwise stated.



	Normally Acceptable	Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
	Conditionally Acceptable	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design.
	Normally Unacceptable	New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirement must be made and needed noise insulation features included in the design.
	Clearly Unacceptable	New construction or development generally should not be undertaken.

SOURCE: City of Merced, 1997

Notes: DNL = 24-hour day and night A-weighed noise exposure level; CNEL = Community Noise Equivalent Level; dB = decibels

Figure 3-4
Land Use Compatibility
for Community Noise Environment

3.17.1 Noise Exposure and Community Noise

An individual's noise exposure is a measure of noise over a period of time. A noise level is a measure of noise at a given instant in time. The noise levels presented in Figure 3-4 are representative of measured noise at a given instant; however, they rarely persist consistently over a long period of time. In comparison, community noise varies continuously over a period of time. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic and atmospheric conditions. What makes community noise constantly variable throughout a day, besides the slowly changing background noise, is the addition of short duration single event noise sources such as aircraft flyovers, vehicle, sirens, etc., which are readily identifiable to the individual. These successive additions of sound to the community noise environment vary the community noise level from instant to instant, requiring the measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are summarized below:

L_{eq}: the equivalent sound level is used to describe noise over a specified period of time, typically one hour, in terms of a single numerical value. The L_{eq} is the constant sound level that would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).

L_{max}: the instantaneous maximum noise level for a specified period of time.

L_{10}: the noise level that is equaled or exceeded 10 percent of the specified time period. The L_{10} is often considered the maximum noise level averaged over the specified time period.

L_{90}: the noise level that is equaled or exceeded 90 percent of the specified time period. The L_{90} is often considered the background noise level averaged over the specified time period.

DNL: 24-hour day and night A-weighed noise exposure level which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night ("penalizing" nighttime noises). Noise between 10 p.m. and 7 a.m. is weighted (penalized) by adding 10 dBA to take into account the greater annoyance of nighttime noise.

CNEL: similar to the DNL, the Community Noise Equivalent Level (CNEL) adds a 5 dBA "penalty" for the evening hours between 7 p.m. and 10 p.m. in addition to a 10 dBA penalty between the hours of 10 p.m. and 7 a.m.

3.17.2 Effects of Noise on People

The effects of noise on people can be placed in three categories:

- Subjective effects of annoyance, nuisance, dissatisfaction;
- Interference with activities such as speech, sleep, learning; and
- Physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists, and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so called "ambient noise" level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur (Caltrans, 1998):

- It is widely accepted that the average healthy ear, however, can barely perceive noise level changes of 3 dBA.

- A change in level of 5 dBA is a readily perceptible increase in noise level.

- A 10 dBA change is recognized as twice as loud as the original source.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. Noise levels are measured on a logarithmic scale, instead of a linear scale. On a logarithmic scale, the sum of two noise sources of equal loudness is 3 dBA greater than the noise generated by just one of the noise sources (e.g., a noise source of 60 dBA plus another noise source of 60 dBA generate a composite noise level of 63 dBA). To apply this formula to a specific noise source, in areas where existing levels are dominated by traffic, a doubling in the volume of the traffic will increase ambient noise levels by 3 dBA. Similarly, a doubling in the use of heavy equipment, such as use of two landfill dozer/compactors where formerly one was used, would also increase ambient noise levels by 3 dBA. A 3 dBA increase is the smallest change in noise level detectable to the average person. A change in ambient sound of 5 dBA can start to create concern among neighbors.

3.17.2 Noise Attenuation

Stationary "point" sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate of 6 dBA to 7.5 dBA per doubling of distance from the source, depending upon environmental conditions (i.e., atmospheric conditions and noise barriers, either vegetative or manufactured). Widely distributed noises, such as a large industrial facility spread over many acres or a street with moving vehicles (a "line" source), would typically attenuate at a

lower rate, approximately 3 to 4.5 dBA per doubling distance from the source (also dependent upon environmental conditions) (Caltrans, 1998). Noise from large construction sites (or a landfill with heavy equipment moving dirt and solid waste daily and trucks entering and exiting the main gate daily-activities similar to construction sites) would have characteristics of both "point" and "line" sources, so attenuation would generally range between 4.5 and 7.5 dBA per doubling of distance.

3.17.3 Local Regulations

In California, local regulation of noise involves implementation of General Plan policies and Noise Ordinance standards. General Plans identify general principles intended to guide and influence development plans. They recognize that different types of land uses have different sensitivities toward to noise; residential areas are considered to be the most sensitive type of land use to noise and industrial/commercial areas the least sensitive. Noise Ordinances set forth the specific standards and procedures for addressing particular noise sources and activities.

City of Merced General Plan

The Noise Element contained in the City's General Plan (City of Merced, 1997) prescribes noise exposure limits for individual land uses with lower noise limits for noise-sensitive land uses. Figure 3-4 includes these community noise exposure limits.

Merced County General Plan

Merced County has established noise compatibility standards for residential land uses in the Noise Element of the *Merced County Year 2000 General Plan* (Merced County, 1990). The General Plan establishes acceptable interior and exterior residential noise levels from roadway, rail, and air traffic and acceptable daytime and nighttime noise levels from other sources (Table 3-10).

TABLE 3-10
MERCED COUNTY GENERAL PLAN
LAND USE COMPATIBILITY STANDARDS FOR RESIDENTIAL LAND USES

Noise Source	Standard	
Traffic on public roadways, railroad line operations, and aircraft in flight	*Exterior* 65 dB Ldn/CNEL	*Interior* 45 dB Ldn/CNEL
Other Sources	*Daytime (7 a.m. – 10 p.m.)* Hourly Leq of 55 dBA and a maximum level of 75 dBA	*Nighttime (10 p.m. – 7 a.m.)* Hourly Leq of 45 dBA and a maximum level of 65 dBA

SOURCE: Merced County, 1990

Merced County Noise Ordinance

The County of Merced has adopted a sound level limitation in Section 10.60.030 of Chapter 10 of the Merced County Code that restricts the sound level when measured at or within the property line of the receiving property (Merced County, 2004) (Table 3-11).

TABLE 3-11
MERCED COUNTY ORDINANCE SOUND LEVEL LIMITATIONS

Residential Property	Non-Residential Property
Daytime (7 a.m. – 10 p.m.) Not to exceed background sound level by 10 dBA *Nighttime (10 p.m .– 7 a.m.)* Not to exceed background sound level by 5 dBA	
If the background sound level cannot be determined: 65 dBA DNL or 75 dBA Lmax	70 dBA DNL or 80 dBA Lmax

SOURCE: Merced County, 2004

This ordinance does not apply to noise from construction activity provided that all construction in or adjacent to urban areas is limited to between 7 a.m. and 6 p.m. and all construction equipment is properly muffled and maintained.

3.17.4 Sensitive Receptors and Existing Noise Environment

Some land uses are considered more sensitive to ambient noise levels than others, due to the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities typically involved. Residences, motels and hotels, schools, libraries, churches, hospitals, and nursing homes generally are more sensitive to noise than are commercial and industrial land uses. Sensitive receptors in the vicinity of the Merced WWTP are scattered along Gove Road and Thornton Road.

The ambient noise environment in the vicinity of the Merced WWTP may be generally characterized as quiet. Existing noise sources in the immediate vicinity of WWTP site are limited to vehicles driving to and from the existing facility and the existing WWTP, operational noise from WWTP equipment, and equipment and vehicles involved in agricultural production on adjacent properties.

In order to characterize ambient noise conditions in the Project vicinity, short-term noise measurements were taken in the Project vicinity. Noise sampling results are presented in Table 3-12.

TABLE 3-12
SOUND LEVEL MEASUREMENTS IN THE VICINITY OF THE PROJECT SITE

Location	Leq (dBA)	Noise Sources
1. Entrance gate to the wastewater treatment plant	45	Vehicle traffic
2. Wastewater treatment plant–50 feet from clarifier	59	Clarifier equipment noise
3. Northeast corner intersection – Hornton Road and Dickenson	65	Traffic noise on Hornton and Dickenson

SOURCE: ESA, 2006

3.18 Visual and Recreation Resources

3.18.1 Visual Resources

The lands surrounding the WWTP site are in agricultural land uses and have been modified for agricultural production. As a result, the terrain is very flat and most native trees and vegetation have been removed. The WWTP site lies to the east of Hartley Slough, a natural waterway that MID operates as a drainage channel. The banks of the slough are vegetated with tall, dry grass and weeds. The surrounding land uses are predominately agriculture and open space, with the exception of a pistol-firing range located at the northwestern section of the City's property. The surrounding rural area contains very few residences or other structures.

Structures at the WWTP site consist of buildings and treatment facilities clustered in the northeast corner of the City's property (Figure 3-5). Other significant features of the site, lying south of the WWTP's structural components, include ponds (i.e., emergency retention pond and sludge drying beds), land application areas for sludge, and wetlands ponds. A small grove of eucalyptus trees stands near the western border of the WWTP site. With the exception of a vacant area in the northwest corner, the rest of the property, including the land application area and ponds, is covered with a variety of low-lying vegetation. Because of the level topography and flat terrain, views from one side of the property to the other are generally unobstructed.

There are no unique visual features in the area or scenic vistas. No roadways are designated as scenic in accordance with existing visual protection programs.

3.18.2 Recreation Resources

The WWTP site is composed of wastewater treatment facilities, storage ponds, and adjacent open space lands. The City has historically allowed public hunters and enthusiasts to enter the WWTP site to access the adjacent Merced Wildlife Management Area (MWMA). Public access is currently restricted to maintain WWTP site security.

View of the WWTP facilities and surrounding lands.

SOURCE: ESA, 2006

City of Merced Wastewater Treatment Plant Improvement Project . 205087

Figure 3-5
Site Photograph

The MWMA lies on 385 acres of native pastureland that had been subject to seasonal flooding from Owens Creek. The City established the MWMA in 1978 to mitigate for the loss of wetland habitat as a consequence of establishing its industrial food wastewater disposal site, which is immediately north of the MWMA. The MWMA is composed of two large enclosed pond features and a small wetland area. Surface waters within the MWMA are maintained through the discharge of 1.2 mgd (or 1,300 acre-feet per year) of treated effluent from the WWTP. The CDFG manages the MWMA. The CDFG reports that, as of November 2000, the MWMA has become outstanding habitat for migratory waterfowl and wetland-associated species and that its construction and operation meets or exceeds the City's mitigation requirements. CDFG regulates and supervises public access to the MWMA. During the hunting season, the CDFG limits public access to around 10 people three days a week. Since 1978, the MWMA has received over 4,000 hunt days.

3.19 Solid Waste and Energy

3.19.1 Solid Waste

Regional Solid Waste Facilities

Two active solid waste landfill facilities are located within the unincorporated areas of Merced County, the Highway 59 Landfill on the north side and the Billy Wright Landfill on the west side of the County. The Highway 59 Landfill is projected to have a remaining useful life, with expansion, of 25 years. The Billy Wright Landfill has, with limited expansion, a 14-year life expectancy. In addition, there is one private disposal facility, the Flintkote County Disposal Site, located at SR 59 and the Merced River. This site is restricted to concrete and earth material disposal.

Onsite Solid Waste Disposal

The current solids treatment and handling facilities include a dissolved air flotation thickener for secondary sludge, primary anaerobic digesters, secondary digester, and earthen solar drying beds. One to three times per year, the solar dried biosolids are land-applied to the City's 580-acre industrial farmland site or hauled offsite to the Forward Landfill in Manteca (ECO:LOGIC, 2005).

3.19.2 Energy

The project area is currently served by MID using a 12.47 kilovolt (KV) service connection. A 1,500 kilowatt backup generator is retained on site in the event of local power outages. The WWTP's electrical system supplies 1,563 kilovolt-ampere (KVA) at 12.47 KV peak running loads.

The expansion will bring an additional 3,812 KVA for a peak 5.37 KVA load. An additional 1,875 KW generator will be need to be installed on-site to provide sufficient backup power for the expanded WWTP (ECO:LOGIC, 2005).

3.20 Traffic and Circulation

The local and regional roadways in the vicinity of the WWTP are described in the following discussion.

3.20.1 Regional Highways and Roadways

SR 99 is the primary regional transportation facility in the Merced area. SR 99 provides access to Sacramento to the north and Fresno and Bakersfield to the south. Through Merced, SR 99 is a four-lane freeway, with an average traffic volume in the range of 35,000 to 40,000 vehicles per day.

SR 59 is a north-south facility extending from SR 152 (near Los Banos) to Snelling, a community located north of the City of Merced on the Merced River. SR 59 is a two-lane rural highway through Merced, serving between 14,000 and 16,000 vehicles per day. SR 59 is located about 3.5 miles east of the WWTP. SR 59 is a significant interregional route of statewide importance and carries most of the truck-transported agricultural goods produced in or transported through the Merced area. The current biosolids hauling route is depicted in Figure 2-9.

SR 140 is a two-lane, east-west conventional highway providing regional access to Yosemite National Park to the east and extending west past SR 99 and Interstate 5.

The local roadway system consists of roads under the jurisdiction of the City of Merced or Merced County Public Works Department, including Thornton Road, Dickenson Ferry Road, and Gove Road. Thornton and Dickenson Ferry Roads are mainly rural collector/minor arterial roads that are used by mostly agricultural vehicles traveling to or from SR 59 and SR 140. Gove Road is a local road used by WWTP staff and the residents who live along its route.

3.20.2 Level of Service

Level of service (LOS) is a general measure of traffic operating conditions whereby a letter grade, from A (the best) to F (the worst), is assigned. These grades represent the perspective of drivers and are an indication of the comfort and convenience associated with driving. The LOS grades, as contained in the Transportation Research Board's (TRB) 1985 Highway Capacity Manual. , are generally defined as follows:

- LOS A represents free-flow travel with an excellent level of comfort and convenience and the freedom to maneuver.
- LOS B has stable operating conditions, but the presence of other road users causes a noticeable, though slight, reduction in comfort, convenience, and maneuvering freedom.
- LOS C has stable operating conditions, but the operation of individual users is significantly affected by the interaction with others in the traffic stream.

- LOS D represents high-density, but stable flow. Users experience severe restriction in speed and freedom to maneuver, with poor levels of comfort and convenience.

- LOS E represents operating conditions at or near capacity. Speeds are reduced to a low but relatively uniform value. Freedom to maneuver is difficult with users experiencing frustration and poor comfort and convenience. Unstable operation is frequent, and minor disturbances in traffic flow can cause breakdown conditions.

- LOS F is used to define forced or breakdown conditions. This condition exists wherever the volume of traffic exceeds the capacity of the roadway. Long queues can form behind these bottleneck points with queued traffic traveling in a stop-and-go fashion.

The level of service on highways is derived from the traffic speed and the rate of vehicular flow, taking into account variables such as annual average daily traffic, roadway capacity, grade, environment (urban versus rural), and other considerations as appropriate. Caltrans' goal is an LOS C on rural state highways and an LOS D on urban state highways. The MCAG's goal is LOS D on all regional highways.

The LOS standard in the current Merced County General Plan is LOS C or better for all roadways. Merced County uses the criteria established in the current edition of the *Highway Capacity Manual* published by the Transportation Research Board to evaluate level of service. Several cities in the county also have LOS C as a standard for all of the roadways.

3.20.3 Roadway Traffic Conditions

The three principal state routes in the Project area presently operate at acceptable service levels of LOS C or better. SR 99 operates mostly at LOS B through the study area, except between SR 140 and SR 59, where it operates at LOS C (MCAG, 2004). These highways and their average daily trips (ADTs) are provided in Table 3-13.

TABLE 3-13
AVERAGE DAILY TRAFFIC IN PROJECT VICINITY

Roadway	Average Daily Traffic
SR 59 (Mission Avenue to SR 99)	8,500 – 14,200
SR 99 (Madera County line to SR 140)	37,000 – 39,500
SR 99 (SR 140 to Atwater Blvd)	49,000 – 55,000
SR 140 (Kniebes Road [Gustine] to SR 99 in Merced)	3,400 – 5,400

SOURCE: MCAG RTP, 2004

Almost all major arterials in the study area currently operate at LOS C or better (City of Merced, 1997). The number of average daily trips for Dickenson Ferry Road, Thornton Road, and Gove Road is not available. However, due to their roadway designations by the County and other regulatory agencies, ADTs for these roadways have been estimated. The capacity of extended lengths of a two-lane arterial under base conditions is 3,200 passenger cars per hour (pc/h), total,

both directions. The capacity of a single direction of a two-lane arterial is 1,700 pc/h (Mannering, et al., 2004). The County estimates that typical traffic volumes on a major collector roadway are anywhere from 3,800 to 20,000 ADT and that typical traffic volumes on local roads are anywhere from 0 to 3,000 ADT. Therefore, it can be assumed that Dickenson Ferry Road, Thornton Road, and Gove Road contain traffic volumes consistent with these volumes.

3.21 Public Health and Safety

3.21.1 Hazardous Materials

A material is considered hazardous if it appears on a list of hazardous materials prepared by a federal, state, or local agency, or if it has characteristics defined as hazardous by such an agency. Numerous materials used in business, commerce, manufacturing, and households are considered hazardous because of their chemical and physical properties. The California Code of Regulations (CCR) defines a hazardous material as a substance that, because of physical or chemical properties, quantity, concentration, or other characteristics, may either (1) cause an increase in mortality or an increase in serious, irreversible, or incapacitating, illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed of, or otherwise managed (22 CCR 66260.10).

Hazardous wastes are defined in the same manner. Hazardous wastes are hazardous materials that no longer have practical use, such as substances that have been discarded, discharged, spilled, contaminated, or are being stored prior to proper disposal. According to Title 22 of the CCR, hazardous materials and hazardous wastes are classified according to four properties: toxic, ignitable, corrosive, and reactive (CCR, Title 22, Chapter 11, Article 3). Toxicity, ignitability, corrosivity, and reactivity are defined in the 22 CCR 66261.20–24, as summarized below:

- Toxic substances may cause short-term or long-lasting health effects, ranging from temporary effects to permanent disability, or death. For example, toxic substances can cause disorientation, acute allergic reactions, asphyxiation, skin irritation, or other adverse health effects if human exposure exceeds certain levels that depend on the substances in question. Carcinogens (substances known to cause cancer) are a special class of toxic substances (examples of toxic substances include pesticides, heavy metal ions, etc.).

- Acute and chronic are terms most often used to describe toxicity. Acute toxicity is an adverse effect expressed by, or mortality of, an organism after the brief exposure to a chemical agent (Hodgson and Levi, 1987) (chemical agent, toxic substance, and toxic material are terms often used interchangeably). A substance is designated hazardous because of its hazardous properties. A chemical agent can either be hazardous or non-hazardous. For example, a chemical agent such as water is typically considered non-hazardous. The brief exposure can either be a single dosage or exposure over a short period of time. An acute toxic response is one that generally occurs shortly after exposure to a chemical agent, usually less than two weeks (Hodgson and Levi, 1987). Chronic toxicity is an expression of an adverse effect manifested over a long time period (oftentimes the life span of the exposed organism or individual) of uptake of small quantities of a chemical agent. The dose is small enough that acute effects are

not expressed. Toxic responses associated with chronic toxicity range from carcinogenesis (cancer) to behavioral changes (Hodgson and Levi, 1987).

- Ignitable substances are hazardous because of their ability to burn. (Gasoline and methane gases are examples of ignitable substances.)

- Corrosive materials can cause severe burns or damage materials. (Examples include chlorine gas, sulfur dioxide gas, strong acids, and strong bases.)

- Reactive materials may cause explosions or generate toxic gases. (Dynamite and pressurized gases are examples of reactive materials.)

Toxic, ignitable, corrosive, and reactive materials are types of hazardous materials. A chemical that poses a significant hazard upon a single exposure is considered acutely hazardous if it is so designated by a regulatory agency (California Health and Safety Code, Section 25531). A hazardous waste is any hazardous material that is discarded, abandoned, or to be recycled. The criteria that render a material hazardous also make a waste hazardous (California Health and Safety Code, Section 25117).

Factors that influence the health effects of exposure to hazardous material include the dose to which the person is exposed, the frequency of exposure, the exposure pathway, and individual susceptibility.

Hazardous materials stored at the WWTP are described in Table 3-14. The hazards potentially associated with these materials include fire, explosion, and acute toxic effects from an accidental release to the air of chlorine or sulfur dioxide gas. Information of the location, type, quantity stored, and health risks of hazardous materials is presented in the Business Plan for the WWTP that was prepared in accordance with Section 25500 *et seq.* of the California Health and Safety Code. This information is made available to firefighters, health officials, public safety officers, regulatory agencies, planners, and other interested individuals to prevent or mitigate health and safety risks to individuals and the environment from the release or threatened release of hazardous materials.

Chlorine

Chlorine, a greenish-yellow gas with an irritating odor, is a potent irritant of the eyes, mucous membranes, and skin. Exposure to low levels in the air can cause mild irritation of mucous membranes and eyes. Progressively higher concentrations produce throat irritation and cough. High concentrations in the air, up to 1,000 parts per million (ppm), are fatal after a few breaths. Acute, nonfatal exposures are also associated with long-term pulmonary injury (Hathaway et al., 1991). Chlorine is shipped and stored as a liquefied gas under pressure in steel cylinders, ton containers, tank trucks, or railroad tank cars. Chlorine is stored in 2,000-pound (lb) containers at the plant's open-air chemical storage building. New containers are delivered to the plant by flatbed truck and placed into the building using an overhead hoist. The plant currently has two 2,000-lb/day chlorinators for the disinfection of wastewater. A leak of liquid chlorine resulting from damage to a container during the transfer of new chlorine containers to the chemical storage building presents the most risk from a sudden release of chlorine into the air.

TABLE 3-14
HAZARDOUS MATERIALS STORED AT THE MERCED WASTEWATER TREATMENT PLANT

Material	Average Daily Amount	Location	Form of Material
Chlorine		Chlorination Building	Compressed gas
Sulfur dioxide		Chlorination Building	Compressed gas
Carbon dioxide	0.4 cubic feet	Maintenance Building/Electricians Bench north end	Compressed gas
Helium		Laboratory	Compressed gas
Hydrogen		Laboratory	Compressed gas
Unleaded gasoline	530 gallons	Aboveground storage tank south end of Maintenance Building	Hydrocarbon fuel
No. 2 diesel	3500 gallons	Aboveground storage tanks north side of Electricians Building & north side of Digester Building, portable fuel tank land application	Hydrocarbon fuel
Stoddard solvent		Flammables room, north end of Maintenance Building	Hydrocarbon solvent
Calcium thiosulfate solution	200 gallons	North side of Secondary Clarifier #1	Liquid
Chevron Delo 400 motor oil	55 gallons	Flammables room north end of Maintenance Building	Liquid
Chevron GST oil 68	40 gallons	Flammables room north end of Maintenance Building	Liquid
Chevron NL gear compound 220	5 gallons	Flammables room north end of Maintenance Building	Liquid
Mobil DTE oil AA	75 gallons	Flammables room north end of Maintenance Building	Liquid
Super HD motor oil SF-CD	220 gallons	Flammables room north end of Maintenance Building	Liquid
Digester gas	50,000 cubic feet	Primary, Secondary and abandoned digester & evacuator	Compressed gas
Sodium hypochlorite	700 gallons	South end of Secondary Clarifier	Liquid
Used motor oil	110 gallons	Breezeway enclosure, south end of Maintenance Building	Mineral oil-based lubricants

Sulfur Dioxide

Sulfur dioxide is a colorless gas that is severely irritating to the eyes, mucous membranes, and skin. Exposure to sulfur dioxide primarily produces effects in the upper respiratory tract, causing irritation to the eyes, nose and throat, nasal discharge, choking and coughing, and resistance to breathing. Sulfur dioxide is stored and shipped as a liquefied gas in ton containers, cylinders, or railroad tank cars (Compressed Gas Association, 1990). Sulfur dioxide is stored at the plant's chemical storage building in 2,000-pound (ton) containers. New containers are delivered to the plant via flatbed truck and placed into the building using an overhead hoist. The plant currently has a single 1,900-lb/day sulfonator for the dechlorination of disinfected wastewater. As with chlorine, the transfer of new sulfur dioxide containers to the chemical storage building poses the greatest risk of a sudden release of sulfur dioxide into the air.

Petroleum Hydrocarbon Fuels, Solvents, and Lubricants

Petroleum hydrocarbon fuels at the plant are unleaded gasoline and No. 2 diesel fuel which are stored in underground tanks. A small quantity of Stoddard solvent is stored at the plant for use as a cleaning solvent. Several types of petroleum hydrocarbon lubricants are also used at the plant; however, these all are mineral oil-based and are discussed as a group.

Gasoline, a clear, volatile liquid with an aromatic odor, is an irritant to the eyes and mucous membranes, and a central nervous system depressant. Long-term exposure has produced and increased incidence of kidney lesions, including tumors, in male rats but not in females or other species of laboratory animals. No. 2 diesel is a colorless to brown liquid with a kerosene-like odor. Diesel is also a central nervous system depressant. Chronic dermal exposure may also result in dermatitis, erythema (reddening of the skin), and eczematous lesions (USAF, 1990). Stoddard solvent is a colorless, aromatic liquid used as a degreaser and paint thinner. It is a mild central nervous system depressant and mucous membrane irritant. Mineral oil-based lubricants currently in use generally are of low toxicity. The principal adverse effect is oil acne resulting from repeated dermal exposures (USAF, 1990). The principal risks associated with these substances are fire and explosion hazards from gasoline leaks during fueling operations and contamination of groundwater used as a drinking water supply via leaks from underground storage tanks.

Digester Gas

Digester gas is produced from the anaerobic digestion of sewage sludge, and consists of 65 percent methane, 30 percent carbon dioxide, and 5 percent hydrogen sulfide. The digester gas system consists of the gas handling and safety equipment, hot water boiler, engine, generator, gas holding cover on the secondary digester, and gas mixing equipment. The digester gas is used to heat the secondary digester. Fire and explosion hazards are the potential risks associated with the release of methane. Hydrogen sulfide is a gas with characteristic “rotten egg” odor detectable at very low concentrations in air. Hydrogen sulfide is hazardous at concentrations exceeding 150 parts per million (ppm) in air due to olfactory fatigue (the odor cannot be detected at higher concentrations in air). Prolonged exposure to concentrations of 250 ppm in air is associated with pulmonary edema. A concentration of 1,000 ppm can be rapidly fatal due to respiratory arrest. The principal risks associated with accidental releases of digester gas are fire and explosion (methane) and overexposure to hydrogen sulfide, particularly if confined space entry is performed to make repairs.

Laboratory Gases (Carbon Dioxide, Helium, and Hydrogen)

Carbon dioxide, helium and hydrogen, stored in compressed gas cylinders, are used in the operation of analytical instruments in the laboratory. Carbon dioxide and helium are asphyxiates that displace atmospheric oxygen if released into poorly ventilated or unventilated spaces in high concentrations. Hydrogen gas represents a fire and explosion hazard. Standard techniques developed for the handling of compressed gas cylinders reduce the hazards associated with these gases.

Hazard Prevention and Mitigation

The current procedures for preventing or mitigating public health impacts associated with releases of hazardous materials are discussed in the WWTP Business Plan. These procedures include:

- Notification in the event of an emergency. This identifies plant personnel as contact persons and describes procedures for contacting responsible agencies. Merced County is on the 911 system.

- Emergency response. This describes evacuation procedures and identifies evacuation routes.

- Medical assistance plan. This identifies the locations of emergency phone numbers and describes procedures for transporting injured individuals to emergency care.

- Mitigation procedures. This includes cleanup of spills of petroleum products, and procedures for managing releases of digester gas, and releases of compressed gases.

- Spill prevention procedures. This includes monitoring of the liquid levels in underground tanks, use of chlorine leak detectors and flammable gas meters, specifies daily inspection of chlorine storage and digester areas and describes handling procedures for steel drums and compressed gas cylinders.

- Abatement plant. This describes procedures for spill control, identifies that a repair kit and self-contained breathing apparatus sets (SCBA) are available on site, specifies the capability of the maintenance crew to repair digester gas piping, and identifies the location of fire extinguishers.

- Employee certification and training. New employee training includes training in the handling of hazardous materials, emergency medical procedures and use of fire extinguishers. New employees are issued a safety manual for the WWTP. Refresher training includes weekly safety meetings, monthly training in use of SCBAs, and practice in repair of a ton container, performed quarterly. Specialized training in handling chlorine, confined space entry, and CPR is provided through the California Water Pollution Control Association.

Fire protection and hazardous materials response are provided primarily by the City of Merced Fire Department. The closest fire station is located 2.5 miles from the plant, providing a 4- to 6-minute response time. The Business Plan identifies the location of hydrants at the plant. In the event of a serious emergency, such as a rupture of a ton container of chlorine, 911 would be used to activate the emergency response system. Responding agencies in such an event would include the State Office of Emergency Services, the Merced County Health Department, the Highway Patrol, and the chlorine supplier (All-Pure Chemical, Tracy, CA). The Business Plan concludes that because of the distance of the facility from SR 59 and the prevailing wind direction (northwest to southeast), residents and roadways in the vicinity of the plant are unlikely to be threatened in the event of a chlorine or sulfur dioxide leak. However, should an emergency occur during a southerly wind pattern, plant operating personnel will provide first-line evacuation notice to residents on Gove and Dickenson Ferry Roads (City of Merced, 2004). A wind sock mounted on the north wall of the chlorine building is used to observe wind direction.

Hazard, Risk, and Exposure

Under the framework of hazardous materials and associated potential impacts to public health and safety, a hazardous material would have an inherent toxicological risk. A toxicological risk is a probabilistic measure that some adverse effect (chronic or acute) would result from a given exposure to a chemical agent. Toxicological risk is a probability or an estimated frequency of occurrence that an adverse effect would be experienced. For instance, a lifetime risk of cancer of 1.0×10^{-6} (or one in one million) is simply a statement of probability. It should not be interpreted to mean one individual in one million individuals would contract cancer; simply the probability for a single exposed individual is 1.0×10^{-6}.

A hazard describes a potential adverse effect or effects of a given chemical agent (e.g., cancer). A statement of toxicological risk, therefore, is presented in terms of a probability that an adverse effect or outcome inherent to a given chemical agent would occur as a consequence of a given unit of exposure (Amdur et al., 1991).

The means by which an individual is exposed to a chemical agent is classically defined through the four basic exposure pathways: inhalation, ingestion, bodily contact, and injection. These pathways are further defined below.

- Inhalation (breathing the hazardous agent) is the primary route of exposure for toxic fumes or vapors and is the primary exposure pathway at a distance from the source.
- Ingestion (swallowing the hazardous agent) is the primary route of exposure for contaminated food or water.
- Direct bodily contact (exposure to a hazardous agent through a splash or touching) requires immediate proximity to the hazardous agent. Direct bodily contact with hazardous fumes or vapors can also occur over a distance.
- Injection (exposure to a hazardous agent through the skin via a puncture from a needle or contaminated object) requires immediate proximity to the hazardous agent and usually occurs from improper handling or improper packing of hazardous agents.

The pathway by which an individual is exposed to a specific chemical agent can have a major effect on risk. For instance, a chemical agent may be toxic when ingested, but not when touched.