3.3 WATER RESOURCES

This section addresses the existing water resources of the Madera County region, the Madera site and the North Fork site. Issues discussed in this section include a description of associated watersheds, existing runoff from the Madera and North Fork sites, the potential for flooding, and a characterization of surface and groundwater features and quality. Other sections of this document also address water resources. **Section 3.5** *Biological Resources* provides a detailed characterization and map of the streams and wetlands on the Madera and North Fork sites. **Section 3.9** *Public Services* describes the water supply for the City of Madera and groundwater wells on and near the Madera and North Fork sites. **Section 3.9** also provides details on existing water supply facilities, and regulatory requirements for wastewater treatment and disposal.

3.3.1 SURFACE WATER, DRAINAGE, AND FLOODING

REGIONAL SETTING

The topography of Madera County is composed of flat to moderately sloped alluvial fans and plains. Precipitation varies from year to year, but averages 11 to 12 inches annually. Most precipitation falls as rain in the winter, with a 25 year, 24 hour precipitation rainfall event of about 2.1 inches [Western Regional Climate Center (WRCC), 2005a] and a 100 year, 24 hour precipitation rainfall event of about 2.4 inches (WRCC, 2005b). The annual average evapotranspiration in the Madera region is 57.9 inches, with the highest evapotranspiration rates occurring during the summer months. Stream flow is dominated by precipitation and snowmelt in the Sierra Nevada. Dams and reservoirs regulate major streams and rivers, and water is diverted for irrigation.

Regionally, Madera County is located entirely within the San Joaquin River Hydrological Drainage Basin, the boundaries of which are formed by the ridgelines of the Sierra Nevada, the Tehachapi, and the Coast Ranges. The San Joaquin Drainage Basin covers an area over 10 million acres and includes all tributary watersheds for the San Joaquin River and the Delta south of the Sacramento River. Principal streams and larger tributaries in Madera County are the San Joaquin, Fresno, and Chowchilla Rivers. Runoff from the City of Madera is drained from east to west by several small rivers and streams, which are tributaries to Dry Creek. Dry Creek flows west from the City of Madera where it drains into the Fresno River and the Chowchilla River from the North. These rivers run parallel to each other and flow westward into the San Joaquin River. The San Joaquin River originates in the Sierra Nevada at an elevation over 10,000 feet above mean sea level (amsl) and enters the San Joaquin Valley near Friant. Below Friant Dam, the river flows west to the center of the valley, turns sharply north at Mendota Pool and flows through the valley to the Delta. Along the valley floor, the San Joaquin River receives flow from

the Merced, Tuolomne, and Stanislaus rivers, and from smaller tributaries draining the east and west sides of the valley.

Madera County has experienced flooding on an average of every nine years since 1861; however, the construction of Hidden and Buchanan Dams in 1975 eliminated major flood concerns in the County. Flooding in Madera County can occur as a result of heavy rains, dam failure, excessive snowmelt and runoff, levee failure, and localized drainage problems. Principal flood problems, as identified in a Flood Insurance Study completed by the Federal Emergency Management Agency (FEMA) in 1987, lie along Cottonwood, Root, Dry, and Schmidt Creeks, and the Schmidt Creek Tributary (Madera County, 1995b). All have perennial flow, and all of the channels are poorly defined and subject to flooding. The most recent flooding occurred in January of 1993, in which parts of Madera County experienced flooding and soil erosion along the Fresno River and its tributaries. The construction of Buchanan, Hidden, and Friant dams, as well as levee improvements along the sloughs and rivers, have eliminated major flooding problems along the San Joaquin, Fresno, and Chowchilla Rivers.

MADERA SITE

Watershed

The Madera site lies within the Middle San Joaquin-Lower Chowchilla River Basin [United States Geologic Survey (USGS) Hydrologic Unit Catalog (HUC) No. 18040001], which includes the lower portions of the Chowchilla and Fresno Rivers (**Figure 3.3-1**). The Madera site lies approximately 2.25 miles north of the Fresno River, and less than 0.25 mile south of Dry Creek. Schmidt Creek is an ephemeral stream, flowing onto the Madera site along its eastern boundary. This stream is now channelized across the Madera site. Airport Ditch, a canal operated by Madera Irrigation District, runs along the western site boundary.

Drainage

The existing topography of the Madera site is relatively flat. The site slopes from its easterly boundary to Road 23 passing through the property at an average slope of 0.1 percent. Schmidt Creek flows westerly through the site from State Highway 99 to Road 23 and into Dry Creek. Existing storm runoff from the site sheet flows into tributary ditches of Schmidt Creek then to Dry Creek, then to the Fresno River. Schmidt Creek Ditch is a realigned channel of Schmidt Creek that was historically within a shallow swale of the site and flowed to the west according to the USGS "Kismet, CA" 7.5 Minute Topographic Quadrangle map. An irrigation canal (Airport Ditch) parallels Road 23 along the western edge of the property; however, it is not hydrologically connected with the Schmidt Creek Ditch (H. T. Harvey & Associates, 2004; **Appendix K**).

Figure 3.3-1: Fresno River Watershed Map

Floodplain

Schmidt Creek is the nearest water body that may cause potential flooding problems on the Madera site. The Madera site is currently situated within the boundaries of a delineated special flood hazard inundation zone as shown on the FEMA Flood Insurance Rate Maps (FIRM), panel numbers 0601700605B and 0601700600B (FEMA, 1987). The specific inundation zone is "Zone AO," which represents an area of "100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet." In addition, oral interviews with the current land tenant who has lived on site for 10 years indicates that the Madera site floods often during the winter months (Flower, pers. communication, 2005). **Figure 3.3-2** depicts the delineated 100-year floodplain boundary in relationship to the Madera site.

Average flood depths for the Madera site are one foot, which are derived from the detailed hydraulic analyses shown within the flood zone map (Komex, 2005). Floodwaters on site progress from east to west as a result of excess runoff associated with Dry Creek and Schmidt Creek. The average floodplain width in proximity to the Madera site is about 11,100 feet (2± miles), and the overall terrain slope is mild from east to west. A small linear area along the eastern edge of the property boundary adjacent to Highway 99 is designated as Zone X, which is determined to be outside the 100-year and 500-year floodplains. Aside from this zone, the remaining area of the Madera site is designated as flood Zone AO, as described above.

NORTH FORK SITE

Watershed

Locally, the North Fork site lies within the Upper San Joaquin Watershed Sub-basin (USGS HUC No. 18040006) (**Figure 3.3-3**), which includes the Middle, North, and South Forks of the San Joaquin River. A tributary stream to Whisky Creek flows across the eastern part of the North Fork site. Another stream, tributary to Willow Creek, originates near the southwestern corner of the property. Whisky Creek is located about 400± feet from the southeast corner of the property at the most adjacent location (**Figure 1-5**).

Drainage

The North Fork site occupies wooded, south-facing slopes of the Sierra foothills, ranging in elevation from approximately 2,920 feet amsl in the southwest, to approximately 3,480 portion of the property to the eastern portion of the property. The site accepts runoff from the property east of Mission Drive and runoff sheet flows to the westerly property line into Whisky Creek. Whisky Creek flows south from the North Fork site into Willow Creek, which is a tributary of the San Joaquin River.

***I*nsert Figure 3.3-2: Madera Site FEMA Flood Zone Map**

Figure 3.3-3: Upper San Joaquin Watershed Map

Floodplain

Whiskey Creek is the nearest water body that may cause potential flooding problems on the North Fork site. Based on the FIRM, panel number 0601700375B prepared by FEMA, the entire site is contained within Zone D, which is the flood insurance rate zone that corresponds to "an area of undetermined but possible flood hazards." Based on the topography (**Figure 1-5**) and the relatively low flow of streams crossing the North Fork site, flooding is unlikely to occur, except in areas immediately adjacent to streambeds. In those adjacent areas, flooding is likely to be minor and temporary, possibly occurring during heavy storm events.

3.3.2 GROUNDWATER

REGIONAL SETTING

Groundwater is the water occurring beneath the earth's surface that completely fills (saturates) the void space of rocks or sediment. Given that all rock has some open space (voids), groundwater can be found underlying nearly any location. In the San Joaquin Valley of western Madera County, potable groundwater occurs mainly in the unconsolidated alluvial deposits of Pleistocene and Holocene age [California Department of Water Resources (CDWR), 2004]. In the foothills to the east, groundwater occurs predominantly in fractured bedrock, but also in gravel- and silt-filled stream courses and meadows (Komex, 2005).

The Madera Sub-basin No. 5-22.06 of the larger San Joaquin River Hydrologic Unit underlies both the Madera site and the North Fork site. According to California's Groundwater Bulletin 118, the Madera Sub-basin (the Sub-basin) contains no apparent groundwater barriers (CDWR, 2004). The Sub-basin consists of lands overlying the alluvium in Madera County. Although younger alluvium and flood-basin deposits yield small quantities of water to wells, the most important aquifer in the area is the older alluvium, which consists mostly of intercalated lenses of clay, silt, sand, and some gravel. The estimated average specific yield of the groundwater Sub-basin is 10.4 percent (CDWR, 2004).

Ground surface elevations in Madera County range from less than 300 feet amsl in the west to over 13,000 feet amsl in the east. Groundwater flow is generally southwestward in the eastern part of the Sub-basin and to the northwest in the southern portion, away from the recharge area along the San Joaquin River. On average, the sub-basin water level has declined nearly 40 feet from 1970 through 2000 (CDWR, 2004). According to calculations using an estimated specific yield of 10.4 percent and water levels collected by the CDWR, the total storage capacity of the Sub-basin is estimated to be 18,500,000 acre feet (af) to a depth of 300 feet and 40,900,000 af to the base of fresh groundwater.

MADERA SITE

The Madera site lies within the Madera Sub-basin of the San Joaquin Valley Groundwater Basin. Water-bearing units in the Madera Sub-basin comprise unconsolidated deposits of Pleistocene and Holocene age (CDWR, 2004). Borehole logs drilled near to the Madera site, obtained from CDWR, indicate alternating sandy and clayey layers to at least 700 feet below ground surface (bgs) with the sandier horizons generally accounting for between 25 percent and 40 percent of the total thickness (Komex, 2005). These drillings indicate the Madera site overlies the Older Alluvium aquifer found within Madera County (Komex, 2005). According to Komex (2005), an important regional aquitard, the E-clay or Corcoran Clay, is not thought to be present beneath the Madera site; its eastern boundary lies about 4 miles to the southwest.

On-Site Groundwater Wells

One active agricultural well exists on the property. Komex attempted to measure the depth to groundwater, but an obstruction was met before groundwater was reached on each occasion. In lieu of direct measurements, maps produced by CDWR were used to approximate groundwater elevation levels as interpreted from spring measurements in designated wells. CDWR interpretations based on records for nearby wells exhibit an overall decline in groundwater levels of approximately 80 feet between 1958 and 2003, with the current groundwater level interpolated to be about 145 feet bgs (**Appendix L**). The dominant influence on groundwater flow direction in the area over the last 15 years appears to be a pumping depression located northwest of the Madera site, beneath an area approximately half way between the Cities of Madera and Chowchilla (Komex, 2005). Comparison of local well hydrographs, precipitation records and reservoir storage data shows short-term correlations between rainfall amount/storage and groundwater levels, but also a long-term decline in groundwater levels that is independent of climatic factors (**Appendix L**).

Municipal Water Supply

Currently, no municipal water supply exists at the Madera site. The City of Madera uses groundwater as its municipal supply and is regulated by the City's Public Works Department. Municipal Well Number 26 is located about one mile south of the Madera site at the intersection of Airport Drive and Aviation Drive. This well is approximately 600 feet deep and has a capacity of approximately 1,300 gpm. Municipal Well Number 25 is also located about 1.5 miles southeast of the Madera site, and is approximately 500 feet deep with a capacity of approximately 2,200 gpm. According to the *City of Madera Comprehensive General Plan and Environmental Impact Report*, the groundwater level has been dropping in the region; however, the City has not experienced any significant problems with supply or quality (City of Madera, 1992). Accordingly, the City plans to use groundwater to serve future development. Unincorporated areas generally rely on individual wells, but some are linked to the City's water system. New development in the State Center Community College Area is proposed to hook up to the City's

water and sewer systems. The Fresno River runs through the center of Madera, but is not used for domestic water supply.

The Madera site is also located within the Madera Irrigation District (MID), which is one of four irrigation districts that manage surface water supply for agricultural irrigation in Madera County. The MID is the main water supplier in the County, covering the most acreage and managing the Madera Canal (located east of the Madera site) for the United States Army Corps of Engineers (USACE). A MID water supply ditch is located along the western border of the Madera site and the nearest public residential water supply lines are located about ½ mile south of the property along Airport Drive. The majority of the Madera site is classified by MID as capable of receiving irrigation water from the MID ditch; however, the existing owner of the property utilizes private groundwater wells for water supply and is currently not under contract to receive MID water.

NORTH FORK SITE

The North Fork site overlies granitic basement rocks, within which groundwater is present in fractures. Little information is available on groundwater occurrence, levels, flow, or storage; however, groundwater is widely used for domestic supply in the area, with wells reportedly achieving yields of between 10 and 240 gallons per minute (gpm).

On-Site Groundwater Wells

Domestic water supply is currently provided by four active wells located at private residences. The water level in one of these wells was measured at approximately 60 feet below ground surface (bgs) on April 13, 2005 (Komex, 2005, **Appendix L**). The depth of the wells was not determined, but the yield of the well was estimated to be less than 10 gallons per minute (gpm). Several springs were also reportedly located near the residences and had historically been developed for water supply; however, the capacities of these springs are not known. Anecdotal evidence from current residents and other local residents suggests that a number of springs and wells exist on land allotments adjacent to the North Fork site. One of these wells was reportedly drilled to 400 feet bgs, and yielded 55 gpm at the time of installation. Another well reportedly tested at 100 gpm, with no measurable drawdown. Other wells are reported to have been drilled to at least 700 feet bgs.

Based on a study conducted by Madera County in 2002, the median well yield of 1,492 well log records in the foothills region of eastern Madera County is 8.5 gpm and average well yield is 22 gpm (HydroScience Engineers, 2006). These well yields are based on drillers' airlift tests, so actual production may be lower. According to the property owner on the North Ranch Property, the four wells on the North Fork site are not drilled as deep as the City wells located near the Madera site; however, water production from each well is strong, with capacities ranging from 332 to 783 gpm (AES, 2004). Overall water balance and current water demands in the foothill

region suggest that a sufficient quantity of water is available on a regional basis to meet current demands and support some future development (City of Madera, 1992; Madera County, 1995b). Therefore, groundwater appears to be plentiful in the area of the North Fork site.

Municipal Water Supply

Currently there is no municipal water supply at the North Fork site. The North Fork Maintenance District 8A supplies water to the Town of North Fork, which is located approximately 5 miles west of the site. The water system has one 520-feet deep groundwater well, pumping 240 gpm into a 200,000-gallon storage tank. In 2002, water shortages had not been reported as an issue for this district (Komex, 2005). An additional existing well is currently inactive but available for future use.

Cascadel Water Company additionally supplies a community located about 4,000 feet northeast of the North Fork site. Water has been supplied from a spring and three wells. Wells 1 (525 feet deep) and 1A (650 feet deep) produce 57 gpm combined, and Well 2 (600 feet deep) produces 25 gpm (Cascadel Water Company, 2005).

3.3.3 WATER QUALITY

REGULATORY SETTING

In 1972, Congress passed the Federal Clean Water Act, which sets forth national goals for the quality of surface waters, applying to both point and non-point sources of pollution (33 USC Sections 402 and 319 respectively). These goals include maintaining waters safe for fishing and swimming, eliminating harmful discharges of pollution, and the protection of the nation's wetlands. The Clean Water Act also requires states to establish beneficial uses and set water quality standards for all contaminants in the surface waters and to review and update them on a triennial basis (Section 303(c)).

As a result of the 1987 Clean Water Act amendments, the USEPA established the National Pollutant Discharge Elimination System (NPDES), pursuant to the Clean Water Act (Sections 1251 to 1387). NPDES is a national program for regulating and administering permits for discharges to receiving waters. In some states, including California, the USEPA has delegated permitting authority to the state water quality management agencies; however, the USEPA continues to regulate discharges originating on Tribal lands into receiving waters. Under the Clean Water Act, Indian Tribes can be treated as states, implying the use of Tribal Government Regulations, for the purpose of NPDES program [33 USC § 1377(e)].

Section 303(d) of the Clean Water Act requires states to periodically prepare a list of all surface waters in the state for which beneficial uses of the water are impaired by pollutants. These are estuaries, lakes, streams, and groundwater basins that fall short of state surface water quality

standards, and are not expected to improve within the next two years. States are also required to establish a priority ranking of these impaired waters for purposes of developing plans that include Total Maximum Daily Loads (TMDLs). A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards and an allocation of that amount to the pollutant's sources. These plans describe how an impaired water body will meet water quality standards through the use of TMDLs.

The State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Board (RWQCB) have adopted a Water Quality Control Plan for the State of California. The purpose is to provide a program of actions designed to preserve and enhance water quality and to protect the water supply for beneficial uses. The SWRCB has primary responsibility for establishing water quality standards in the County. In addition, the California Department of Fish and Game (CDFG) and the County Environmental Health Department have codes and ordinances, which also provide for water quality protection.

While the RWQCB does not have approval authority over the project alternatives, the goals and policies relating to Fresno River, Dry Creek, Schmidt Creek, and its tributaries contained within the Water Quality Control Plan for the Sacramento-San Joaquin Region (Basin Plan) are summarized to characterize the water quality issues in the project area.

Under the mandate of the Safe Drinking Water Act, the USEPA defines National Primary Drinking Water Regulations for groundwater (primary standards). These are legally enforceable standards that apply to public water systems. These standards are established to protect human health by limiting the levels of contaminants in drinking water. The USEPA also defines National Secondary Drinking Water Regulations (secondary standards). These secondary standards are non-enforceable. They regulate contaminants that cause cosmetic effects or aesthetic effects. USEPA recommends these standards to water systems but does not require systems to comply.

Both primary and secondary drinking water standards are defined as either Maximum Contaminant Levels (MCL) which are the highest level allowed in drinking water, or Maximum Contaminant Level Goals (MCLG) which are the level of contaminant below which there is no known or expected risk to health. The 1996 amendments to the Safe Drinking Water Act also require that states complete source water assessments for all public drinking water systems and include MCLs or MCLGs for all potential contaminants. Contaminants that may be present in untreated water include microbial contaminants, inorganic contaminants, pesticides and herbicides, radioactive contaminants, and organic chemical contaminants.

REGIONAL SETTING

Surface water quality in Madera County differs from east to west and from north to south, due to varying degrees of turbidity, color, odor and chemical characteristics. The differences in surface water quality are caused by the climate and the differences in the physical character of the geology in the smaller watersheds. The Sierra Nevada Mountains dispense low amounts of dissolved solids into east side streams and rivers, while the west side streams have a much higher salinity rate due to the sediments that comprise the Diablo Range of the Coastal Mountains. Similarly, the stream flow into the Merced River in the northern part of the County is of very good quality, but gradually decreases south through the Valley due to the inflow of excess irrigation waters.

The majority of the Madera Sub-basin is generally a calcium-sodium bicarbonate type, with sodium bicarbonate and sodium chloride at the western margin of the Sub-basin along the San Joaquin River (CDWR, 2004). The quality of groundwater is determined primarily by salt concentrations, and to a lesser degree by levels of nutrients, pesticides and other contaminants. Low quality groundwater is found throughout much of the San Joaquin Valley Basin with high levels of soil boron and total dissolved solids occurring west of the San Joaquin River. Additionally, concentrations of nitrates and pesticides are generally found in shallow wells northwest of Atwater. Overall groundwater quality is generally similar to surface water quality; it is good to excellent in the high foothill areas and decrease in quality toward the Valley center low areas.

Concentrations of total dissolved solids (TDS) within the Madera Sub-basin are in the 100 to 300 parts per million (ppm) range, but several wells in the Hillview Water Company systems had TDS concentrations that exceeded 10,000 ppm. Although these levels do not present a health concern, a more mineralized taste may result (HydroSceience Engineers, 2005). Some water quality problems do occur in the County systems, including elevated concentrations of total coliform bacteria, gross alpha/uranium, arsenic, iron, and manganese. Although naturally occurring and typically related to the granitic rocks of the Sierra Nevada, elevated concentrations of gross alpha uranium and arsenic have rendered some sources of supply nonpotable. Elevated concentrations of iron and manganese seem to correlate to elevated turbidity in the sample and may indicate iron and manganese that are in soil/rock particles in the sample and not actually dissolved in the water (Madera County, 1995b).

MADERA SITE

Surface Water Quality

The Madera site is located within the Middle San Joaquin-Lower Chowchilla Watershed area of the southern portion of the San Joaquin River Basin. The beneficial and potential beneficial uses

of the Fresno River, Chowchilla River, and related tributaries are identified in the Sacramento-San Joaquin Basin Plan as follows:

- Municipal and Domestic Supply
- Agricultural Supply
- Water Contact Recreation
- Non-Contact Recreation
- Warm Freshwater Habitat
- Wildlife Habitat

The water quality objectives for the Sacramento-San Joaquin River Basin inland surface waters, including the Fresno River, are summarized in **Table 3.3-1** below.

Schmidt Creek and Fresno River are not designated as part of the RWQCB's 303(d) listing of impaired water bodies; however, the Fresno River drains into the San Joaquin River, which is listed as an impaired water body. The receiving waters are designated by the RWQCB to have existing beneficial uses as previously described.

TABLE 3.3-1
WATER QUALITY OBJECTIVES FOR INLAND SURFACE WATERS OF THE SACRAMENTO-SAN JOAQUIN RIVER BASIN

Constituent	Water Quality Objective
Bacteria	In waters designated for contact recreation (REC-1) the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed a geometric mean of 200/100 ml, nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 400/100 ml.
Chemical Constituents	Waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. Water designated for use as domestic or municipal (MUN) water supply shall not contain concentration of chemical constituents in excess of the maximum contaminant levels specified in the provisions of Title 22 of the California Code of Regulations. Water designated for use as MUN shall not contain lead in excess of 0.015 mg/l.
Color	Water shall be free of discoloration that causes nuisance or adversely affects beneficial uses.
Dissolved Oxygen	The dissolved oxygen concentrations shall not be reduced below the following minimum levels at any time for the following designated waters: 1. Cold Freshwater Habitat – 5.0 mg/l 2. Warm Freshwater Habitat – 7.0 mg/l 3. Spawning, Reproduction, and/or Early Development – 7.0 mg/l
Floating Material	Water shall not contain floating material in amounts that cause nuisance or adversely affect beneficial uses.
Oil and Grease	Waters shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in a visible film or coating of the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses.
pH	The pH shall not be depressed below 6.5 nor raised above 8.5. changes in normal ambient pH levels shall not exceed 0.5 in waters designated cold freshwater habitat or warm fresh water habitat.
Pesticides	Water quality objectives for pesticides include the following:

Constituent	Water Quality Objective
	1. No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses. 2. Discharges shall not result in pesticide concentrations in bottom sediments or aquatic life that adversely affect beneficial uses 3. Total identifiable persistent chlorinated hydrocarbon pesticides shall not be present at concentrations detectable within the accuracy of analytical methods approved by the Environmental Protection Agency or the Executive Officer. 4. Pesticide concentrations shall not exceed those allowable by applicable anti-degradation policies. 5. Pesticide concentrations shall not exceed the lowest levels technically and economically achievable. 6. Waters designated for domestic or municipal supply shall not contain concentrations in excess of the Maximum Contaminant Levels set forth in the California Code of Regulations, Title 22, Division 4, Chapter 15. 7. Waters designated for domestic or municipal supply shall not contain concentrations of thiobencarb in excess of 1.0 µg/l.
Radioactivity	Radionuclides shall not be present in concentrations that are harmful to human, plant, animal or aquatic life that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to those life beings.
Sediment	The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.
Settleable Material.	Waters shall not contain substances in concentrations that result in the deposition of material that causes nuisance or adversely affects beneficial uses.
Suspended Material	Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.
Tastes and Odors	Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic municipal water supplies or to fish flesh or other edible produces of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses.
Temperature	The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Water Board that such alteration in temperature does not adversely affect beneficial uses. At no time shall the temperature of Cold Freshwater Habitat or Warm Freshwater Habitat be increased more than 5 degrees Fahrenheit above natural receiving water temperature.
Toxicity	All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses to human, plant, animal, or aquatic life. This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances as specified by the Regional Water Board and other appropriate agencies to evaluate compliance with this objective.
Turbidity	Increased in turbidity attributable to controllable water quality factors shall not exceed the following: 1. Where natural turbidity is between 0 and 5 Nephelometric Turbidity Units (NTUs) increases shall not exceed 1 NTU. 2. Where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent. 3. Where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs. 4. Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent.

SOURCE: California RWQCB, 1998.

Groundwater Quality

Since the protection of designated beneficial uses are also relevant to groundwater quality, water quality objectives for the Sacramento-San Joaquin River Basin ground waters are also included in the Sacramento-San Joaquin Basin Plan (RWQCB, 1998). **Table 3.3-2** summarizes groundwater quality objectives.

TABLE 3.3-2
WATER QUALITY OBJECTIVES FOR GROUND WATERS OF THE SACRAMENTO-SAN JOAQUIN RIVER BASIN

Constituent	Water Quality Objective
Bacteria	In ground waters used for domestic or municipal supply the most probably number of coliform organisms over any seven day period shall be less than 2.2/100 ml.
Chemical Constituents	Ground waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. At a minimum, ground waters designated for use as domestic or municipal supply shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCL's) specified by the applicable provisions of Title 22 of the California Code of Regulations. At minimum, water designated for use as domestic or municipal supply shall not contain lead in excess of 0.015 mg/l.
Radioactivity	At a minimum ground waters designated for use as domestic or municipal supply shall not contain concentrations of radionucliedes in excess of the maximum in excess of the maximum contaminant levels (MCL's) specified by the applicable provisions of Title 22 of the California Code of Regulations.
Tastes and Odors	Ground waters shall not contain taste – or odor- producing substances in concentrations that cause nuisance or adversely affect beneficial uses.
Toxicity	Ground waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life associated with designated beneficial uses. This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances.

SOURCE: California RWQCB, 1998.

Groundwater quality is generally good, but manganese levels tend to increase with depth north of the City (HydroScience Engineers, Inc., 2006). Nitrogen problems appear to be the dominant land use related pollution problem. Sources of groundwater nitrogen pollution include fertilizers, animal manures, treated sewage from percolation ponds or land disposal, septic systems, natural geologic sources and plant residues from cropland and native vegetation.

According to the Madera County General Plan, there appears to be adequate groundwater in the county to sustain growth in the near term. According to Marvin Ward, Water Quality Specialist for the Madera Public Works Department, existing water supply capacity is approximately 25 million gallons per day (mgd), with an average demand of 6 mgd. He stated that some of the extra capacity was used to provide a buffer during droughts and maintenance. Mr. Ward also noted that two new wells were planned, with the first to be completed in May 2004.

A source water assessment conducted for the City of Madera water system during February and March 2004 was included as an Appendix in the Water and Wastewater Feasibility Report (HydroScience Engineers, 2006) (**Appendix I**).

The summary of the assessment indicated that City Water Well No. 26, the nearest potential source of offsite water supply for the Madera site, was considered most vulnerable to airport activities (maintenance/fueling areas), automobiles (gas stations), historic waste dumps/landfills, and metal plating/finishing/fabricating. The activities indicated above were not associated with any detected contaminants and no current MCL exceedances from the Water Quality Inquiry database or from the State Department of Health Services exist for City Water Well No. 26. **Table 3.3-3** shows the contaminants found in the City of Madera water system. The State allows the City to monitor for some contaminants less than once per year because the concentrations of these contaminants do not change frequently. Some of the data, though representative, is more than one year old, with data ranging from 1996-2005.

Wastewater Effluent Quality

The nearest public sewer main is located about ½ mile south of the Madera site along Airport Drive. This main is operated by the City of Madera, which is served by a municipal wastewater treatment plant. The City of Madera has a trickling filter wastewater treatment plant, which is located at 13048 Road 21½ (at the intersection of Road 21½ and Avenue 13), and is approximately 5 miles southwest of the Madera site. The wastewater treatment plant currently treats an average of about 5 million gallons per day (mgd) and has a capacity of 7 mgd. Expansion to a 10 mgd capacity is planned to accommodate anticipated growth. During the expansion, the trickling filter system will be replaced with an activated sludge system. The treated wastewater is conveyed to percolation beds for disposal. Wastewater effluent is treated to USEPA standards prior to discharge.

NORTH FORK SITE

Surface Water Quality

The North Fork site is located within the Upper Chowchilla-Upper Fresno Watershed area of the southern portion of the San Joaquin River Basin. The beneficial and potential beneficial uses of the Fresno River, Chowchilla River, and related tributaries are identified in the Sacramento-San Joaquin Basin Plan as follows:

- Municipal and Domestic Supply
- Agricultural Supply
- Water Contact Recreation
- Non-Contact Recreation
- Warm Freshwater Habitat
- Wildlife Habitat

TABLE 3.3-3
CITY OF MADERA SOURCE WATER ASSESSMENT

Chemical Compound	MCL	MCLG	Range of Detection	Average	Typical Source of Contaminant
Primary Standards					
Aresenic (µg/L)	50	n/a	n/d – 4	0.67	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes.
Barium (µg/L)	1,000	2,000	n/d – 180	30	Discharges of oil drilling wastes and from metal refineries; erosion of natural deposits.
Nitrate (mg/L) [as NO_3]	45	45	3 – 29	8.89	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits.
DBCP (µg/L)	0.20	n/a	n/d – 0.20	0.02	Banned nematocide that may still be present in soils due to runoff/leaching from former use on soybeans, cotton, vineyards, tomatoes, and tree fruit.
Ethylene dibromide (µg/L)	0.05	0.01	0.00 – **0.51**	0.03	
Tetrachloroethylene (µg/L)	5	n/a	n/d – 2	0.22	Discharge from factories, dry cleaners, or auto shops.
Secondary Standards					
Chloride (mg/L)	500		16 – 42	22.40	Runoff/leaching from natural deposits; seawater influence.
Iron (µg/L)	300		n/d – 220	14.67	Leaching from natural deposits; industrial waste
Odor (TON)	3		1 – 1	1	Naturally occurring organic materials
pH (Std. Units)	6.5 – 8.5		5.9 – 7.4	6.55	
Specific Conductance (umho/cm)	1,600		190 – 600	273.33	Substances that form ions when in water, seawater influence.
Total Filterable Residue (mg/L)	1,000		140 – 400	200	Runoff/leaching from natural deposits.
Sulfate (mg/L)	500		3 – 17	6.75	Runoff/leaching from natural deposits, industrial waste.
Lab Turbidity (NTU)	5		0 – 0.40	0.12	
General Minerals					
Copper (mg/L)	1.30	0.17	0 – 0.19	0.114	Internal corrosion of household plumbing systems, erosion of natural deposits, leaching from wood preservatives.
Fluoride (µg/L)	2,000	100	n/d – 100	13.35	Erosion of natural deposits, from water additive that promotes strong teeth.
Lead (mg/L)	0.02	0.002	n/d – 0.01	0.0002	Internal corrosion of household plumbing systems, discharge from industrial manufacturers, erosion of natural deposits.
Organics					

Chemical Compound	MCL	MCLG	Range of Detection	Average	Typical Source of Contaminant
Tetrachlorethylene (µg/L)	5	60	0 – 2	0.22	Discharge from factories, dry cleaners and auto shops (metal degreaser)
Radioactivity					
Gross Alpha (pCi/L)	15		-0.24 – 11.3	0.96	Erosion of natural and man-made deposit.
Uranium (pCi/L)	20		-0.05 – 8.41	0.97	Erosion of natural deposits.

NOTES: Numbers shown in bold represent an exceedance of the correlating MCL. This exceedance was not representative of contaminants found at Well No. 26.
MCL = maximum contaminant level; DBCP = dibromochloropropane; g/L = micrograms per liter or parts per billion; mg/L – milligrams per liter or parts per million; NTU = nephelometric turbidity units; MCLG = maximum contaminant level goal; n/a = not applicable; n/d = non-detect.
SOURCE: City of Madera, 2004.

The water quality objectives for the Sacramento-San Joaquin River Basin inland surface waters, including the Fresno River, are summarized in **Table 3.3-1** above.

Neither Whiskey Creek, the Fresno River, nor the Chowchilla River are designated as part of the RWQCB's 303(d) listing of impaired water bodies; however, the Fresno River drains into the San Joaquin River, which is listed as an impaired water body. The receiving waters are designated by the RWQCB to have existing beneficial uses as previously described for the Madera site.

Groundwater Quality

The Sacramento-San Joaquin Basin Plan includes water quality objectives for the Sacramento-San Joaquin River Basin ground waters for additional protection of designated beneficial uses (RWQCB, 1998). **Table 3.3-2** summarizes groundwater quality objectives above.

Although a source water assessment has not been conducted for wells on the North Fork site, a Phase I was performed by AES in 2005 (**Appendix P**). The Phase I included interviews with tribal residents and record searches for on site water quality testing. According to tribal residents, the domestic water from the well located on the North Fork site has an unpleasant taste and odor. The water was tested in 1998 and 2004 for general minerals, inorganic chemicals, and fecal coliform. The analytical results were compared to USEPA Title 22 drinking water standards that are protective of human health. The water samples from 1998 exceeded both maximum contaminant levels (MCLs) for iron and manganese. Elevated iron and manganese concentrations may be due to elevated turbidity in the sample and may not reflect actual groundwater concentrations. The resident only uses the water for bathing and no longer drinks the water from the well. Additionally, according to a member of the Tribe, a sheen on the surface of the water has been known to be present (AES, 2005).

Wastewater Effluent Quality

Currently there are no wastewater treatment facilities located on the North Fork site. Residential units currently utilize individual septic systems. The County-operated wastewater treatment plant (WWTP) for the community of North Fork is located approximately one mile northwest of the site, near the intersection of Road 225 and Road 228. The WWTP uses extended aeration treatment for the 31,000 gpd it treats. Effluent is disposed of in sprayfields. Plans are underway to expand the existing wastewater treatment plant in the town of North Fork to a capacity of 60,000 gpd. The wastewater treatment plant expansion will use leachfields, in addition to the existing spray fields, for disposal of the disinfected effluent.