

4.7 PUBLIC HEALTH AND SAFETY

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4.7 PUBLIC HEALTH AND SAFETY

This chapter provides information regarding potential public health and safety impacts including exposure to chemicals or microorganisms in recycled water; exposure to hazardous materials or wastes; construction safety hazards; and safety hazards associated with flooding, fire, disease transmission by mosquitoes, and placement of facilities near airports. To provide a basis for this evaluation the setting section describes the policies and regulations pertaining to water recycling and wastewater discharge, hazardous materials/waste storage and handling, construction safety, dam safety, fire safety, mosquito control, and safe operation of airports. Information on water quality is presented in the context of how people may be exposed to the chemical and biological constituents of recycled water and whether these exposures would be expected to affect human health.

IMPACTS EVALUATED IN OTHER SECTIONS

The following items are related to the Public Health and Safety Section, but are evaluated in other sections of this document.

- Safety issues associated with seismicity and hydrology are evaluated in Section 4.3, Geology, Soils, and Seismicity, and Section 4.4, Surface Water Hydrology, respectively.
- Public health issues related to degradation of groundwater quality at existing or future wells are evaluated in Section 4.5, Groundwater.
- Safety issues associated with the impacts of road lane closures during construction on emergency response are evaluated in Section 4.10, Transportation.
- Public health issues associated with toxic air contaminants are evaluated in Section 4.11, Air Quality.

SETTING

The affected environment for recycled water and hazards and the regulatory framework for them are discussed in the following paragraphs.

Drinking Water and Recycled Water

Drinking Water

The quality of water available for domestic use (drinking water) within the project area, and for most Californians, is regulated under the California Safe Drinking Water Act (California Health & Safety Code, §116270 et seq.) and the California Domestic Water Quality and Monitoring Regulations (Title 22, California Code of Regulations, §64401 et seq.). These State laws and regulations are at least as stringent as federal drinking water laws and regulations, and California has been authorized by the U.S. Environmental Protection Agency (U.S. EPA) to operate its own drinking water

program. The California Department of Public Health (CDPH) Office of Drinking Water is responsible for enforcing the State’s drinking water program.

The California Safe Drinking Water Act defines two general types of water delivery systems: Public Water Systems and State Small Water Systems (see Table 4.7-1).

**TABLE 4.7-1
Regulation of Water Delivery Systems**

| Type of System | Definition | Oversight Agency |
|--------------------------|---|---|
| Public Water System | System that provides piped water to the public for human consumption which serves at least 15 connections or 25 individuals daily at least 60 days per year. Public Water Systems are classified as Community, Transient, Non-community, and Non-transient Water Systems. | CDPH |
| State Small Water System | System that provides piped water to the public for human consumption which serves at least 15 connections or 25 individuals daily at least 60 days per year. Public Water Systems are classified as Community, Transient, Non-community, and Non-transient Water Systems. | Sonoma County Environmental Health Department |

Source: California Health & Safety Code, §116270 et seq.

Public Water Systems must meet the requirements of the Safe Drinking Water Act whereas the State Small Water Systems are excluded from the provisions of the Act (California Health and Safety Code §4010.8) as are private wells and systems with less than five service connections. Separate regulations have been adopted by California to cover Public Water Systems (Title 22, California Code of Regulations §64401 *et seq.*) and State Small Water Systems (Title 22, California Code of Regulations §64201 *et seq.*). Public Water Systems in Sonoma County are regulated by CDPH, Office of Drinking Water. State Small Water Systems in Sonoma County are regulated by the Sonoma County Environmental Health Department.

Both federal and State regulations contain primary and secondary drinking water standards (called maximum contaminant levels or “MCL’s”) for the maximum permissible concentrations of organic and inorganic chemicals and for radionuclides in domestic water supplies delivered by a Public Water System. State MCLs are required to be at least as stringent as federal MCLs (California Health and Safety Code §4023.1). The MCLs were set to be protective of human health, taking water treatment technology and cost into account. Public Water Systems must have a

regular program for monitoring the concentrations of these chemicals and radionuclides. If a Public Water System exceeds an MCL, the system must report these results to the State, notify the public, and take action to bring the level of that contaminant to or below its MCL.

The largest Public Water Systems in the project area are the Sonoma County Water Agency (SCWA) and the municipal systems operated by Santa Rosa, Sebastopol, and Windsor. There are also numerous smaller systems operated by private companies that supply individual businesses or developments (e.g., restaurants, vineyards, apartment complexes, and trailer parks). Each of the systems in the project area receives all or some of their water from groundwater. The SCWA wells in the Santa Rosa Plain and the Sebastopol wells were the only municipal wells close enough to warrant inclusion in the groundwater model.

The drinking water supplied by Public Water Systems is tested to ensure that high quality drinking water is maintained. Only a few chemical, biological, and radiological constituents have been detected in the drinking water of these communities (see Table 4.7-2), and all are below MCLs. Detected constituents were primarily inorganic chemicals (e.g., metals and nitrate) and trihalomethanes.

TABLE 4.7-2
Detected Contaminants in Municipal Drinking Water Supplies

| Constituent | Units | MCL ⁽¹⁾ | SCWA ⁽²⁾ | Santa Rosa | Sebastopol |
|--------------------------------|--------------------|----------------------|---------------------|------------|--------------------|
| INORGANICS | | | | | |
| Arsenic | mg/L | 0.05 | — ⁽³⁾ | — | 0.01196 |
| Barium | mg/L | 1 | — | — | |
| Chromium | mg/L | 0.05 | — | — | .00410 |
| Chromium – Hexavalent (CR + 6) | mg/L | none | — | — | 4.1 ⁽⁴⁾ |
| Copper | mg/L | 1.3 ⁽⁵⁾ | — | 0.076 | .10 |
| Fluoride | mg/L | 2 | 0.19 | 0.13 | 0.25 |
| Lead | mg/L | 0.015 ⁽⁵⁾ | — | 0.004 | <0.005 |
| Nitrate as nitrogen | mg/L | 45 | 0.2 | — | 7.50 |
| Barium | mg/L | 1 | — | — | — |
| Boron | mg/L | 1.0 ⁽⁶⁾ | — | 0.235 | 0.068 |
| Vanadium | µg/L | 50 ⁽⁶⁾ | — | 0.28 | 3.2 |
| ORGANICS | | | | | |
| Trihalomethanes | mg/L | 0.10 | 0.0223 | 0.021 | — |
| Haloacetic acids | mg/L | 0.06 | 0.0026 | 0.0031 | — |
| 1,1,2-Trichloroethane | µg/L | 5 | 0.000008 | — | — |
| Xylenes | mg/L | 1.750 | 0.00003 | — | — |
| MICROBIOLOGY | | | | | |
| Total Coliform Bacteria | % positive samples | <5% | 2% | 0.8% | 0% |
| SECONDARY STANDARDS | | | | | |
| Chloride | mg/L | 500 | 8.6 | 8.6 | 13.0 |
| Color | units | 15 | 0.27 | 0.27 | — |
| Iron | mg/L | 0.3 | — | — | — |
| Manganese | mg/L | 0.05 | 0.0097 | 0.00973 | — |
| Odor | TON | 3 | 0.18 | — | — |
| Sulfate | mg/L | 250 | 10.5 | 10.5 | 11.77 |
| Sodium | mg/L | None | 15 | 15.2 | 18.67 |
| Specific Conductance | µmhos/cm | 1600 | 257 | 257 | 310.0 |
| Total Dissolved Solids (TDS) | mg/L | 500 | 149 | 149 | 196.97 |
| Turbidity | units | 5 | 0.16 | 0.17 | 0.40 |

| RADIOACTIVITY | | | | | |
|----------------------|----------------------|-----|------|------|------|
| Gross Alpha | pCi/L ⁽⁸⁾ | 15 | 0.03 | 0.17 | 1.23 |
| Radon 22 | pCi/L | n/a | 165 | 165 | — |

Sources: Rohnert Park 2005; Santa Rosa 2005, Sebastopol 2005

Notes:

- ⁽¹⁾ The lower of the State or Federal MCL is listed
- ⁽²⁾ Sonoma County Water Agency (SCWA) results as reported in the Rohnert Park Consumer Confidence Report for 2005
- ⁽³⁾ — = Not detected above the method reporting limit or not reported
- ⁽⁴⁾ Sample dates were June and November 2002.
- ⁽⁵⁾ Action level based on 90th percentile concentration
- ⁽⁶⁾ Notification level
- ⁽⁷⁾ Highest single measurement (NTU)
- ⁽⁸⁾ pCi/L = picoCuries per liter

The North Coast Regional Water Quality Control Board (NCRWQB) has developed a Water Quality Control Plan (Basin Plan) to protect surface and groundwater within the project area. The Basin Plan identifies water for domestic use (including drinking water supply) by community, military, or individual water supply systems as a protected beneficial use. The principal issues involving municipal water supply quality are protection of public health, aesthetic acceptability of the water, and the economic impacts associated with treatment or quality-related damages.

Health considerations include disease transmission by biological agents (e.g., typhoid fever or cholera) as well as toxic effects (e.g., increased risk of cancer from exposure to halogenated organic compounds). Aesthetic qualities include unpleasant odors or taste, turbidity, color, and excessive hardness. Published water quality objectives (e.g., MCLs as discussed above) give limits for known health-related constituents and most properties affecting public acceptance (e.g., odor, color, taste) and are the numerical water quality criteria identified in the Basin Plan for the protection of water supplies (both groundwater and surface water).

The water quality objectives for groundwater consist of both narrative and numerical objectives and apply to all groundwater, not just at a wellhead or at a point of consumption. The maintenance of existing high quality of groundwater is the primary narrative groundwater objective. In addition, the Basin Plan specifies that groundwater with a beneficial use of municipal and domestic supply shall not contain concentrations of bacteria, chemical constituents, radioactivity, or substances producing taste and odor in excess of human health objectives, as identified by the USEPA and CDPH, unless natural background concentrations are greater. Quantitative objectives include: (1) the median of the Most Probable Number (MPN) of coliform organisms over any seven-day period shall be less than 1.1 MPN/100 mL and (2) groundwater shall be maintained free of organic and inorganic chemical constituents in concentrations that adversely affect beneficial uses. At a minimum, they shall not contain concentrations of chemical constituents or radionuclides in excess of the state or federal MCLs or secondary MCLs, whichever is less.

Recycled Water

Untreated wastewater potentially contains pathogenic microorganisms (i.e., bacteria, viruses, and parasites) that must be removed to allow safe use of recycled water. The potential for pathogenic contamination of recycled water is expressed as the number (measured by the MPN) of coliform bacteria present in water sources. Coliform bacteria are “indicator organisms” whose presence is evidence that pollution (associated with fecal contamination from humans or other warm-blooded animals) has occurred. Indicator organisms may be accompanied by pathogens, but do not necessarily cause disease themselves. Indicators have the following general characteristics: they are absent from unpolluted waters; are present in greater numbers than pathogenic organisms; have greater survival time than pathogens; and their detection is generally more reliable and less time-consuming.

To ensure an appropriate level of treatment for protection of public health from pathogenic organisms, CDPH has established treatment requirements for a variety of recycled water uses (Title 22, California Code of Regulations, §60301 *et seq.*). These conventional and widely practiced water and wastewater treatment processes are believed to be capable of reducing pathogenic constituents to acceptable levels. CDPH updated the State’s recycled water regulations in June 2001.

Title 22 criteria for recycled water are intended to prevent transmission of disease by any of the possible mechanisms: skin contact; ingestion; or inhalation of infectious agents in water or by direct contact with a contaminated object. Recycled water must be treated to an appropriate level to protect surface water and to prevent transmission of pathogens through aerosols (small particles of water suspended in air) from spray irrigation. The level of treatment varies with the ultimate use of the recycled water. At minimum, wastewater must receive secondary treatment prior to use as recycled water (see Table 4.7-3). Those uses with the highest potential for human exposure are permitted to use only disinfected tertiary recycled water.

TABLE 4.7-3
Categories of Recycled Water as Defined in California’s Recycled Water Regulations

| Recycled Water Category | Definition |
|--|---|
| Disinfected Tertiary Recycled Water | Filtered and subsequently disinfected wastewater that meets the following criteria: (a) The filtered wastewater has been disinfected by either: A chlorine disinfection process following filtration that provides a CT value (the product of total chlorine residual and modal contact time measured at the same point) of not less than 450 milligram-minutes per liter at all times with a modal contact time of at least 90 minutes, based on peak dry weather design flow; or A disinfection process that, when combined with the filtration process, has been demonstrated to inactivate and/or remove 99.999 percent of the plaque-forming units of F-specific bacteriophage. (b) The median concentration of total coliform bacteria measured in the disinfected effluent does not exceed an MPN of 2.2 per 100 milliliters (ml) utilizing the bacteriological results of the last seven days for which analyses have been completed and the number of total coliform bacteria does not exceed an MPN of 23 per 100 ml in more than one sample in any 30 day period. No sample shall exceed an MPN of 240 total coliform bacteria per 100 ml. |
| Disinfected Secondary-2.2 Recycled Water | Recycled water that has been oxidized and disinfected so that the median concentration of total coliform bacteria in the disinfected effluent does not exceed an MPN of 2.2 per 100 ml utilizing the bacteriological results of the last seven days for which analyses have been completed, and the number of total coliform bacteria does not exceed an MPN of 23 per 100 ml in more than one sample in any 30 day period. |
| Disinfected Secondary-23 Recycled Water | Recycled water that has been oxidized and disinfected so that the median concentration of total coliform bacteria in the disinfected effluent does not exceed an MPN of 23 per 100 ml utilizing the bacteriological results of the last seven days for which analyses have been completed, and the number of total coliform bacteria does not exceed an MPN of 240 per 100 ml in more than one sample in any 30 day period. |
| Undisinfected Secondary Recycled Water | Oxidized wastewater. |

Source: Title 22, California Code of Regulations, §60301 et seq.

The Subregional System currently produces disinfected tertiary recycled water that is used in accordance with Title 22 regulations. Uses approved by Title 22 specifically include irrigation of food crops, parks and playgrounds, school yards, residential landscaping, unrestricted access golf courses, pasture for animals producing milk for human consumption, and a variety of other uses (see Table 4.7-4).

TABLE 4.7-4
Categories of Recycled Water Usage

| Recycled Water Category | Approved Uses |
|--|--|
| Disinfected Tertiary Recycled Water | <p>Irrigation of food crops, including all edible root crops, where the recycled water comes into contact with the edible portion of the crop; parks and playgrounds, school yards, residential landscaping; unrestricted access golf courses; and any other irrigation use not specified in Title 22 recycled water regulations and not prohibited by other sections of the California Code of Regulations;</p> <p>Water supply for nonrestricted recreational impoundments;</p> <p>Commercial cooling or air conditioning that uses a cooling tower, evaporative condenser, spraying or any mechanism that creates a mist (drift eliminators and additional disinfection of recirculating water may be required);</p> <p>Flushing toilets and urinals, priming drain traps, industrial processes that come into contact with workers, structural fire fighting, decorative fountains, commercial laundries, artificial snow making, consolidation of backfill around potable water pipelines, and commercial car washes.</p> |
| Disinfected Secondary-2.2 Recycled Water | <p>Surface irrigation of food crops where the edible portion is produced above ground and not contacted by recycled water;</p> <p>Source of water supply for restricted recreational water impoundments and publicly accessible impoundments at fish hatcheries;</p> <p>Commercial cooling or air conditioning that does not use a cooling tower, evaporative cooler, spraying or any mechanism that creates a mist.</p> |
| Disinfected Secondary-23 Recycled Water | <p>Surface irrigation of cemeteries, freeway landscaping, restricted access golf courses, ornamental nursery stock and sod farms where access by the general public is not restricted, pasture for animals producing milk for human consumption, and any non-edible vegetation where access is controlled so that the irrigated area cannot be used as if it were part of a park, playground or school yard;</p> <p>Water supply for landscape impoundments that do not use decorative fountains;</p> <p>Industrial boiler feed, nonstructural fire fighting, backfill consolidation around nonpotable piping, soil compaction, mixing concrete, dust control on roads and streets, cleaning roads, sidewalks and outdoor work areas and industrial process water that does not come into contact with workers.</p> |
| Undisinfected Secondary Recycled Water | <p>Surface irrigation of orchards and vineyards where the recycled water does not contact the edible portion of the crop; non-food bearing trees, ornamental nursery stock and sod where irrigation ceases at least 14 days prior to harvesting, retail sale, or allowing access by the general public; fodder and fiber crops and pasture for animals not producing milk for human consumption; seed crops not eaten by humans; and food crops that must undergo commercial pathogen-destroying processing before being consumed by humans.</p> |

Source: Title 22, California Code of Regulations, §60301 *et seq.*

Discharge

Recycled water discharges to surface waters (rivers, lakes and streams) are regulated under the federal Clean Water Act and in California under the Porter-Cologne Water Quality Control Act (Porter-Cologne Act, California Water Code §13000 *et seq.*). The Porter-Cologne Act also addresses recycled water discharges that may affect groundwater quality. The Clean Water Act's broad objective is to "restore and maintain the chemical, physical, and biological integrity of the nation's waters." To meet this objective, the USEPA has set up a system of permitting and licensing, the National Pollutant Discharge Elimination System (NPDES), to monitor and control recycled water discharges. In the IRWP area, this system is administered by the State Water Resources Control Board and the North Coast Regional Water Quality Control Board (NCRWQCB), which are part of the California Environmental Protection Agency.

The groundwater model for the SSP (see Section 4.5 Groundwater and TM 4 Groundwater Evaluation) does not release recycled water to surface waters; these regulations are, therefore, not applicable.

Human Exposure to Recycled Water

Potentially exposed populations for the SSP are current and future residents. Current and future residents may be exposed via ingestion and dermal contact with groundwater used for domestic purposes. Exposure may include children, teens, and adults over their lifespan. Refer to the Methodology Section for a description of the exposure pathways, exposure parameters, and an understanding of the conservative nature of the risk assessment methodology.

Hazardous Materials/Wastes

The USEPA defines a "hazardous" waste as one "which because of its quantity, concentrations, or physiochemical or infectious properties, may either increase mortality or produce irreversible or incapacitating illness, or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed." Materials and wastes that exhibit hazardous properties require special handling and management. Their treatment, storage, transport and disposal are highly regulated by the federal, state, and local governments. As a result, compliance with federal and state hazardous materials laws and regulations minimizes the risk to the public presented by these potential hazards.

The federal hazardous waste laws are generally known as the Resource Conservation and Recovery Act (RCRA). These laws provide for the "cradle to grave" regulation of hazardous wastes. Any business, institution or other entity that generates hazardous waste is required to identify and track its hazardous waste from the point of generation until it is recycled, reused, or disposed.

The USEPA has primary responsibility for implementing RCRA, but individual states are encouraged to seek authorization to implement some or all RCRA provisions. California received authorization to implement RCRA in August 1992. The California Department of Toxic Substances Control (DTSC) is responsible for implementing RCRA. The DTSC is also responsible for implementing and enforcing California's Hazardous Waste Control Law. The California Hazardous Waste Control Law and its associated regulations are similar to RCRA but regulate a larger number of chemicals because they define hazardous waste more broadly. Hazardous wastes regulated by California, but not by the EPA, are called non-RCRA hazardous wastes.

Known hazardous waste release sites are governed under several State and federal laws and are subject to oversight by federal, state, and/or local agencies. These include the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA).

The agencies with potential oversight at sites with environmental releases in the SSP area include the USEPA, the California EPA (including the DTSC and the NCRWQCB); the Sonoma County Public Health Department, Environmental Health Services; and local city and county fire departments. Information about these sites is maintained in government agency lists, files, and databases. One such list is the State's Hazardous Waste and Substances Sites List (Cortese List). This list identifies sites with leaking underground fuel tanks, hazardous waste facilities subject to corrective actions, solid waste disposal facilities from which there is a known migration of hazardous waste, and other sites where environmental releases have occurred. Pursuant to Government Code §65962.5, before a local agency accepts an application as complete for any development project, the applicant must certify whether or not the project site is on the Cortese list.

Chapter 6.95, §25503(a), of the California Health and Safety Code and Title 19 of the California Code of Regulations §2729, *et seq.*, require any business that handles a hazardous material or mixture containing a hazardous material in reportable quantities to establish and implement a Hazardous Materials Business Plan for emergency response to a release or threatened release of a hazardous material. The minimum reportable quantities are 500 pounds for a solid, 55 gallons for a liquid, and 200 cubic feet for a gas at standard temperature and pressure. Some acutely hazardous materials are reportable at much decreased quantities. Businesses in the SSP area submit their plans to the appropriate Certified Unified Program Agency (CUPA)—the Sonoma County Department of Emergency Services or the fire departments in Santa Rosa, Petaluma and Healdsburg. The Business Plan must identify the type of business, location, emergency contacts, emergency procedures, mitigation plans, and chemical inventory at each location.

Certain chemicals that could be released to the environment and might affect surrounding communities are regulated by California's Accidental Release Prevention Law. This State law and similar federal laws [*i.e.*, the Emergency Preparedness and Community Right-to-Know Act (EPCRA) and the Clean Air Act] allow local oversight of both the State and federal programs. The State and federal laws are similar in their requirements, however, the California threshold planning quantities for regulated substances are lower than the federal values. Local agencies may set lower reporting thresholds or add additional chemicals to the

program. Beginning in 1997, the Accidental Release Prevention Law has been implemented by the local CUPAs. Any business where the maximum quantity of a regulated substance exceeds the specified threshold quantities must register with the CUPA as a manager of regulated substances.

Hazardous Waste Releases

If handled improperly, hazardous materials can be released to the environment and become hazardous waste that can endanger human health or the environment. Historical industrial activities are the most common sources of hazardous waste releases. Spillage or leakage from storage and handling areas could result in the contamination of soil, surface water, or groundwater. Examples of hazardous waste release sites include properties with underground storage tanks (e.g., gas stations), solid waste landfills, businesses that use or store hazardous materials (e.g., manufacturing facilities, dry cleaners, metal finishers, automotive repair shops, and solvent recyclers), and a variety of other operations that handle, generate, or store hazardous materials or hazardous wastes.

Leaded gasoline was used as vehicle fuel in the U.S. beginning in the 1920s. Although lead was banned from fuel formulations in the 1980s, leaded fuels are still a recognized source of contamination in soils along roadways in urban areas (Madhavan et al. 1989). The SSP area includes Highway and other heavily trafficked routes. Surface and near-surface soils adjacent to these roadways have the potential to contain significant concentrations of lead (over 1,000 mg/kg) due to the deposition of lead compounds from vehicle exhausts.

Hazardous Materials Storage and Use

Hazardous materials, such as fuels, motor oils, paints, and compressed gases, would be used during construction. While these are commonly used materials, if handled improperly (fuels, for example, are flammable) they could endanger workers and the public.

State regulations require the operator of a business that uses hazardous materials to prepare a Hazardous Materials Business Plan (HMBP) to address the storage and handling of these materials and to be prepared to respond to the possible release of such materials. The plans are generally provided to fire departments to aid their response to emergencies at facilities that handle hazardous materials. HMBPs are intended to prevent or to mitigate damage from hazardous materials releases and therefore to minimize the safety and health hazards that these materials pose. The Laguna Plant has prepared HMBPs to address the storage and handling of hazardous materials during operation of the water recycling plant and maintenance facilities. In addition, the recycling plant has a Process Safety Plan that addresses the handling of other hazardous materials during the daily operation of the plant.

Chlorine was formerly used to provide tertiary disinfection at the Laguna Plant. Beginning in 1998, the plant converted to ultraviolet disinfection and chlorine use was discontinued. With the discontinuation of chlorine disinfection, other processes that formerly used chlorine (e.g., odor control at the headworks) are now accomplished with the use of hypochlorite (bleach solution). The bleach solution is stored in four 10,000-gallon tanks provided with

secondary containment. About 75 percent of the bleach solution is used in the headworks, 20 percent is used for algae control in storage ponds, and 5 percent is used for cleaning filters.

Construction Hazards

Hazards associated with construction activities can affect the safety of both workers and the general public. The safety of workers is regulated by the California Department of Industrial Relations, which receives its authority from Title 8 of the California Code of Regulations. These regulations also indirectly protect the general public by requiring construction managers to post warnings signs, to limit public access to construction areas, and to obtain permits for work considered to present a significant risk of injury (e.g., excavations greater than 5 feet into which a person is required to descend).

Where excavations or other activities would occur in public rights-of-way, an encroachment permit is required from the appropriate agency such as the California Department of Transportation for State highways, departments of Public Works for roadways within cities, or the Sonoma County Department of Public Works or Office of Emergency Services for county roads (refer to Section 4.10, Transportation in this EIR). These permits are designed to protect the public by providing a system of notification to providers of emergency or other important services of road closures. Compliance with these requirements would minimize the safety and health hazards associated with construction activities.

Flooding Due to Dam Failure

Flooding or inundation may occur when runoff from a watershed exceeds the capacity of the stream or river channel that drains the watershed or when water is released catastrophically from a dam failure. Impacts of the alternatives relative to flooding from excessive runoff are discussed in Surface Water Hydrology, Section 4.4.

The California Department of Water Resources Division of Safety of Dams (DSOD) oversees dam safety. It has developed and enforces design and construction standards intended to reduce the probability of dam failure and protect public safety. Historically, earthen dams most often fail because an unusually heavy rain causes overtopping of the dam or because undetected surface or internal erosion, deformation, or sliding has weakened the dam. Contributing factors in these failures are improper siting, a lack of maintenance and monitoring, or inappropriate modification to an older structure (Jansen 1988). Maintenance, surveillance, and preparedness for emergencies are therefore required by DSCOD and recognized as important activities that ensure the safety of dams. The California Office of Emergency Services requires preparation of an inundation map and development of a downstream evacuation plan for areas within the potential inundation area (California Water Code §6000 and California Government Code §8589.5). See the Emergency Scenario section of Chapter 2 Project Description regarding the probability of dam failure.

Fire Hazards

Fires are extremely costly, not only to property owners and residents, but also to local agencies (California Government Code §51175). They pose a serious threat to the

preservation of the public peace, health, and safety. Wildland fires burn natural or wild vegetation located on undeveloped lands. At the urban/wildland interface, the fire hazards increase because most fires are caused by human activities such as smoking, debris burning, and equipment operation. The California Department of Forestry (CDF) classifies the fire potential for wildlands based on three factors: fuel load, climate and topography.

Vector Control

Mosquitoes are both pests and vectors of disease to humans and animals. Mosquito populations can increase rapidly, especially during the warmer summer months. Over twenty species of mosquitoes are known to occur within the SSP area. Several of these have the potential to breed and to reproduce as a result of the construction and operation of ponds.

The California Health and Safety Code provides authority for mosquito abatement districts to advise and control mosquito production on private and public lands and to assess the land owner for the cost of that control. The districts also have the authority to hold hearings and assess civil penalties to abate nuisance and potential health threats to the general public (California Health and Safety Code §2270-2294). The Marin/Sonoma Mosquito Abatement District (Abatement District) and the Vector Biology and Control Branch of the CDPH are responsible for overseeing the mosquito prevention program within the SSP area. The primary objective of the Abatement District is to suppress the mosquito population below the threshold level required for disease transmission or nuisance tolerance level.

The Abatement District has produced several documents addressing mosquitoes and other biting arthropods associated with wastewater recycling or disposal projects. These documents provide project design criteria for mosquito prevention as well as guidelines for proper management of recycled water projects.

Airport Operations

The Comprehensive Airport Land Use Plan (CALUP) for Sonoma County (Sonoma County 2001) uses the criteria defined in Part 77 of the Federal Aviation Regulations (F.A.R.) for airspace protection standards around all public use airports in Sonoma County. The SSP alternative sites are not located within an airport referral area boundary of the CALUP for Sonoma County.

GOALS, OBJECTIVES, AND POLICIES

Table 4.7-5 identifies public health and safety goals, objectives, and policies that relate to the SSP. The table also indicates which criteria in the Public Health and Safety Section are responsive to each set of policies.

TABLE 4.7-5
Goals, Objectives, and Policies – Public Health and Safety

| Adopted Plan Document | Document Section | Document Numeric Reference | Policy | Relevant Evaluation Criteria |
|------------------------------|--------------------------|-----------------------------------|---|-------------------------------------|
| Santa Rosa General Plan | Noise and Safety Element | Goal NS-E | Minimize dangers from hazardous materials | 2,3 |
| Santa Rosa General Plan | Noise and Safety Element | Goal NS-F | Minimize the potential for wildland fires | 6 |

Sources: Santa Rosa 2002

Note: 1. Evaluation criteria are identified in Table 4.7-7.

EVALUATION CRITERIA WITH SIGNIFICANCE THRESHOLDS

The evaluation criteria for Public Health and Safety are based on standards promulgated by the USEPA and the State of California, and on goals, objectives, and/or policies of regional and local governments and special districts (Table 4.7-6).

TABLE 4.7-6

Evaluation Criteria with Significance Thresholds – Public Health and Safety¹

| Evaluation Criteria | As Measured by | Significance Thresholds | Sources of Criteria |
|--|---|--|--|
| 1. Will the SSP expose the public to chemicals, radionuclides, pathogenic viruses, bacteria, or other disease organisms at concentrations detrimental to human health? | Proposed measures not in compliance with California Title 22 regulations for the use of recycled water or the treatment plant's NPDES permit. | Greater than 0 occurrences | California Title 22 regulations governing the use of recycled water and the Clean Water Act |
| | Incremental risk of cancer | Greater than 1 excess case in 100,000 | Title 22, California Code of Regulations, §12703 |
| | Hazard Index | Greater than 1 | Standard professional practice |
| | Cumulative recycled water contributions to groundwater sources | 5 percent over short durations (monthly averages at groundwater source) for pathogenic microorganism control, or 10 percent as an average over long periods of time (yearly averages at groundwater source), for chemical contaminant contribution | CDPH (2007) (see Appendix D) |
| 2. Will the SSP expose workers or the public to hazards from a known hazardous waste site? | Ground disturbance within 500 feet of a hazardous waste release site(s). | Greater than 0 occurrences within the SSP study area | CEQA Guidelines Appendix G, Checklist Item VII (d); California Government Code, Section 65962.5; RCRA; CERCLA (as amended by the Superfund Amendments and Reauthorization Act); California Hazardous Waste Control Law |

TABLE 4.7-6
Evaluation Criteria with Significance Thresholds – Public Health and Safety¹

| Evaluation Criteria | As Measured by | Significance Thresholds | Sources of Criteria |
|--|--|--|---|
| 3. Will the SSP increase potential exposure of the public to hazardous materials due to a chemical release during their routine transport, use, storage or disposal? | Increase in transport, use, storage or disposal of hazardous materials not in accordance with State and federal hazardous materials or waste regulations. Use of acutely hazardous materials or hazardous emissions within ¼ mile of a school. | Greater than 0 occurrences | CEQA Guidelines Appendix G, Checklist Item VII (a), (b), and (c); Federal Emergency Planning and Community Right-to-Know Act; California Accidental Release Prevention Law; Public Safety sections of local General Plans |
| 4. Will the SSP expose the public to safety hazards associated with operation of heavy machinery, vehicles, or equipment; or creation of accessible excavations (trenches, pits, or borings); or creation of an accessible open body of water? | Use of heavy machinery, vehicles or equipment; creation of excavations; or creation of an open body of water in public areas not in accordance with State construction safety regulations. | Greater than 0 occurrences | California Construction Safety Regulations |
| 5. Will the SSP expose the public to a flooding hazard? | Increased risk of inundation due to proposed element(s) not in compliance with State’s dam safety standards. | Greater than 0 occurrences | CEQA Guidelines Appendix G, Checklist Item VII (a) and (b); Standards set by the California Department of Water Resources Division of Safety of Dams; Public Safety sections of local General Plans |
| 6. Will the SSP expose people or structures to a risk of loss, injury or death involving wildland fires? | Operation of the SSP not in compliance with the State’s Fire Safe Regulations | Greater than 0 occurrences | CEQA Guidelines Appendix G, Checklist Item VIII (h); Public Safety sections of local General Plans; State Fire Safe Regulations |
| 7. Will the SSP increase the potential exposure of the public to disease vectors (i.e., mosquitoes)? | Creation of mosquito habitat | Greater than 0 acres of new mosquito habitat | Marin/Sonoma Mosquito Abatement District and CDPH Vector Biology and Control Branch criteria for mosquito abatement |

TABLE 4.7-6
Evaluation Criteria with Significance Thresholds – Public Health and Safety¹

| Evaluation Criteria | As Measured by | Significance Thresholds | Sources of Criteria |
|---|--|---|--|
| 8. Will the SSP create a safety hazard for people residing or working near a public or private airport or airstrip? | Construction activities or permanent structures that create a safety hazard for residents or workers within an airport land use area or within 2 miles of an airstrip or airport without a land use plan | Construction or structures not in compliance with airport land use policies | CEQA Guidelines Appendix G, Checklist Item VII (e) and (f) Airport Land Use Plan for Sonoma County Chapter 8 F.A.R. Part 77, Subpart C – Obstruction Standards |

Notes:

1. CEQA checklist item VII (g) asks if the Project would impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. This question is addressed in the transportation section.

METHODOLOGY

Exposure to Chemicals, Radionuclides, Pathogenic Viruses, Bacteria, or Other Disease Organisms

This EIR provides three methods by which to evaluate the public health impacts of exposure to recycled water from recycled water storage, each of which is reported under criterion 1:

- Compliance with CDPH Water Recycling Criteria;
- Human Health Risk Assessment; and
- Analysis of the percent water of recycled water origin at the source of groundwater wells (see also Section 4.5 Groundwater).

Compliance with CDPH Water Recycling Criteria

This method evaluates the past and projected compliance of recycled water with the Water Recycling Criteria found in Title 22 of the California Code of Regulations.

Human Health Risk Assessment

Potential health impacts presented by the possible exposure mechanisms depend upon the concentrations of the chemical and biological constituents in the water and the pathways (inhalation, dermal contact, ingestion) via which people might be exposed. The potential health impacts from exposure to recycled water were initially evaluated in a human health risk assessment (HHRA) that was prepared for the Santa Rosa Long-Term Wastewater Project (Parsons Engineering Science 1996). This was followed by an HHRA update prepared in 2002 for the IRWP Program EIR. A second HHRA update has been prepared in March 2008 for the IRWP Discharge

Compliance Project (DCP) Draft EIR. The HHRA (DCP Draft EIR Appendix F) and the discussion of the HHRA in Section 4.7 Public Health and Safety section of the DCP Draft EIR are incorporated by reference into this SSP Draft EIR. The DCP Draft EIR, like this Draft EIR found that impacts to human health as represented by the HHRA are less than significant with no need for mitigation. The Clearinghouse number for the DCP Draft EIR is the same as for this SSP EIR, #2002072046.

The HHRA in the DCP Draft EIR is the appropriate risk assessment for the SSP, because it includes all exposures and risks that may be experienced by residents and recreationists in Sonoma County. The exposure from the SSP is less than, and a subset of the exposure represented in the DCP HHRA, because a local resident could swim in the Russian River, eat fish from the Russian River, eat crops grown with recycled water, and use domestic water affected by the SSP as well as the DCP. The exposure from the SSP is less than that represented by the DCP HHRA, because the DCP HHRA models a resident who uses Russian River or Laguna water as 100 percent of their source of domestic water, and exposure from the SSP would be via the same domestic water pathway at equal or lesser percentages. For example, the maximum domestic water exposure in the DCP HHRA is 4 percent from the Laguna, whereas the maximum domestic water exposure in the SSP is 3 percent from the SCWA wells in the Santa Rosa Plain¹.

Human health risk assessment requires consideration of environmental fate, transport, and exposure assessment for each of the contaminants of concern. In addition, the toxicity parameters of contaminants are evaluated to ensure that the latest scientific knowledge is used in evaluating potential toxicity. These evaluations must comply with the California EPA Department of Toxic Substances Control (DTSC) and U.S. EPA risk assessment guidance and policy.

The approach used in the HHRA update is consistent with guidance from DTSC, and with similar guidance from U.S. EPA for those issues not addressed by the State of California. Work plans were submitted to the CPDH and North Coast Regional Water Quality Control Board prior to beginning the risk assessment and were modified based on feedback from the two agencies. Guidance used for the assessment included:

- CalEPA Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities. July 1996.
- Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A) Interim Final EPA/5401/1-891002. December 1989.

¹ The SCWA wells in the Santa Rosa Plain do not serve as direct sources of domestic water but are blended with SCWA water supply from the Russian River, resulting in about 1 percent of water of wastewater origin at maximum. None of these calculations accounts for attenuation of constituents in recycled water from soil, groundwater, or surface waters.

The most recent data set includes Laguna Plant recycled water data, storage pond data, and receiving water data from both the Laguna de Santa Rosa and the Russian River. The Laguna Plant data used for the HHRA update were collected from May 2002 to December 2006 during the discharge season (October 1 through May 14). Although these data cover May 2002 through December 2006, they are hereafter referred to as the 2006 data. Additional sampling of recycled water and receiving waters for cysts of *Giardia* and oocysts of *Cryptosporidium* was conducted in early 2007. Finally, because quantitative data and toxicity criteria for most non-regulated chemicals are not available, the HHRA update uses literature data from studies of receiving waters above and below wastewater treatment plant (WWTP) discharges to qualitatively evaluate these chemicals.

As part of the HHRA update, the previous program-level screening of recycled water constituents was re-examined and updated to ensure that previous analyses did not miss potentially important chemicals. In addition to re-evaluating each chemical assessed in the 2002 HHRA, additional chemicals were selected, if they showed an increase in maximum concentrations detected compared to previous results, if they exceeded any EPA Region 9 preliminary remediation goals (PRGs) for tap water and/or California MCLs for drinking water, or if they were known carcinogens or known to bioaccumulate in fish.

Exposure pathways in the HHRA update are evaluated for both current and future recreation users and residents. For the SSP, potentially exposed populations are current and future residents via domestic water with a portion of water of wastewater origin from pond seepage. Current and future residents may be exposed via ingestion and dermal contact with groundwater used for domestic purposes. Exposure may include children, teens, and adults over their lifespan.

The methods used in the HHRA update are conservative (i.e., they are more likely to overestimate than underestimate possible health risks). For example, risks and hazards were estimated using the maximum detected recycled water concentrations. Also, the HHRA does not account for attenuation of chemical concentrations that would be reduced as the water percolates through sediments to alluvial groundwater.

Exposure parameters are summarized in Table 4.7-7. For carcinogens, intake calculations average the total cumulative dose over a lifetime (70 years * 365 days/year). For non-carcinogens, individuals are assumed to be exposed for 350 days (ingestion of produce) and during the discharge season of 266 days (ingestion of drinking water, inhalation and dermal contact while showering) of the year. Residential exposure was modeled for an adult for 30 years, a child for 6 years, and a combination of the two for 36 years.

Due to the modeling assumptions discussed above and the conservative exposure parameters, risks and hazards calculated in the HHRA overestimate potential risks to people using water for drinking or irrigation.

TABLE 4.7-7
Exposure Parameters

| Exposure Parameter | Current and Future Resident | | | |
|--|-----------------------------|-----|-----------|-----|
| | Adult | | Child | |
| Body Weight (kg) | 70 | a,d | 15 | c,d |
| Averaging Time - Carcinogenic (days) | 25,550 | a,d | 25,550 | a,d |
| Averaging Time - Noncarcinogenic (days) | 10,950 | a,d | 2,190 | d |
| Exposure Frequency (days/yr) | 350/226 | a,b | 350/226 | a,b |
| Exposure Duration (years) | 30 | d | 6 | d |
| Exposure Time (hrs/day) | 24 | d | 24 | d |
| Exposure Time Showering/ Bathing (hrs/day) | 0.58 | f | 1 | f |
| Ingestion Rate | 2 (L/day) | g | 1 (L/day) | g |
| Inhalation Rate (m ³ /day) | 20 | h | 10 | h |
| Skin Surface Area Available for Contact (cm ² /event) | 18,000 | f | 6,600 | f |

Note:

Exposure parameters for evaluation of fish and produce consumption are provided in Tables 3-3 and 3-4

RME – reasonable maximum exposure

CTE – central tendency exposure

Sources:

- a. EPA, 1989. Risk Assessment Guidance for Superfund. Volume I - Human Health Evaluation Manual, Part A. EPA/540/1-89/002. Office of Emergency and Remedial Response. Washington D.C.
- b. Site-specific. Professional judgment. See text.
- c. EPA, 1997a. Exposure Factors Handbook. EPA/600/P-95/002Fa
- d. CalEPA, 2005, Human Exposure Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil. Appendix C. January revision.
- e. DTSC, 1999 Preliminary Endangerment Assessment Guidance Manual.
- f. EPA, 2004a Risk Assessment guidance for Superfund, Vol. 1: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005.
- g. EPA, 1991: Risk Assessment Guidance for Superfund Vol. 1: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.
- h. EPA, 2004b: EPA Region 9 User's Guide and Background Technical Document for USEPA Region 9's Preliminary Remediation Goals (PRG)

Analysis of the Percent Water of Recycled Water Origin at the Source of Groundwater Wells

This methodology is used in Section 4.5 Groundwater to estimate the percentage of groundwater at the nearest municipal well that would be derived from recycled water sources as a result of recycled water storage. The estimate was then compared to a CDPH recommended threshold that: 1) not more than 5 percent of drinking water

from a well be derived from wastewater sources over short durations (monthly averages at groundwater source) for pathogenic microorganism control; and 2) not more than 10 percent be derived from wastewater sources as an average over long periods of time (yearly averages at groundwater source) for chemical contaminant control. The thresholds are intended to be protective of human health for drinking water sources (see Appendix D).

Hazardous Materials/Waste

The hazardous materials/waste criterion is based on the CEQA requirement that lead agencies consult the lists of hazardous waste sites compiled pursuant to Section 65962.5 of the California Government Code to determine whether the proposed activities are located on a site that is included on any of the lists, collectively known as the Cortese List. The lists are compiled by the Regional Water Quality Control Boards, the California Department of Toxic Substances Control, and the California Integrated Waste Management Board. The SSP sites are evaluated to determine whether they would be constructed or operate within 500 feet of a listed hazardous waste release site.

Hazardous Materials Storage and Use

The hazardous materials storage and use criterion is based on the requirements of the Public Safety Sections of local General Plans, which list goals, objectives, and/or policies for reducing potential damage from hazardous materials. These requirements are derived from State regulations (e.g., California Health and Safety Code §25500 *et seq.*) that require local agencies, such as fire departments, to administer programs for storing and handling of hazardous materials. The SSP sites are evaluated to determine whether they would comply with these requirements and regulations.

Construction Hazards

The criterion for safety hazards during construction is based on safety regulations (Title 8, California Code of Regulations §1500 to §1938) regarding construction sites. While the regulations have been promulgated to protect workers in the construction industry, the SSP alternatives have components, such as pipelines, that may be built in areas accessible to the public. The SSP components are evaluated to determine whether they would comply with the State's construction safety regulations.

Flooding Hazards

The criterion for flooding is based on standards set by the DSOD and on information contained in the Safety Elements of local General Plans. The plans generally recognize the importance of reducing the potential hazard due to flooding as might occur from dam failure and inundation. The storage components are evaluated to determine whether they would comply with the standards set by the DSOD and the general requirements of local general plans.

Fire Hazards

The criterion for fire hazards is based on information contained in the Draft Fire Hazard Severity Zoning Map, December 6, 2006 (CDFF Fire and Resource Assessment Program). The impact evaluation determines whether SSP sites fall within a high or very high fire hazard zone.

Vector Control

The criterion for disease vectors is based on the requirements of the Marin/Sonoma Mosquito Abatement District and the CDPH Vector Biology and Control Branch. The Abatement District has issued criteria for mosquito prevention in wastewater recycling or disposal projects. The SSP storage components are evaluated to determine whether they would comply with the Abatement District and Vector Control Branch guidelines.

Airport Operations

The criterion for safe airport operations is based on the requirements of the Sonoma County CALUP, which is responsible for ensuring the safe operation of the airports within the area. The CALUP uses the criteria defined in Part 77 of the F.A.R. rules and regulations for airspace protection standards around all public use airports in Sonoma County. The SSP sites are evaluated to determine whether they are located within the CALUP boundary, and if so, whether they comply with the safety elements of the plan.

IMPACTS AND RECOMMENDED MITIGATION MEASURES

TABLE 4.7-8
Public Health and Safety Impacts

| Evaluation Criteria | Significance Threshold | Impact | Type of Impact ¹ | Level of Significance ² |
|---|--|--|--|------------------------------------|
| 7.1. Will the SSP expose the public to chemicals, radionuclides, pathogenic viruses, bacteria, or other disease organisms, at concentrations detrimental to human health? | Proposed measures not in compliance with California Title 22 regulations for the use of recycled water or the treatment plant's NPDES permit | | | |
| KF1, KF2, BF1, BF2, and AF <i>Storage component</i> <i>Pump Station component</i> | | Less than threshold None | O&M/P O&M/P | ○ == |
| KF1, KF2, BF1, BF2, and AF <i>Storage component</i> <i>Pump Station component</i> | Incremental risk of cancer greater than 1 x 10 ⁻⁵ | Maximum of 8 x 10 ⁻⁶ None | O&M/P O&M/P | ○ == |
| KF1, KF2, BF1, BF2, and AF <i>Storage component</i> <i>Pump Station component</i> | | Hazard Index greater than 1 | Maximum of 0.11 None | O&M/P O&M/P |
| KF1, KF2, BF1, BF2, and AF <i>Storage component</i> <i>Pump Station component</i> | Cumulative recycled water contributions to groundwater sources greater than 5 or 10% | Maximum of 3% None | O&M/P O&M/P | ○ == |
| KF1, KF2, BF1, BF2, and AF <i>Storage component</i> <i>Pump Station component</i> | | 7.2. Will the SSP expose workers or the public to hazards from a known hazardous waste site? | Ground disturbance within 500 feet of a hazardous waste release site(s). | |
| KF1 | | 3 known hazardous release sites within 500 feet | C | ○ |
| KF2, BF1, BF2 | | Historical UST possibly within 500 feet | C | ○ |
| AF | | None | C | == |
| 7.3. Will the SSP increase potential exposure of the public to hazardous materials due to a chemical release during their routine transport, | Increase in transport, use, storage, or disposal of hazardous materials not in accordance with | Minimal | C | ○ |
| | | | | |

TABLE 4.7-8
Public Health and Safety Impacts

| Evaluation Criteria | Significance Threshold | Impact | Type of Impact¹ | Level of Significance² |
|---|---|-----------------------|-----------------------------------|--|
| use, storage, or disposal? | State and federal hazardous materials or waste regulations. Use of acutely hazardous materials or hazardous emissions within ¼ mile of a school. | | | |
| 7.4. Will the SSP expose the public to safety hazards associated with operation of heavy machinery, vehicles, or equipment; or create accessible excavations or an accessible open body of water? | Use of heavy machinery, vehicles, or equipment; creation of excavations; or creation of an open body of water in public areas not in accordance with State construction safety regulations. | Temporary | C | ○ |
| 7.5. Will the SSP expose the public to a flooding hazard? | Increased risk of inundation due to proposed element(s) not in compliance with State's dam safety standards. | | | |
| KF1, KF2, BF1, BF2, and AF <i>Storage component</i> <i>Pump Station component</i> | | Less than Significant | O&M/P | ○ |
| | | None | O&M/P | == |
| 7.6. Will the SSP expose people or structures to a risk of loss, injury, or death involving wildland fires? | Operation of the SSP not in compliance with the State's Fire Safe Regulations | None | C | == |
| 7.7. Will the SSP increase the potential exposure of the public to disease vectors (i.e., mosquitoes)? | Creation of mosquito habitat | | | |
| KF1, KF2, BF1, BF2, and AF <i>Storage component</i> <i>Pump Station component</i> | | Less than significant | O&M/P | ○ |
| | | None | O&M/P | == |

TABLE 4.7-8
Public Health and Safety Impacts

| Evaluation Criteria | Significance Threshold | Impact | Type of Impact ¹ | Level of Significance ² |
|--|---|--------|-----------------------------|------------------------------------|
| 7.8 Will the SSP create a safety hazard for people residing or working near a public or private airport or airstrip? | Construction or structures not in compliance with airport land use policies | None | C/O&M/P | == |

Notes:

1. Type of Impact:

C: Construction

O&M: Operation and Maintenance

P: Permanent

2. Level of Significance:

● Significant impact before and after mitigation

⊙ Significant impact before mitigation; less than significant impact after mitigation

○ Less than significant impact; no mitigation proposed

== No impact

Impact: 7.1. Will the SSP expose the public to chemicals, radionuclides, pathogenic viruses, bacteria, or other disease organisms, at concentrations detrimental to human health?

Analysis: *Storage component - Less than Significant: KF1, KF2, BF1, BF2, and AF*

Compliance with CDPH Water Recycling Criteria

Untreated wastewater potentially contains pathogenic microorganisms (i.e., bacteria, viruses, and parasites) that must be removed to allow safe use of recycled water. The potential for pathogenic contamination of recycled water is expressed as the number (measured by the MPN) of coliform bacteria present in water sources. Coliform bacteria are “indicator organisms” whose presence is evidence that pollution (associated with fecal contamination from humans or other warm-blooded animals) has occurred. Indicator organisms may be accompanied by pathogens, but do not necessarily cause disease themselves. Indicators have the following general characteristics: they are absent from unpolluted waters; are present in greater numbers than pathogenic organisms; have greater survival time than pathogens; and their detection is generally more reliable and less time-consuming.

To ensure an appropriate level of treatment for protection of public health from pathogenic organisms, the California Department of Public Health (CDPH) has established treatment requirements for a variety of recycled water uses (Title 22, California Code of Regulations, §60301 *et seq.*). These conventional and widely practiced water and wastewater treatment processes are believed to be capable of reducing pathogenic constituents to acceptable levels. The CDPH updated the State’s recycled water regulations in June 2001.

Title 22 criteria for recycled water are intended to prevent transmission of disease by any of the possible mechanisms: skin contact; ingestion; or

inhalation of infectious agents in water or by direct contact with a contaminated object. Recycled water must be treated to an appropriate level to protect surface water and to prevent transmission of pathogens through aerosols (small particles of water suspended in air) from spray irrigation. The level of treatment varies with the ultimate use of the recycled water. At minimum, wastewater must receive secondary treatment prior to use as recycled water. Those uses with the highest potential for human exposure are permitted to use only disinfected tertiary recycled water. Disinfected tertiary recycled water means a filtered and subsequently disinfected wastewater that meets the following criteria:

(a) The filtered wastewater has been disinfected by either:

(1) A chlorine disinfection process following filtration that provides a CT (the product of total chlorine residual and modal contact time measured at the same point) value of not less than 450 milligram-minutes per liter at all times with a modal contact time of at least 90 minutes, based on peak dry weather design flow; or

(2) A disinfection process that, when combined with the filtration process, has been demonstrated to inactivate and/or remove 99.999 percent of the plaque-forming units of F-specific bacteriophage MS2, or poliovirus in the wastewater. A virus that is at least as resistant to disinfection as poliovirus may be used for purposes of the demonstration.

(b) The median concentration of total coliform bacteria measured in the disinfected effluent does not exceed an MPN of 2.2 per 100 milliliters utilizing the bacteriological results of the last seven days for which analyses have been completed and the number of total coliform bacteria does not exceed an MPN of 23 per 100 milliliters in more than one sample in any 30 day period. No sample shall exceed an MPN of 240 total coliform bacteria per 100 milliliters.

In addition, those uses with the highest potential for human exposure are required to meet the following turbidity requirements:

- An average of 2 NTU within a 24-hour period
- 5 NTU more than 5 percent of the time within a 24-hour period; and
- 10 NTU at any time

Table 4.7-9 shows water recycling criteria and treatment plant recycled water concentrations of total coliform bacteria and turbidity.

TABLE 4.7-9

Laguna Plant Recycled Water Quality for CDPH Water Recycling Criteria

| Constituent | Water Recycling Criteria | 24-hour Average ^a | 7-day Median ^a | Maximum in 30 days | Maximum Detected | Number of Samples |
|---|--|------------------------------|---------------------------|--------------------|------------------|-------------------|
| Total Coliform Bacteria (MPN ^c /100ml) | 2.2 (7 day Median) 23 (no more than 1 sample in 30 days) 240 (maximum) | NA | <2.2 | <23 | 240 | 1,619 |
| Turbidity (NTU ^d) | 2 (24-hour average) 5 (no more than 5 percent of samples in 24 hours) 10 (max) | 0.59 | NA | NA | 2.8 ^b | 2,429 |

Notes:

- a. When values were below detection, half the reporting limit used to calculate averages and medians except when all values were below detection. If all values were below detection, the values shown are the average and median of the reporting limits.
- b. Higher turbidities (up to 16 NTU) were measured in the treatment plant during late December 2005 through early January 2006 during a time of extreme Laguna flooding when the treatment plant was flooded and normal plant operations were not in effect.
- c. MPN is Most Probable Number. The MPN technique is used to estimate microbial population sizes in a liquid substrate.
- d. NTU is nephelometric turbidity unit.

The quality of the City's recycled water would meet or exceed criteria adopted by the CDPH to be protective of human health. Recycled water would be treated and tested in accordance with California's laws and regulations governing water reuse to assure that the water quality meets the State's health standards. The Laguna Plant, which produces disinfected tertiary recycled water, conforms to all of the treatment regulations contained in the CDPH water recycling criteria.

Human Health Risk Assessment (HHRA)

Refer to the Methodology Section for a description of the exposure pathways, exposure parameters, and an understanding of the conservative nature of the risk assessment methodology. See the HHRA in Appendix F of the Discharge Compliance Project Draft EIR (State Clearinghouse #2002072046) for a more detailed analysis.

The HHRA calculated risks for current and future recreationists and residents who could be exposed to recycled water. Possible human exposure pathways evaluated in the HHRA include incidental ingestion and dermal contact of surface water by recreationists and ingestion of plants, fish, and surface water

or groundwater, as well as inhalation and dermal contact with surface water or groundwater used for showering by residents.

The HHRA in the DCP Draft EIR is the appropriate risk assessment for the SSP, because it includes all exposures and risks that may be experienced by residents and recreationists in Sonoma County. The exposure from the SSP is less than, and a subset of, the exposure represented in the DCP HHRA. The results of the HHRA provide quantitative estimates of cancer risk and non-cancer hazards, as well as a qualitative discussion of human health threats for pathogens and non-regulated chemicals that may be present in recycled water. Potential cancer risks and potential non-cancer hazards are separately calculated using standard methods from U.S.EPA. These equations are consistent with the CalEPA's equations in CalTOX, a multimedia total exposure model (CalEPA, 1994).

For carcinogens, intake calculations average the total cumulative dose over a lifetime (70 years * 365 days/year). For non-carcinogens, individuals are assumed to be exposed for 350 days (ingestion of produce) and during the discharge season of 266 days (ingestion of drinking water, inhalation and dermal contact while showering) of the year. Residential exposure was modeled for an adult for 30 years, a child for 6 years, and a combination of the two for 36 years.

Cancer risks are estimated by multiplying exposure estimates for carcinogenic chemicals by corresponding cancer slope factors. The result is a risk estimate expressed as the incremental increase in the odds of developing cancer. If the additional risk (or odds) of developing cancer is less than 1 in one hundred thousand (1×10^{-5}), then this risk is considered less than significant, and no further analysis need be performed.

The incremental risk of cancer from exposure to recycled water from the storage component is shown in Table 4.7-10 and calculated to be, at maximum, 8×10^{-6} . This risk is less than the significance threshold, and therefore considered to be less than significant.

Chronic non-cancer hazard indices are calculated by dividing exposure estimates by reference doses. Reference doses are estimates of highest exposure levels that would not cause adverse health effects even for sensitive populations and if exposures continue over a lifetime. The ratio of exposure to reference dose is termed the hazard quotient (HQ). A HQ greater than 1.0 indicates an exposure greater than that considered safe. Impacts of exposure to multiple chemicals are accounted for by adding estimated HQs for non-carcinogenic chemicals that affect the same target organ or tissue in the body. Addition of HQs for chemicals that produce effects in similar organs and tissues results in a hazard index (HI) that reflects possible cumulative hazards. The incremental risk of non-cancer hazards from exposure to recycled water from the storage component is shown in Table 4.7-10 and calculated to be, at maximum, 0.11. This risk is less than the significance threshold, and therefore considered to be less than significant.

TABLE 4.7-10
Human Health Risk Assessment Results for Storage Component

| | Incremental Chronic Cancer Risk | Incremental Chronic Non-Cancer Hazard Index (HI) |
|---------------------------|--|---|
| Threshold of Significance | 1×10^{-5} | 1.0 |
| Residential Adult + Child | 8×10^{-6} | 0.06 |
| Residential Child | 2×10^{-6} | 0.11 |
| Recreational Adult | 4×10^{-8} | 0.01 |
| Recreational Teen | 2×10^{-8} | 0.01 |

Source: Discharge Compliance Project Draft EIR Section 4.7 Public Health and Safety and Appendix F, Human Health Risk Assessment.

Total incremental lifetime cancer risk and incremental non-cancer hazard estimates for residential adults and adolescents are less than the threshold of significance.

These risks are primarily due to the ingestion of arsenic in groundwater used as drinking water and ingestion of arsenic in fish and shellfish, as well as exposure to two other chemicals, n-nitrosodimethylamine (NDMA), and Bis(2-ethylhexyl)phthalate (BEHP). A discussion of each of these chemicals, as well as non-cancer hazards, pathogens, and non-regulated compounds is provided in the sections below.

Arsenic

The current EPA MCL for arsenic in drinking water is 10 µg/L. Recycled water maximum concentration is 2.9 µg/L, 14 percent above background concentrations in surface waters. Toxicity criteria currently established for arsenic are very restrictive and suggest substantial risk for exposure to arsenic in many residential situations. As an example, CalEPA has established a Public Health Goal (PHG) for arsenic in drinking water of 0.004 µg/L, a value far below detection limits for currently available methods of analysis, and well below concentrations of arsenic commonly found in public water supplies.

Arsenic contributes to both the incremental cancer risk and the incremental non-cancer hazard index listed in the Table 4.7-10. Arsenic is responsible for approximately 20 percent of the incremental cancer risk and approximately 3 percent of the incremental non-cancer hazard for a residential adult.

NDMA

Maximum detected NDMA concentrations were 12 parts per trillion and near the lower limits of what can be detected with current

methods. California OEHHA has recently (2006) developed a Public Health Goal for NDMA of 3 ppt. Although NDMA is not expected to volatilize and/or photodegrade rapidly in surface waters, it is also not expected to adsorb to sediments, and not expected to bioconcentrate. NDMA is of concern because of its high potency as a carcinogen in animal studies. CalEPA and EPA have developed very similar estimates for cancer potency for this chemical indicating that the current analysis is likely to be protective. NDMA is responsible for approximately 9 percent of the incremental cancer risk for a residential adult. It should be noted that NDMA has not been detected in stored recycled water.

BEHP

Although BEHP was not detected in any recycled water samples, it is included in the risk assessment, because its detection limits are greater than the Public Health Goal, and because it is a strong carcinogen. BEHP is a common laboratory contaminant that can leach from plastic lab ware. Recent improvements in laboratory methods have reduced this source of BEHP, and recent analyses of recycled water have not detected the chemical. Laboratory contamination is likely to have influenced past detections. Because half of the detection limit of BEHP was used in the risk calculations, actual risks due to any BEHP that may be present currently in recycled water are likely lower. BEHP is responsible for approximately 71 percent of the incremental cancer risk for a residential adult.

Pathogens

Regarding pathogens, the HHRA indicates that available data suggest that the numbers of pathogens in the Laguna Plant recycled water is within bounds considered by regulatory agencies as protective of human health (see analysis for CDPH Water Recycling Criteria above).

Pathogens that comprise the focus of the past and current HHRAs include total coliform, *giardia lamblia*, and *cryptosporidium parvum*. Coliform bacteria are used as indicator organisms for fecal contamination because they are easy to detect and the test is inexpensive. *Giardia lamblia* is the most common cause of waterborne disease in humans in the U.S. *Giardia* originates from a parasitic protozoan that is spread through the excrement of infected humans or animals. *Cryptosporidium parvum* is another parasitic protozoan that can be spread through the excrement of infected humans or animals.

Total coliform counts are routinely collected by the Laguna Plant, and the Plant remains in compliance with water recycling standards. The results of continued monitoring for total coliform also suggests that

concentrations of other pathogens, such as *Salmonella*, *Shigella*, *Legionella*, enteric viruses, and heterotrophic bacteria, have also not increased to disease causing levels.

In 2007, recycled water and receiving waters were sampled for cysts of *Giardia* and oocysts of *Cryptosporidium*. The results indicate that pathogen loads in recycled water have not increased from previous measurements and that the maximum numbers of cysts and oocysts in recycled water were an order of magnitude less than the numbers used to support pathogen risk evaluation in the 2002 HHRA. The results also indicate that the numbers of cysts and oocysts in the Russian River above current discharge points are similar to those in recycled water, suggesting that “background” concentrations of cysts in the river or groundwater would not be increased by discharge or infiltration of recycled water.

In addition, stored recycled water is filtered through soil and groundwater for at least 650 feet and approximately 50 years of travel time before reaching the closest municipal well (SCWA Sebastopol Road well).

Non-Regulated Chemicals

Toxicity criteria that can be used to quantify potential human health risks from chronic low-level exposure are not available for non-regulated chemicals. The risk assessment uses literature data from studies of receiving waters above and below WWTP discharges to qualitatively evaluate these chemicals.

Non-regulated chemicals include compounds which are known collectively as endocrine disrupting compounds (EDCs) and other xenobiotics. Potential EDCs include natural and synthetic hormones, chlorine-based chemicals, pesticides, and heavy metals. Non-regulated xenobiotics include pharmaceutically active compounds and personal care products such as drugs (e.g., pain relievers and antibiotics), insect repellents, alkylphenols (degradation products of household cleaners and shampoo), and caffeine.

Potential EDCs are exogenous substances or mixtures that possess properties that may alter the function(s) of the endocrine system and consequently cause adverse health effects in an organism, its progeny, or (sub)population. The World Health Organization (WHO) reports that it is plausible that exposure to EDCs could damage certain reproductive and developing systems in humans (WHO 2002). However, uncertainty exists in establishing links between exposure to EDCs at very low environmental concentrations and specific adverse human health effects. In addition, insufficient data exist to evaluate effects of mixtures of potential EDCs.

Studies have shown adverse effects due to exposure to EDCs in wildlife and laboratory animals. Evidence of adverse outcomes in wildlife and laboratory animals exposed to EDC warrants concern for human exposures (WHO 2002). The pattern of observable effects reported in numerous animal studies varies among species and among compounds. The studies suggest: the chemicals of concern may have entirely different effects on the embryo, fetus, perinatal organism than on the adult; the effects are most often manifested in offspring, not in the exposed parent. The timing of exposure in the developing organism is crucial in determining its character and future potential; and although critical exposure occurs during embryonic development, obvious manifestations may not occur until maturity (Colborn and Clement 1992; Schmidt 1994).

A literature review of non-regulated chemicals for the DCP was performed and summarized in a state of the science report on xenobiotics (see *TM D-8, Xenobiotics Update* in Volume 6 of the Discharge Compliance Project Draft EIR).

An increasing body of evidence exists confirming that common drugs, components of consumer products and other xenobiotics are present at detectable concentrations in wastewater and in receiving water bodies. Although studies have indicated that agriculture and industrial activities are the most important source of surface water contamination by these non-regulated chemicals (Wandan and Zabik, 1996), particularly endocrine disrupting compounds (EDCs), additional concern over non-regulated chemicals discharged to surface water bodies by WWTPs also exists. In a recent study, the United States Geological Survey (USGS) collected and analyzed water samples from 139 streams considered susceptible to contamination by xenobiotics from various wastewater sources (Kolpin 2002). The USGS analyzed for 95 chemicals and found that one or more of pharmaceuticals, hormones or other organic wastewater contaminants were detected in 80 percent of the streams sampled. Mixtures of chemicals were common. The most frequently detected chemicals were cholesterol, coprostanol (a fecal sterol), N-N-diethyltoluamide (insect repellent), caffeine, triclosan (disinfectant), tri(2-chlorethyl)phosphate (fire retardant), and 4-nonylphenol (detergent metabolite).

Non-regulated chemicals are usually present at very low environmental concentrations requiring sophisticated analytical techniques for detection. For example environmental levels of natural and synthetic estrogens are typically reported in nanograms per liter (parts per trillion) and below. Standard analytical methods are unavailable for most of these compounds. However, for detectable compounds, the ability to detect non-regulated chemicals at very low concentrations has outpaced the scientific and regulatory communities' abilities to determine whether typical concentrations in receiving

waters are a health hazard for humans and wildlife. The significance of non-regulated chemicals in water is an ongoing area of research by the EPA and other regulatory agencies. Regulatory agencies have not developed standards or adjusted existing standards to address non-regulated chemicals due to insufficient data to evaluate potential effects of exposure to humans or the environment. Any regulation of these chemicals will likely not occur for several years, if at all.

Concern about the possible health effects of non-regulated chemicals in the environment exists, but no evidence directly links typical environmental concentrations of these chemicals to adverse human health effects. Based on studies at other WWTPs, non-regulated chemicals in recycled water from the Laguna Plant are expected to be present only at very low concentrations. Existing standards and/or regulatory agency risk assessment methodologies are not yet capable of quantitatively evaluating risk to humans potentially exposed to non-regulated chemicals at these low concentrations.

EDCs include compounds that may interfere with hormones that control sexual reproduction and development as well as thyroid, cortisol, insulin or other growth regulators. Thus far, EDCs have been the primary health concern of the non-regulated xenobiotics in the environment since endocrine function can be influenced by very low concentrations of hormones in humans and wildlife. While potential effects are uncertain, some evidence indicates that concentrations of some xenobiotics detected in streams and rivers are well below usual pharmaceutical and/or ambient doses from other societal sources and are therefore unlikely to cause human health effects.

Potential EDCs

Although a few reports indicate non-estrogenic pharmaceutical impact on the environment, the primary concern of xenobiotics in the environment is focused on endocrine-disrupting compounds. EDCs can exert physiological effects at very low concentrations, yet the relative potency of EDCs can vary by orders of magnitude.

Some indication of the estrogenicity of effluent from the Laguna Plant and nearby receiving waters is available in studies by de Vlaming et al (2006) and Lazorchak 2006), Lazorchak, and Smith (2004). In the former study, receiving water samples were collected from a number of receiving streams in California including the Russian River, Laguna de Santa Rosa and Santa Rosa Creek. These waters were used in a test of vitellogenin gene expression. Vitellogenin (Vtg) is a precursor of fish egg yolk proteins and is used as an indicator of estrogenic activity. Each of the water samples was tested for its ability to induce Vtg in juvenile rainbow trout. Juvenile

trout are used because Vtg expression is minimal in these animals without some outside stimuli.

Water samples were collected along the Laguna de Santa Rosa near Delta Pond below the direct discharge from the Regional Facility. Water was also collected from Santa Rosa Creek at Willowside Road and along the Laguna de Santa Rosa at Occidental Road. Santa Rosa Creek is not influenced by discharge from the Laguna Plant and the location at Occidental Road is upstream of the discharge. None of these water samples showed any statistically significant estrogenicity. Absolute values for Vtg expression were actually highest for the two locations (Santa Rosa Creek and Occidental Road) which would not be influenced by discharge from the Laguna Plant. At face value, these results suggest that the Laguna Plant is not a significant source of estrogenic chemicals. A number of factors, however, make this conclusion preliminary.

In the second study, samples of effluent from the Laguna Plant were tested for their ability to induce Vtg expression in fathead minnows, a common aquatic test species. Effluent samples did not induce Vtg expression in male fish (which ordinarily do not produce Vtg) above that induced by moderately hard water alone (no effluent present). Thus, the study suggests that estrogenicity of effluent from the Laguna Plant is low. This study obviates any influence due to dilution, degradation, or binding to sediments in receiving waters and thus is a stronger indication that effluent from the Laguna Plant does not contain significant amounts of estrogenic chemicals, but should still be viewed as suggestive only.

Note that in the above study, 13 out of 50 effluent samples from other sources did induce Vtg expression in fathead minnows. Similarly, several receiving waters also induced significant expression of Vtg in juvenile rainbow trout in the study discussed earlier. Thus, the lack of estrogenicity in the Santa Rosa samples and Laguna de Santa Rosa and Russian River water samples was not a consequence of the assays themselves being performed inappropriately.

Potential Risks and Hazards

Recycled water samples from the Laguna Plant were analyzed for some xenobiotics. A few potential EDCs were reported at low concentrations in undiluted recycled water in samples collected during December 1997 through April 2002. Potential detected EDCs include two pesticides (endosulfan and lindane), although neither of these pesticides was detected in most recent sampling efforts, and one metal (lead). These

chemicals were detected infrequently and at concentrations close to the detection limits of the analytical methods. These compounds are evaluated quantitatively and included in the standard risk assessment methods as discussed above, although toxicity criteria used are not based on endocrine disrupting potential.

Currently, xenobiotics such as personal care products, pharmaceuticals, and household chemicals are not monitored in recycled water from the Laguna Plant. Research conducted on the Santa Ana River in southern California provides insight into the fate of these chemicals once they enter the aquatic environment. A study by Gross et al. (2004) evaluated the occurrence and fate of chemicals having endocrine-disrupting properties to the Santa Ana River. Environmental conditions are generally similar to those associated with the DCP, in that recycled water from a WWTP is discharged to a shallow, unlined river near the coast of California. The contaminants studied included pharmaceuticals, their metabolites, and hormones.

While ibuprofen and its metabolites were regularly detected at concentrations in the parts per billion range, hormones were not detected in WWTP recycled water samples above the detection limit of 2 ng/L (parts per trillion). Notably, transport in the Santa Ana River for 11 kilometers resulted in significant attenuation of all contaminants. Attenuation is expected to be significant in shallow, unlined rivers similar to the Santa Ana River and the Russian River. It should also be noted that WWTPs utilizing tertiary treatment were generally associated with concentrations of pharmaceuticals below those found in recycled waters from WWTPs using secondary (biological) treatment only.

In a second study conducted on the Santa Ana River by Lin and Reinhard (2005), photodegradation rates for 5 pharmaceuticals and four estrogenic compounds were investigated. Half-lives in river water ranged from 1.1 minutes to 15 hours. Half-lives from photolysis in Santa Ana River water were comparable to less than 2 days of continuing California midday sunlight for all target chemicals. Results are most applicable to shallow clear water with minimal sunlight attenuation. The study also suggested that biological degradation (microbial) is likely contributing to short half lives half-lives under natural conditions.

Based on studies at other WWTPs non-regulated xenobiotics present in recycled water at the Laguna Plant are expected to be present only at very low concentrations and concentrations

are expected to be reduced or possibly eliminated through various advanced treatment technologies (tertiary treatment). Although concern about the possible health effects of non-regulated chemicals in the environment exists, thus far, no firm evidence links typical environmental concentrations of these chemicals to adverse human health effects. Existing standards and/or regulatory agency risk assessment methodology cannot quantitatively evaluate risk to humans potentially exposed to non-regulated chemicals that may be present at very low concentrations in recycled water due to lack of information about effects at such low levels. Available information regarding non-regulated chemicals is therefore considered too speculative to determine the significance of impacts.

Analysis of the Percent Water of Recycled Water Origin at the Source of Groundwater Wells

The potential for the storage component to degrade groundwater quality at existing or future wells resulting in public health hazards is evaluated in Section 4.5, Groundwater. Briefly, results of that analysis at downstream municipal wells are shown in Table 4.7.11.

TABLE 4.7-11

Percentage of Cumulative Contribution from Recycled Water at Municipal Well:

| Municipal Well | Cumulative Contribution from SSP Ponds under Steady State Conditions |
|--------------------------------------|---|
| SCWA Sebastopol Rd Well | 3 percent |
| SCWA Occidental Rd Well | 0.1 percent |
| SCWA Todd Rd Well | 3 percent |
| Sebastopol #6 | 0.1 percent |
| Sebastopol #7 | 0.1 percent |
| Future, anywhere in Santa Rosa Plain | 3 percent |

Note: Water supply from the SCWA wells in the Santa Rosa Plain is blended with supply from their Russian River Ranney collectors.

The estimated cumulative recycled water contribution for each pond would be less than 5 percent over short durations and less than 10 percent over long periods of time. Therefore, the storage component would have a less-than-significant impact on municipal wellfields' groundwater quality.

Domestic wells, which pump from the shallow aquifer, would not be affected by potential pond seepage because the hydraulic gradient near the storage pond sites is dominated by the deep municipal pumping from the SCWA wells. Gradients are predominantly vertical near each pond, thus groundwater does not flow laterally to nearby domestic wells. Therefore, impacts are found to be less than significant on shallow groundwater quality.

In summary, the potential for the storage component to expose the public to chemicals, radionuclides, pathogenic viruses, bacteria, or other disease organisms at concentrations detrimental to human health is considered to be less than significant. The quality of the City's recycled water would meet or exceed Water Recycling Criteria adopted by the CDPH to be protective of human health. The HHRA concluded that incremental cancer risks and the incremental non-cancer hazard index were below the thresholds of significance. The analysis of the percent water of recycled water origin at the source of groundwater wells also indicates a less-than-significant impact on public health from drinking water wells downstream of the storage ponds.

Analysis: *Pump Station Component - No Impact: KF1, KF2, BF1, BF2, and AF*

The pump station components at KF1, KF2, BF1, BF2, and AF would not release recycled water to the environment and thus the public would not be exposed to recycled water.

Mitigation: No mitigation is needed.

Impact: 7.2. Will the SSP expose workers or the public to hazards from a known hazardous waste site?

Analysis: *Storage Component - Less than Significant: KF1, KF2, BF1, and BF2*

Database reports for the area near the KF1 storage component identified three known hazardous waste sites within 500 feet of construction. These sites include the California Department of Transportation (Caltrans) facility at 5611 Sebastopol Road, the Pipeline Excavators company at 5715 Sebastopol Road, and the Weeks Drilling and Pump company at 6100 Sebastopol Road. The Caltrans facility at 5611 Sebastopol Road is currently a closed LUST site. The facility was also listed in the SLIC and Envirostor databases. The sites at 5715 and 6100 Sebastopol Road are active LUST sites.

Database reports for the area near the KF2 storage component identified one historical underground storage tank (historical UST) associated with the Kelly Farm Irrigation Site. The site was not listed in any other databases that would indicate a release of hazardous materials from the UST. Therefore, it is unlikely that contamination from this historical UST site would be encountered during storage component construction.

Database reports for the area near the BF1 and BF2 storage components identified one historical UST associated with the Brown Farm Irrigation Site. The site was not listed in any other databases that would indicate a release of hazardous materials from the UST. Therefore, it is unlikely that contamination from this historical UST site would be encountered during storage component construction.

In accordance with Project Measure 3.2.11, if contamination from these sites could be present during storage component construction, a Construction Management Program would provide for the identification, assessment and management of potentially contaminated soil and groundwater and

minimization of potential impacts to public health and safety. This measure would reduce temporary hazards from known hazardous waste release sites to a level that is less than significant.

Pump Station Component - Less than Significant: KF1, KF2, BF1, and BF2

The known hazardous waste sites described in the storage component analysis for KF1, KF2, BF1, and BF2 are also located in the vicinity of the associated pump station components. In the event that contamination from these sites would be present during pump station component construction, Measure 3.2.11 is included as part of the SSP. This measure would reduce temporary hazards from known hazardous waste release sites to a level that is less than significant.

Storage Component - No Impact: AF

Database reports for the area near the AF storage component did not identify any known hazardous waste sites within 500 feet of the new storage pond. As a result, neither workers nor the public would be exposed to hazards from a known hazardous waste site during ground disturbance.

Pump Station Component - No Impact: AF

Database reports for the area near the AF pump station component did not identify any known hazardous waste sites within 500 feet of the new storage pond. As a result, neither workers nor the public would be exposed to hazards from a known hazardous waste site during ground disturbance.

Mitigation: No mitigation is needed.

Impact: 7.3. Will the SSP increase potential exposure of the public to hazardous materials due to a chemical release during their routine transport, use, storage, or disposal?

Analysis: *Storage Component - Less than Significant: KF1, KF2, BF1, BF2, and AF*

Minor amounts of hazardous materials would be used during construction and operation of the proposed Project (e.g., fuel for vehicles). Any hazardous materials used in the construction or operation of the storage components at KF1, KF2, BF1, BF2, or AF would be stored and used in accordance with State and Federal regulations regarding hazardous materials. Compliance with Federal and State hazardous materials laws and regulations would minimize the risk to the public and to the environment presented by these potential hazards, therefore the construction phase impact would be less than significant.

The storage component would not emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or wastes. In addition, the storage components at KF1, KF2, BF1, BF2, or AF would not be located within ¼ of a mile of any known schools. The impact would be less than significant.

Pump Station Component - Less than Significant: KF1, KF2, BF1, BF2, and AF

Similar to the analysis for the storage components described above, minor amounts of hazardous materials would be used during pump station construction and operation. Any hazardous materials used in the construction or operation of the pump station components would be stored and used in accordance with State and Federal regulations regarding hazardous materials.

The pump station component would not emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or wastes. In addition, the pump station components at KF1, KF2, BF1, BF2, or AF would not be located within ¼ of a mile of any known schools. The impact would be less than significant.

Mitigation: No mitigation is needed.

Impact: 7.4. Will the SSP expose the public to safety hazards associated with operation of heavy machinery, vehicles, or equipment; or creation of an accessible excavation; or creation of an accessible open body of water?

Analysis: *Storage Component - Less than Significant: KF1, KF2, BF1, BF2, and AF*

Storage component construction at KF1, KF2, BF1, BF2, or AF would require the operation of heavy machinery, vehicles, and equipment. Construction would occur on a City-owned property that would not be accessible to the public, therefore, the exposure of the public would be limited. Nevertheless, general safety practices would protect both workers and the public from the hazards associated with operation of this equipment during construction activities. A Construction Management Program (Measure 3.2.11) is included as part of the SSP. The Construction Management Program would provide for the guarding of excavations by readily visible barricades, rails, or other effective means for worker and public safety. This measure would reduce exposure of workers and the public to safety hazards associated with operation of heavy machinery, vehicles, or equipment. The ponds would be fenced with chain link fence to prevent access to an open body of water both during construction and operation. Impacts are considered less than significant.

Pump Station Component - Less than Significant: KF1, KF2, BF1, BF2, and AF

Similar to the analysis for the storage components described above, pump station component construction at KF1, KF2, BF1, BF2, or AF would also require the operation of heavy machinery, vehicles, and equipment. A Construction Management Program (Measure 3.2.11) is included as part of the SSP. The Construction Management Program would reduce exposure of workers and the public to safety hazards associated with operation of heavy machinery, vehicles, or equipment.

Mitigation: No mitigation is needed.

Impact: 7.5. Will the SSP expose the public to a flooding hazard?

Analysis: *Storage Component - Less than Significant: KF1, KF2, BF1, BF2, and AF*

The design and construction of the storage pond embankments at KF1, KF2, BF1, BF2, and/or AF would meet the design, construction, and operational standards of safety established by the state Division of Safety of Dams (DSOD). The embankment design would substantially reduce the possibility of failure by the major causes of failure, including seismic events, unstable slope conditions, or damage from corrosive or expensive soils, so that the probability of such an event is considered extremely remote. The DSOD believes that adherence to these design and construction standards greatly reduces the probability of embankment failure and is protective of public safety (Head 1996).

During operation, the reservoirs would be visually inspected on a regular basis to ensure that the embankments, control structures, access roads, and monitoring instrumentation are maintained. Impediments would be removed from the spillway and other control structures as soon as they are observed.

Maintenance, surveillance, and preparedness for emergencies are recognized as important activities that insure the safety of dams. Although failure is extremely unlikely, the California Office of Emergency Services requires preparation of an inundation map and development of a downstream evacuation plan for areas within the potential inundation area (California Water Code §6002, and California Government Code §8589.5). An inundation map and downstream evacuation plan would be prepared as required by the Office of Emergency Services (Measure 3.2.13). With preparation of the map and plan, along with design and construction in accordance with standards set by the DSOD and implementation of the maintenance and surveillance measures, the risk of a flooding hazard from embankment failure is determined to be less than significant.

Analysis: *Pump Station Component – No Impact: KF1, KF2, BF1, BF2, and AF*

Pump stations would not release recycled water to the environment, therefore no flooding risk exists. The analysis of potential flooding from a pipeline rupture is presented in the Surface Water Hydrology Section. The only facility impacted by a pipe rupture would be the road in which it is located. In the event of an earthquake, the primary impact on the road would be due to ground shaking or rupture rather than a pipeline break.

Mitigation: No mitigation is needed.

Impact: 7.6. Will the SSP expose people or structures to a risk of loss, injury, or death involving wildland fires?

Analysis: *Storage Component – No Impact: KF1, KF2, BF1, BF2, and AF*

The storage components at KF1, KF2, BF1, BF2, and AF are not located in wildland areas or in high or very high fire hazard zones. There would be no impact.

Pump Station Component – No Impact: KF1, KF2, BF1, BF2, and AF

The pump station components at KF1, KF2, BF1, BF2, and AF are not located in wildland areas or in high or very high fire hazard zones. There would be no impact.

Mitigation: No mitigation is needed.

Impact: 7.7. Will the SSP increase the potential exposure of the public to disease vectors (i.e., mosquitoes)?

Analysis: *Storage Component - Less than Significant: KF1, KF2, BF1, BF2, and AF*

The storage components at KF1, KF2, BF1, BF2, and AF would create potential habitat for mosquitoes. Measure 3.2.12, Mosquito Prevention Program, requires that the SSP comply with the requirements of the Marin/Sonoma Mosquito Abatement District and the Vector Biology and Control Branch of the California Department of Public Health. Implementation of these requirements would suppress mosquito populations below the threshold level required for disease transmission or nuisance tolerance level. Thus, this impact would be less than significant.

Analysis: *Pump Station Component – No Impact: KF1, KF2, BF1, BF2, and AF*

Neither construction nor operation and maintenance of the pump station components at KF1, KF2, BF1, BF2, and AF would create an open body of water where mosquitoes could breed.

Mitigation: No mitigation is needed.

Impact: 7.8. Will the SSP create a safety hazard for people residing or working near a public or private airport or airstrip?

Analysis: *Storage Component – No Impact: KF1, KF2, BF1, BF2, and AF*

The storage components at KF1, KF2, BF1, BF2, and AF would not be located within an airport referral area boundary of the Sonoma County CALUP. There would be no impact.

Pump Station Component – No Impact: KF1, KF2, BF1, BF2, and AF

The pump station components at KF1, KF2, BF1, BF2, and AF would not be located within an airport referral area boundary of the Sonoma County CALUP. There would be no impact.

Mitigation: No mitigation is needed.

No Project

Impact: 7.1 through 7.8. Will the No Project component impact public health and safety based on evaluation criteria 1 through 8?

Analysis: *No Impact*

The No Project component would have no effect on public health and safety because there would be no change in use of recycled water and no construction activity.

Mitigation: No mitigation is needed.

CUMULATIVE IMPACTS

The following projects were determined to have potential cumulative impacts on public health and safety when combined with the SSP:

- City of Santa Rosa Discharge Compliance Project;
- City of Santa Rosa Urban Reuse Project;
- Sonoma County Water Agency North Sonoma County Agricultural Reuse Project;
- Sonoma County Water Agency Water Supply, Transmission, and Reliability Project;
- Town of Windsor Eastside Road Storage Project.

In addition to these projects, any construction project could have cumulative impacts related to safety hazards associated with exposure to hazardous materials or waste or operation of construction equipment.

Impact: 7.1C. Will the SSP plus cumulative projects expose the public to chemicals, radionuclides, pathogenic viruses, bacteria, or other disease organisms, at concentrations detrimental to human health?

Analysis: *Less than Significant*

The water recycling projects listed above have the potential to increase exposure of the public to constituents in recycled water. However, each project is sited in a different location, so levels of exposure would not be expected to be additive. In addition, standards set by the CDPH for exposure to recycled water are protective of workers who are exposed for long periods every day for a long duration exposure, and the Human Health Risk Assessment results are based on maximum and multiple exposure pathways. Therefore, the SSP has been evaluated against standards intended for long duration exposures and cumulative impacts need not be considered further. Other recycled water projects would be have to meet Title 22 and Regional Board requirements, so potential impacts of those projects would have to be fully mitigated. Thus the cumulative impact would not be significant, and no further mitigation is required.

Impact: 7.2C. Will the SSP plus cumulative projects expose workers or the public to hazards from a known hazardous waste site?

Analysis: *No Impact*

This exposure would be a site-specific hazard and is not subject to any additional or cumulative impacts from other projects.

Impact: 7.3C. Will the SSP plus cumulative projects increase potential exposure of the public to hazardous materials due to a chemical release?

Analysis: *Less than Significant*

Use of hazardous materials for construction and operation of SSP and all other cumulative projects must be fully in accordance with applicable laws, and since these laws are protective of public safety considering all hazardous chemical use, cumulative impacts would be less than significant.

Impact 7.4C. Will the SSP plus cumulative projects create a safety hazard associated with machinery, excavations, or bodies of water?

Analysis: *No Impact*

This impact would be a site-specific hazard and is not subject to cumulative impacts from other projects.

Impact: 7.5C. Will the SSP plus cumulative projects expose the public to a flooding hazard?

Analysis: *Less than Significant*

The SSP storage reservoirs would be constructed according to standards set by the DSOD. Inundation maps and emergency evacuation plans would be prepared in accordance with requirements of the Office of Emergency Services. Because the DSOD and the Office of Emergency Services have statewide jurisdiction and similar projects in the area would also be subject to the Division's and Office's requirements, cumulative impacts would be less than significant.

Impact 7.6C. Will the SSP plus cumulative projects create a safety hazard involving wildland fires?

Analysis: *No e Impact*

This impact would be a temporary (during construction), site-specific hazard and is not subject to cumulative impacts from other projects.

Impact: 7.7C. Will the SSP plus cumulative projects increase the potential exposure of the public to disease vectors (i.e., mosquitoes)?

Analysis: *Less than Significant*

The SSP storage reservoirs would be constructed according to guidelines set by the Marin/Sonoma Mosquito Abatement District and the Vector Biology and Control Branch of the CDPH. Because the Abatement District has jurisdiction over the area subject to this impact and similar projects in the area

would also be subject to the Abatement District's requirements, the Abatement District will be able to manage mosquito habitat sufficiently to reduce cumulative impacts to a less-than-significant level.

Impact **7.8C. Will the SSP plus cumulative projects create a safety hazard for people residing or working near a public or private airport or airstrip?**

Analysis: *No Impact*

This impact would be a site-specific hazard and is not subject to cumulative impacts from other projects.

SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

No significant Public Health and Safety impacts have been identified for the SSP.

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USGS, Fire Planning and Mapping Tools Viewer