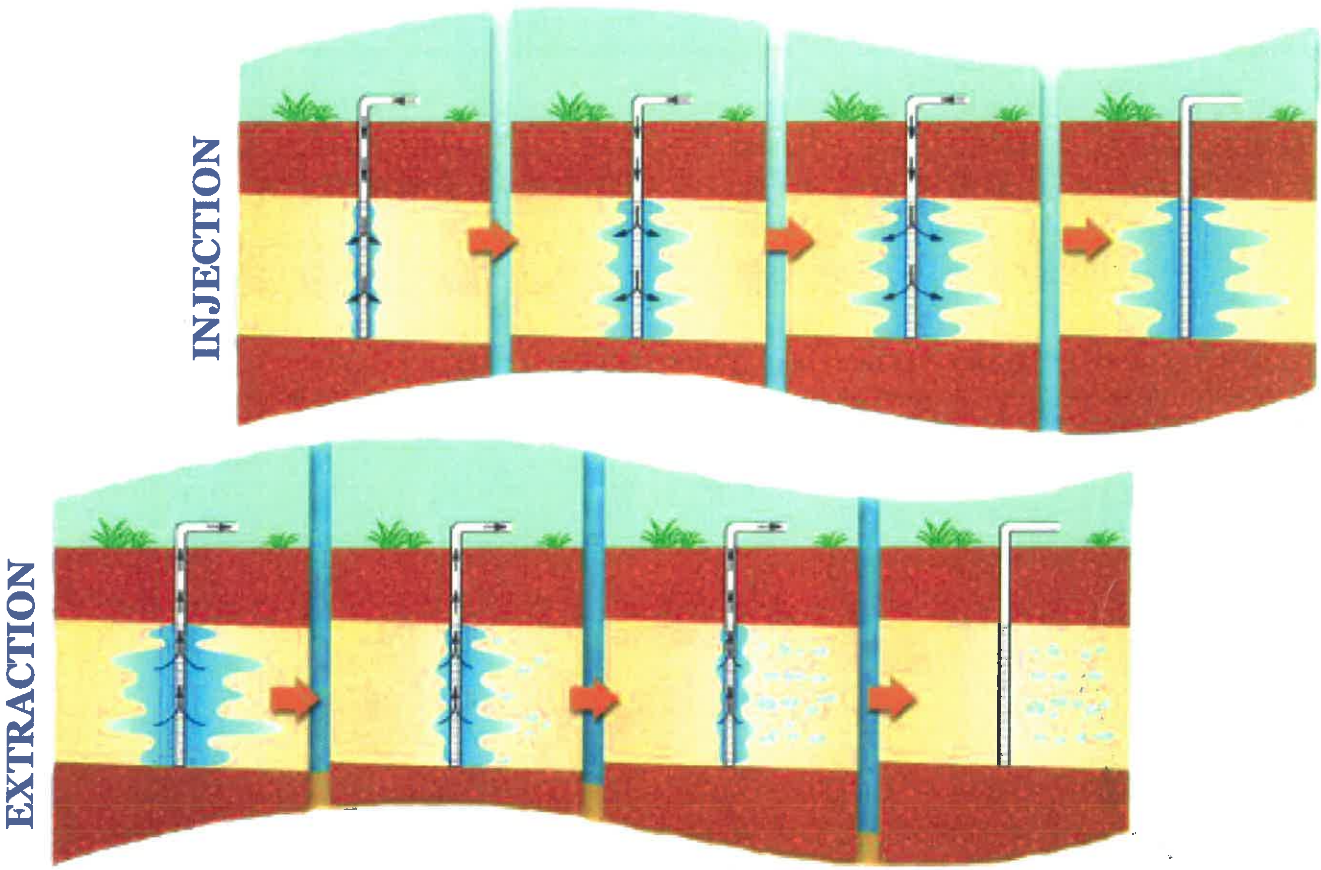
Aquifer Storage and Recovery Program Draft Environmental Impact Report

SCH NO. 2009072018



CITY OF ROSEVILLE CALIFORNIA

December 2011

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CHAPTER 1.0
Introduction

1.1 Project Background

This Draft Environmental Impact Report (DEIR) examines the potential environmental impacts of a proposed citywide Aquifer Storage and Recovery (ASR) Program. The ASR Program is intended to maintain groundwater as a sustainable resource, improve the City of Roseville's (City) water supply reliability, and meet regional conjunctive use program goals. ASR is a process where treated surface water supply is injected by specially designed groundwater wells into the groundwater aquifer for storage and then later recovered for municipal use.

Over the past several decades, there has been increasing demand for water supplies in the City. At the same time, the City, and the surrounding region, has also been affected by:

- Extended drought and wet periods;
- Statewide push to dedicate surface water for environmental purposes;
- Declining groundwater levels statewide; and
- Ongoing and potential impacts to surface water quality and groundwater quality.

To address these challenges, and remain compliant with General Plan Policy, the City is proposing an ASR Program. Chapter 2.0 of this DEIR includes a complete project description.

1.2 Purpose and Intended Uses of this Draft Environmental Impact Report

The City has prepared this DEIR for the following purposes:

- To satisfy the requirements of the California Environmental Quality Act (CEQA), the CEQA Guidelines, and the City's procedures for implementing CEQA. CEQA requires preparation of an EIR when a proposed project would potentially result in a significant environmental impact. Public agencies are required to consider the information presented in the EIR when determining whether or not to approve a project.
- To inform the general public, the local community, responsible and interested public agencies, and the City's decision-making bodies (e.g., the Public Utilities Commission, and City Council) regarding the potentially significant environmental effects that could result from implementation of the proposed project, as well as possible measures to mitigate the significant effects; and alternatives to the proposed project that would avoid or substantially minimize significant impacts while feasibly attaining the basic objectives of the project.
- To enable the City to consider environmental consequences when deciding whether to approve the project.

- To serve as a source document for responsible agencies (e.g. the Central Valley Regional Water Quality Control Board) to issue permits and approvals as required for implementation of the project.

In summary, this document is intended to provide information that enables decision-makers and the public, to intelligently consider the environmental consequences of the proposed action. It identifies significant or potentially significant environmental impacts and ways those impacts can be reduced to less-than-significant levels, either through implementation of mitigation measures or selection of a project alternative. In a practical sense, EIRs are a tool for the public and regulatory agency staff to review and evaluate baseline conditions and project impacts through a process of full disclosure. Additionally, this DEIR provides the primary source of environmental information for the lead agency to consider when exercising any permitting authority or approval power directly related to implementation of the proposed project.

1.3 Type of EIR

This DEIR has been prepared to meet the requirements of a project-level EIR, as defined by Section 15161 of the State CEQA Guidelines. The project-level EIR examines the environmental impacts of the proposed project and focuses on changes in the physical environment that would result from implementation of the project, including its planning, construction, and operation. The City's intention in preparing this project DEIR is that no further environmental review under CEQA would be required for subsequent activities consistent with the proposed project (see State CEQA Guidelines Sections 15162–15164 and 15183). This would provide for the streamlined approval of projects proposed within the scope of the proposed ASR Program and this DEIR, as described in Section 1.4 below.

1.4 Prior CEQA Approvals

Two CEQA documents have been prepared by the City as part of examining the potential for a City ASR Program: 1) the Diamond Creek Well Project Initial Study/Mitigated Negative Declaration (IS/MND) (February 2002); and, 2) The City of Roseville Aquifer Storage and Recovery Demonstration Test Phase 2 Initial Study/Negative Declaration (IS/ND) (June 2005).

1.4.1 Diamond Creek Well Project IS/MND

The Diamond Creek Well project IS/MND was adopted by the City Council on May 1, 2002. This document addressed construction and operation of the Diamond Creek well located on Northpark Drive in the Diamond Creek Subdivision in the North Roseville Specific Plan area. According to the Diamond Creek Well IS/MND, this well and pump station was constructed to provide backup to existing surface water supplies during critically dry periods. In addition, the CEQA document for the Diamond Creek Well project also covered use of the well to gather information to help determine if groundwater conditions in the vicinity may be suitable for future development of an ASR Program. The Diamond Creek Well IS/MND covered not only well construction and operation as a backup water supply, but also testing for both water injection and extraction. This testing, which later became known as the ASR pilot-scale cycle test (Phase I Pilot Study), was performed from May 5 to September 20, 2004 and included monitoring injection and extraction volumes, water quality, and groundwater level changes to evaluate system performance for potential future ASR use.

1.4.2 City of Roseville Aquifer Storage and Recover Demonstration Test Phase 2 IS/ND

Following the Phase 1 Pilot Study which determined that the local aquifer has the capacity to accept, store, and release water for recovery consistent with ASR technology, the City and the Central Valley RWQCB (CVRWQCB) wanted to further assess ASR feasibility during a longer demonstration test. A longer test would yield more operational and water quality information for use in future planning of a city-wide ASR Program. Consequently, the City of Roseville Aquifer Storage and Recovery Demonstration Test Phase 2 (Phase 2 Test) IS/ND was prepared in collaboration with the RWQCB and adopted by City Council on August 3, 2005. This CEQA document examined potential impacts of prolonged testing involving six months of injection, four months of storage, and 10 months of extraction. The ASR Demonstration Test Phase 2 IS/ND concluded that no significant impacts would result from implementation of the Phase 2 Test. As a result, the Phase 2 Test was carried out beginning in winter 2005 following the pattern of injection and extraction cycles described above.

1.5 Scope of the EIR

The scope of this EIR was determined by consulting with interested parties and CEQA responsible and trustee agencies as follows:

- In 2008, meetings with the RWQCB were initiated and continued until shortly before release of the Draft EIR. These meetings were used to assist with defining the project, water quality thresholds of significance, related permit requirements and the scope of CEQA analysis. The goal was to ensure this DEIR would provide the water quality analysis required by the RWQCB to issue a Waste Discharge Permit (or a waiver thereof) for the project.
- A Notice of Preparation (NOP)/Initial Study (IS) was circulated for a 30-day comment period beginning on June 30, 2009. The NOP/Initial Study is included as Appendix A of this EIR.
- Two public scoping meetings were held on July 15, and July 29, 2009. Comments received during the scoping meetings and following the issuance of the NOP helped to determine the final scope of the DEIR. All comments received during the EIR scoping process are included in Appendix B of this DEIR.

Under the CEQA statutes and the State CEQA Guidelines, a lead agency may limit the discussion of environmental effects in an EIR when they are not considered potentially significant as long as a brief statement is included indicating the reasons why. Such a statement may be contained in an attached copy of the Initial Study (Public Resources Code Section 21002.1[e]; State CEQA Guidelines Sections 15128 and 15143). The Initial Study (Appendix A) contains these statements and "focuses" out the following issue areas where no significant or potentially significant impacts are identified:

- Aesthetics
- Agricultural Resources
- Air Quality and Global Climate Change
- Biological Resources
- Cultural Resources
- Geology and Soils
- Hazards and Hazardous Materials
- Land Use and Planning
- Mineral Resources
- Population and Housing
- Public Services
- Recreation
- Transportation/Traffic
- Utilities and Service Systems

As a result of the above scoping process which included review of existing information, analysis of less than significant effects as presented in the NOP/IS, meetings with RWQCB staff and review of NOP, and scoping meeting comments, it was determined that the issues of Hydrology and Water Quality (DEIR Chapter 4.2) and Noise (DEIR Chapter 4.3) should be fully evaluated in the DEIR. Impacts for all other issue areas were determined to be less than significant per the Initial Study analysis. All Initial Study mitigation measures have been incorporated into the Project Description, Section 2.2.6 as Environmental Commitments.

Consistent with CEQA Guidelines §15123, an EIR must identify areas of controversy known to the Lead Agency, including issues raised by the public and regulatory agencies. Generally, public comments have included concerns about the use of groundwater, primarily regarding potential health effects and water quality in general. These and other comments are summarized in Table 1-1.

TABLE 1-1. NOP COMMENT SUMMARY

Agency	Comments	Referenced in EIR
United Auburn Indian Community	In the event of discovery of historic cultural resources or human burials, the UAIC would like to be contacted immediately to provide input on the appropriate course of action.	Initial Study Checklist: Appendix A
Water Quality Control Board, Central Valley Region	Improved reliability implies no increase in City's water demand beyond that already allocated. If that's not the anticipated outcome, EIR needs to describe other appropriate impacts of required water treatment plant expansion and impacts to surface water discharge water quality.	2.0 Project Description 6.0 Alternatives
	Identify controls/mitigation strategy addressing potential overdraft of groundwater.	2.0 Project Description
	City is required to submit a Report of Waste Discharge at least 150 days prior to operating the ASR project.	2.0 Project Description
	City needs to complete an antidegradation analysis.	4.2 Water Quality
Department of Water Resources	Implementation should be coordinated to maintain consistency with regional efforts. EIR should document ASR as a method of maintaining groundwater as a sustainable resource, and improvement to the City's water supply reliability.	2.0 Project Description
Sacramento Groundwater Authority	Encourage the City of Roseville to participate in the Sacramento Regional Contamination Issues Committee, and in the State and Federal land surface subsidence monitoring efforts.	2.0 Project Description
Placer County Air Pollution Control District	Short-term construction impacts should be mitigated in compliance with PCAPCD rules and regulations.	Initial Study Checklist: Appendix A

Public Comments	Referenced in EIR
Why not use other storage systems (above ground) instead of aquifer?	6.0 Alternatives
Why not store water instead of releasing/overflow of Folsom on wet years?	6.0 Alternatives
When aquifer (well) water was supplied to Sun City as a test use, there were many negative consequences. Address these issues, i.e., skin itch and rash, and too much salt in water.	4.2 Water Quality
How often will aquifer water be tested before distribution?	2.0 Project Description
Major concern is the sodium content in well water.	4.2 Water Quality
Sun City families should not be considered a standard family in size or make-up in your studies regarding consumption.	Consumption standards are not an issue evaluated in the ASR EIR.
Address potential effect of ASR water with blood pressure medicine. If put on this water again, we need to be notified so I can notify my doctor and see about bottled water or a home purification system.	4.2 Water Quality
The first option should be above-ground storage. Underground storage should be absolutely the last option.	6.0 Alternatives

Public Comments	Referenced in EIR
Maximize use of ASR water for irrigation uses, etc. - other than household use.	6.0 Alternatives
Blend ASR water with surface water at a 1:4 ratio in storage/blending tanks.	2.0 Project Description 4.2 Water Quality
DEIR needs to clearly state all the potential uses of groundwater, how much used and when.	2.0 Project Description
Explain how/if the State Water Resources Control Board has oversight of this process.	2.0 Project Description
What exactly are the "Regional Conjunctive Use Program Goals" Where in California has ASR been used and for how long?	2.0 Project Description
Identify "any" health issues or risks associated with the various groundwater properties.	4.2 Water Quality
Discuss the issue of declining groundwater levels.	2.0 Project Description
What types of monitoring programs will be established?	2.0 Project Description 4.2 Water Quality
Discuss project cost, how it will be funded, and whether there is enough surface water to meet current demands.	2.0 Project Description
Explain how much surface water will be injected, how it will be measured and monitored, and whether the amount recovered will exceed the amount injected.	2.0 Project Description
Explain the process for water treatment prior to injection and extraction.	2.0 Project Description
Mitigation should be treatment of the extracted amount prior to delivery. If this is not feasible, explain why.	2.0 Project Description 6.0 Alternatives
Will the ASR program create the need for expansion of the Water Treatment Plant?	2.0 Project Description
Explain the "use or lose" component of the City's surface water supply.	2.0 Project Description
Address potential impacts to biologic resources.	Initial Study Checklist: Appendix A
Include exhibit showing the well discussion/location in the Del Webb Specific Plan EIR.	Appendix F
Identify sources of surface water supply contract limitations, etc. Implications of future annexations, using RHNA numbers.	2.0 Project Description 5.0 CEQA Considerations
Compare ASR water quality to the surface water.	4.2 Water Quality
Identify measures to neutralize or mitigate water quality contamination in the aquifer?	4.2 Water Quality
Identify surface water supply and demand data, including sources of surface water and demand at build-out.	2.0 Project Description
What are cumulative demand amounts for potential annexations being planned?	2.0 Project Description
Are new development "supply and demand" years based on "dry years"?	2.0 Project Description
Would there be policy changes associated with project? Flexible Long-term Water Supply Planning Policy?	2.0 Project Description
Include information about the pilot test, and concerns raised during the pilot test.	1.0 Introduction
Will public be notified of distribution of groundwater in the future?	2.0 Project Description

Public Comments	Referenced in EIR
Please analyze and discuss water quality issues including cumulative impacts associated with: urban runoff, drainage and infiltration of stormwater, pesticides, traffic pollutants, reclaimed water, rail yards, golf courses, agriculture, including livestock.	4.2 Water Quality
Address atrazine, DBP, arsenic, nitrates, and groundwater contamination. Reference groundwater contamination concerns in the state.	4.2 Water Quality
How will evolving research impact the City's Risk Management and overall costs as more groundwater risks are discovered?	4.2 Water Quality
Consider a storage tank alternative.	6.0 Alternatives

1.6 Lead, Responsible and Trustee Agencies

As required by CEQA, this DEIR defines Lead, Responsible and Trustee Agencies. The City is the Lead Agency for the project because it holds principal responsibility for approving the project. A Responsible Agency refers to a public agency other than the Lead Agency that has discretionary approval over the project. Responsible agencies include: the RWQCB and the California Department of Public Health (DPH). A Trustee Agency is defined as a state agency that has jurisdiction by law over natural resources that are held in trust for the people of the state. The California Department of Fish and Game (CDFG), the California Department of Toxic Substances Control (DTSC), the California Public Utilities Commission (CPUC), the State Water Resources Control Board (SWRCB), the Placer County Air Pollution Control District, and the Placer County Environmental Health Division are Trustee Agencies with respect to this project.

1.7 Environmental Review Process

This EIR has been prepared to meet all of the substantive and procedural requirements of CEQA (California Public Resources Code Section 21000 et seq.). As the Lead Agency, the City has primary responsibility for conducting the environmental review and approving or denying the project.

During the preparation of the EIR, agencies, organizations, and persons who the City believed might have an interest in this project were contacted. Information, data, and observations from these contacts are included in the EIR. Agencies or interested persons who did not respond during the public review period for the NOP will have an opportunity during the 45-day public review period for the DEIR, as well as at public hearings on the project.

This DEIR and the Notice of Availability that the EIR is available for public review, has been distributed to agencies that have commented on the NOP, surrounding cities, and interested parties for a 45-day public review period. Copies of the DEIR are available for review at the following locations:

City of Roseville Permit Center
311 Vernon Street
Roseville, CA 95678
Hours: Monday-Friday 8 a.m. to 5 p.m.

Roseville Main Library
225 Taylor Street
Roseville, CA 95678

Martha Riley Community Library
1501 Pleasant Grove Boulevard
Roseville CA 95747

City of Roseville Website: www.roseville.ca.us/gov/community_development/edpn.asp

Copies of all technical documents referenced in this DEIR are available at the City of Roseville Permit Center at the address referenced above.

Interested parties may provide comments on the DEIR in written form during the 45-day public comment period. Comments should be addressed to:

Terri Shirhall, Administrative Analyst
City of Roseville Environmental Utilities Department
2005 Hilltop Circle
Roseville, CA 95747
tshirhall@roseville.ca.us

Upon completion of the 45-day public review period, written responses to all significant comments raised with respect to the environment will be prepared and incorporated into the Final EIR (FEIR). Written responses to comments received from any State agencies will be made available to those agencies at least ten days prior to the public hearing during which the certification of the FEIR will be considered. These comments and their responses will be included in the FEIR for consideration by the City Council, as well as any other public decision-makers. The process will culminate with City Council hearings to consider certification of the FEIR and whether to approve the proposed project.

According to the Public Resources Code, Section 21081, the Lead Agency must make specific Findings of Fact (Findings) before approving the FEIR when the EIR identifies significant environmental impacts that may result from a project. The purpose of the Findings is to establish the connection between the contents of the FEIR and the action of the Lead Agency with regard to approval or rejections of the project. Prior to approval of a project, one of three findings must be made as follows:

- Changes or alterations have been required in, or incorporated into, the project that avoid or substantially lessen the significant environmental effect as identified in the FEIR.
- Such changes or alternations are within the responsibility and jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by such other agency or can and should be adopted by such other agency.

- Specific economic, legal, social, technological, or other considerations, including provision of employment opportunities for highly trained workers, make infeasible the mitigation measures or project alternatives in the DEIR.

Additionally, according to PRC Section 21081.6 (a)(1), for projects in which significant impacts will be avoided by mitigation measures, the Lead Agency must prepare a mitigation monitoring program (MMP) to be adopted at the same time the Lead Agency decision-making body makes its Findings. The purpose of the MMP is to ensure compliance with required mitigation during implementation of the project. An MMP will be developed as part of the Final EIR.

There are instances in which significant impacts may not be mitigated to a less-than-significant level. When this occurs, impacts are considered significant and unavoidable. If a public agency approves a project that has significant and unavoidable impacts, the agency shall state in writing the specific reasons for approving the project based on the DEIR and any other information in the public record. This document is termed a "Statement of Overriding Considerations" and is used to explain the specific reasons why, in the minds of agency decision-makers, the benefits of a proposed project make its unavoidable significant environmental effects acceptable. That statement is prepared, if required, after the FEIR has been completed, yet before action to approve the project has been taken.

1.7.1 EIR Adequacy

The level of detail contained throughout this EIR is consistent with Section 15151 of the CEQA Guidelines and recent court decisions, which provide the standard of adequacy on which this document is based. The Guidelines state as follows:

> *"An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of the environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full disclosure."*

1.8 Document Organization

This DEIR has been designed for easy use and reference. To help the reader locate information of particular interest, a brief summary of the contents of each section of the DEIR is provided. This report includes seven principal parts:

- **Introduction (Chapter 1)** - Provides a brief project background and description of the EIR, including its purpose, intended use, type, scope, and standards for adequacy; and identification of lead, responsible, and trustee agencies; a description of the environmental review process; and a summary of how the document is organized.

- **Project Description (Chapter 2)** - Includes a discussion of the project site(s); a statement of project objectives; a general description of the project's technical and environmental characteristics, including proposed ASR Program operational parameters; and required governmental approvals.
- **Summary of Impacts and Mitigation Measures (Chapter 3)** - Presents an overview of the results and conclusions of the environmental evaluation. This section identifies project impacts for the ASR Program and available mitigation measures for use by the City in reviewing the project and establishing conditions under which the project may be implemented. It also identifies the level of significance of project-related impacts both before and after the imposition of mitigation measures.
- **Environmental Setting, Impacts, and Mitigation Measures (Chapter 4)** - Includes analysis of baseline environmental conditions and impacts that would or could result from ASR Program implementation. It also identifies potentially feasible mitigation measures that, if adopted, would reduce the level of significance of environmental impacts. The results of field visits, data collection, and results of agency contacts are included in the analysis.
- **CEQA Considerations (Chapter 5)** - Includes a discussion of certain specific issues that CEQA requires: significant unavoidable adverse impacts, irreversible environmental changes, growth inducement, and cumulative impacts.
- **Alternatives Analysis (Chapter 6)** - Includes an assessment of alternative methods for accomplishing most of the basic objectives of the proposed project while substantially lessening at least one significant impact of the project. This assessment, required by CEQA, provides information for decision-makers to make a reasoned choice among potentially feasible alternatives based on the impacts of the project.
- **Appendices** - Contains technical analyses, reference items and reports providing support and documentation of the analyses in the EIR.

1.9 Documents Incorporated by Reference

In accordance with Section 15150 of the State CEQA Guidelines, this DEIR incorporates the following documents by reference:

- City of Roseville 2025 General Plan (as amended 2010);
- West Roseville Specific Plan, February 2004. SCH No.2002082057
- North Roseville Specific Plan, July 1997. SCH No.96112014
- Hewlett-Packard Master Plan Draft Environmental Impact Report, February 1996. SCH No.95112022
- Del Webb Specific Plan Environmental Impact Report, September 1993. SCH No.93042005
- City of Roseville Diamond Creek Well Project, Initial Study/Mitigated Negative Declaration. February 2002.

- City of Roseville Aquifer Storage and Recovery Demonstration Test Phase 2, Initial Study Negative Declaration. June 2005.
- Sierra Vista Specific Plan EIR, May 2010.SCH No.2008032115 (Updated General Plan to 2025)

These documents are referenced and certain elements are discussed and summarized in this DEIR. Copies of each of these documents, as well as all documents referenced in this DEIR, are available for review, weekdays, during normal business hours, at the City of Roseville Permit Center, 311 Vernon Street, Roseville, California 95678.

1.10 Mitigating Ordinances and Standards

In April 2008, the City adopted Findings of Fact under Resolution 08-172, confirming that the development policies and standards uniformly applied by the City on a City-wide basis will substantially mitigate environmental effects, unless substantial new information indicates significant effects would still occur. The following adopted policies apply to the proposed project and were considered in the CEQA evaluation of potential project effects.

- The City's Noise Ordinance (Municipal Code Section 9.24) exempts City operations and activities from noise ordinance regulation. The noise ordinance specifies noise-generating construction activities should be limited to Monday through Friday from 7 a.m. to 7 p.m. and Saturday/Sunday from 8 a.m. to 8 p.m. The ordinance (Section 9.24.160) does allow the City Manager (or the Manager's designee) to grant exceptions.
- The City's Tree Preservation Ordinance (Roseville Municipal Code, Chapter 19.66) establishes an in-lieu mitigation fee for projects that would affect native oak trees.
- The City's Construction Standards (Resolution 01-208) require the Contractor to stop construction if signs of an archeological site are discovered during construction of the project, halt all work, and notify the City Community Development Department. The City shall then notify a qualified archeologist, and additional mitigation may be required.
- The City's Grading Ordinance and Construction Standards require grading plans to include an erosion control plan to eliminate offsite flows of sediment and to reduce site erosion.
- The City's Design Standards (Resolution 02-37) and Construction Standards require preparation of an erosion and sediment control plan intended to protect water quality in streams and drainages, the storm drain system, and adjacent properties.
- The Roseville Municipal Code, via the Drainage Fees for the Dry Creek Watershed (Roseville Municipal Code, Chapter 4.49), provides funding for improvements sufficient to mitigate potential flooding impacts within and downstream of the Dry Creek Watershed.

- The City's Flood Damage Prevention Ordinance (Roseville Municipal Code, Chapter 9.80) includes measures designed to prevent or regulate construction of flood barriers that may divert floodwater or increase flood hazards. This ordinance includes standard requirements for all new construction, including regulation of development with the potential to impede or redirect flood flows, and methods and provisions restricting uses that could result in damaging increases in erosion or flood height/velocities.
- The Roseville Municipal Code (RMC Title 13, Ch. 28) requires that any roadwork resulting in traffic lane closures be approved by the City's Engineering Department, and that the Police and Fire Departments be noticed 48 hours in advance of any road closures.

1.11 Standard Terminology/Acronyms

This DEIR uses the following terminology, acronyms and abbreviations.

No impact	No change from existing conditions (no mitigation is needed).
Less-than-significant impact	No substantial adverse change in the physical environment (no mitigation is needed).
Potentially significant impact	An impact that might cause a substantial adverse change in the environment (mitigation is recommended because potentially significant impacts are treated as significant).
Significant impact	An impact that would cause a substantial adverse change in the physical environment (mitigation is recommended).
Significant and unavoidable impact	An impact that would cause a substantial adverse change in the physical environment and that cannot be avoided, even with the implementation of recommended mitigation.
Proposed project	Aquifer Storage and Recovery Program, as described above and throughout this DEIR.
Project site	Project site(s) identified as described in Chapter 3 and throughout this DEIR.

AF	acre-feet
AFY	acre-feet per year
ASR	Aquifer Storage and Recovery
BMP	best management practices
AB	Assembly Bill
ADWF	Average Dry Weather Flow
Cal/EPA	California Environmental Protection Agency
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CNEL	Community Noise Equivalent Level
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act

CVRWQCB	Central Valley Regional Water Quality Control Board
dB	decibel
dBA	A-weighted noise level in decibels
DBP	Disinfection By-Products
DPH	California Department of Public Health
DWR	Department of Water Resources
EIR	Environmental Impact Report
gpm	gallons per minute
MAF	million acre feet
M&I	municipal and industrial
MCLs	Maximum Contaminant Levels
mg	million gallon(s)
mgd	million gallons per day
mg/L	milligram per liter
msl	mean sea level
NOP	Notice of Preparation
ppb	parts per billion
ppm	parts per million
RO	reverse osmosis
RWQCB	Regional Water Quality Control Board
SACOG	Sacramento Council of Governments
SDWA	Safe Drinking Water Act
SGA	Sacramento Groundwater Authority
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
THM	trihalomethanes
TOC	Total Organic Carbon
µg/L	micro grams per liter

CHAPTER 2.0
Project Description

The City of Roseville (City) Aquifer Storage and Recovery Program (referred to in this document as the "ASR Program," "proposed project," or "ASR") is a Capital Improvement Program[1] project proposed by the City to improve water supply reliability, maintain groundwater as a sustainable resource, improve operational flexibility, and meet regional conjunctive use program goals. ASR is a process where treated surplus surface water is injected through specially designed groundwater wells into the groundwater aquifer for storage. It is later recovered, when needed, for municipal use thereby increasing the City's water supply reliability during peak demand times, or during dry rainfall years. The City is exploring ASR as a component of the its overall water supply strategy in order to maximize the ability to fully utilize allocated surface water; manage the groundwater aquifer for its cost-effective, large-scale storage capability not otherwise readily available above-ground; meet regional conjunctive use program goals as outlined in the City's General Plan and Regional Water Management Plans; and ensure no net impact to the groundwater aquifer from potential use during dry and drier years.

The ASR Program is not required to meet City buildout water demands. The City uses a portfolio approach to meet water demands. In normal/wet years, buildout water demands will be met using a combination of contracted surface water and recycled water supplies. Groundwater is also a part of the City's planned water supply portfolio and is currently used during critically dry years when surface water supplies are limited due to drought. The City's water supply strategy is further discussed within this Chapter.

The remainder of this Chapter is divided into two sections. Section 2.1 discusses the project background and context for ASR, including the City's water supply and demand, and applicable groundwater management goals and policies. Section 2.2 describes the proposed ASR Program including well site locations and characteristics, operational parameters, and injection and extraction rates.

2.1 Project Background and Context

2.1.1 Existing City Buildout: Water Supply And Demand

Over the past several decades the City's water demand has increased commensurate with approved growth. In 1997 the City served 66,901 people through approximately 21,000 residential and 2,400 commercial water connections. The City's water needs have been steadily rising with deliveries increasing from 14,242 Acre Feet per Year (AFY) in 1990, to about 31,000 AFY in 2009.

Water demands are segmented into potable demands and recycled water demands. Potable demands are that component of the total water demand that will be used for public health related activities such as drinking water, indoor use and irrigation where

[1] CIP's are funded with Water Construction Funds, comprised of Development Impact Fees.

recycled water is not available. Potable demands are met by surface water supplies, supplemented by groundwater supplies as needed when surface supplies are cut during dry year conditions (discussed further below). Recycled water is treated wastewater that can be used for outside irrigation use that has historically been irrigated with surface water. Potable demands are calculated by subtracting estimated recycled water demands from total water demands.

City-wide water demands are estimated to reach 62,746 AFY at buildout. Buildout assumes the existing City boundary plus the recently approved Sierra Vista Specific Plan (SVSP); the pending Creekview Specific Plan, and Fiddyment Ranch Specific Plan Amendment No. 3 projects currently under review by the City. The City has two assured sources of water in normal/wet years to serve the City's buildout water demand. They are the City's American River supplies (surface water) from Folsom Reservoir, and recycled water for landscape irrigation. Roseville's water supply contracts total 66,000 AFY and include supply from the U.S. Department of the Interior, Bureau of Reclamation (USBR) 32,000 AF, Placer County Water Agency (PCWA) 39,000 AF, and San Juan Water District (SJWD) 4,000 AF. These contracts are described in detail in the SVSP Final EIR and in the Water Supply Assessment included as Appendix H-2 within the SVSP EIR (City of Roseville, November 2009).

In normal/wet years pursuant to the City's Water Forum Agreement, the City can access 58,900 AFY of American River supply. During any water year type the City can also produce 4,361 AF of recycled water for landscape irrigation. These sources combined total 63,261AF (58,900 AF surface water contracts + 4,361 AF recycled water = 63,261 AF). This supply source is sufficient to meet the total buildout demand of 62,476 AF. The City's treatment plant can treat up to 100 MGD, which satisfies the summer maximum daily demand at buildout. The City does not receive credit for any unused portion of this supply source. Instead any amount that is not diverted for City municipal and industrial use remains in the Folsom Reservoir/American River system and complements other recreation and environmental needs.

2.1.2 Potential American River Supply Cut Backs

As indicated above, during normal/wet years the City can access 58,900 AFY of its American River supply which is sufficient to meet the buildout potable water demand of 58,385 AFY. However, in accordance with the City's Water Forum Agreement (WFA) (further described below), the City has agreed to reduce this supply source based on the unimpaired inflow volumes into Folsom Reservoir in any given year. Unimpaired inflow is defined as the amount of water projected to enter Folsom Reservoir between March and November. The Water Forum categorized water years into three types: 1) Normal or Wet (normal/wet) Years, 2) Drier Years, and 3) Driest (critically dry) Years. These hydrologic types are defined as follows:

- Normal/Wet Years: When the projected March through November Unimpaired Inflow to Folsom Reservoir is greater than 950,000 AF;
- Drier Years: When the projected March through November Unimpaired Inflow to Folsom Reservoir is between 950,000 AF and 400,000 AF; and,
- Driest Years: When the projected March through November Unimpaired Inflow to Folsom Reservoir is less than 400,000 AF.

Future water supply cutbacks have been estimated based on review of 100 years of historic American River hydrologic records. According to this record, there were two (2) critically dry years and thirteen (13) drier years (out of 100) where City demands would need to be adjusted downward to conform to available surface water supplies. In critically dry years the City could face American River supply cut backs of up to 19,100 AFY. Under the driest year scenario the City's American River supplies could be reduced to no less than 39,800 AFY which is insufficient to meet the buildout potable demand of 58,385 AFY (for full Water Forum commitments see the Water Purveyor Specific Agreement in Appendix D).

2.1.3 Groundwater Demands at Buildout During Normal/Wet Years

As described earlier, the normal buildout water demand for the City, including the specific plans under review, is estimated at 62,746 AFY (including recycled water). It is further estimated a total of 4,361 AFY of recycled water is available in all Water Forum year types to offset total water demands at buildout. The use of recycled water as an assured water supply source reduces total potable water supply needs at City buildout to 58,385 AFY (62,746 AFY – 4,361 AFY RW supply = 58,385 AFY potable water demand). When compared to available surface water supplies of 58,900 AFY, the City has sufficient supplies to meet demands. Groundwater is not required to meet demands in normal/wet years.

2.1.4 Groundwater Demands at Buildout During Drier Years

In drier years the City's surface water supply could be reduced to a point between 58,900 AFY and 39,800 AFY depending on the unimpaired inflow into Folsom Lake. The City would make up the difference between 39,800 AFY and 58,900 AFY (0 AFY to 19,100 AFY) by implementing conservation measures identified in the Roseville Municipal Code and by supplementing available surface water supplies with groundwater only when needed. The amount of supplemental groundwater required depends on the amount of demand reduction achieved through conservation efforts. While the City is allowed to implement water conservation strategies during drought periods that are estimated to reduce water demands ups to 50%, for planning purposes the City only assumes a 20% demand reduction achieved through water conservation efforts. A 20% demand reduction of surface water needs would amount to 11,677 AFY. Depending on the amount of surface water available in a drier or driest year and applying a 20% conservation rate, the amount of groundwater can be determined. Groundwater use would range from 0 AFY to 6,908 AFY and would be needed to meet the potable buildout water demand of 58,385 AFY.

2.1.5 Groundwater Demands at Buildout During a Critically Dry Year

During a critically dry year it is expected that the City's American River supply source would be cut to its maximum level of 19,100 AFY resulting in an available supply of only 39,800 AFY. Under this scenario, and assuming a 20% demand reduction can be achieved through conservation, it is expected that supplemental groundwater supplies totaling 6,908 AFY would be needed to meet net City buildout demand of 58,385 (39,800 AFY American River supply + 11,677 AFY conservation + 6,908 AFY groundwater = 58,385 AFY potable buildout water demand).

With or without the ASR program, groundwater would be extracted to meet water demand shortfalls in critically dry years. As discussed in Section 2.2, the ASR program would augment groundwater supply while achieving the project objective to manage the groundwater aquifer as a sustainable resource ensuring groundwater availability in times of drought when the City's surface water supplies are cut back.

2.1.6 Conjunctive Use of Water Resources

The term conjunctive use of water resources denotes coordinated use of surface water and groundwater. Because rivers and aquifers can be two interrelated sources of water in one area, it makes sense to manage them jointly. In fact, joint use of surface and subsurface water can lead to cost-effective environmentally friendly water management strategy. For example, when surface water is scarce, groundwater can be utilized (subject to availability) to meet demands and when surface water is in excess, groundwater can be recharged. The main advantage of conjunctive use is an overall increase in benefits and reduction in adverse effects due to non-sustainable use of either resource (surface water or groundwater).

Existing Conjunctive Use/ASR Projects

Conjunctive use ASR projects have been developed to address the supply needs of water utilities and their customers throughout many regions of the United States. In 2005 the East Bay Municipal Utilities District (EBMUD) commissioned a study titled Technical Memorandum: A Summary of Operating Aquifer Storage and Recovery Case Systems (EBMUD, April 7, 2005) (Appendix C). The following discussion is a summary of information contained in the EBMUD memorandum:

In the United States, ASR wells have been used as a means to store water since the late 1960's. The EBMUD memorandum identified over 60 active ASR operations in the United States as of the year 2005. This was a sharp increase from three that were documented as being in operation in the early 1980's. In addition, approximately 100 new ASR facilities were thought to be in development at the time the Technical Memorandum was prepared. ASR sites are primarily found in growing regions of the United States. Examples include the Florida coast (both the Gulf and Atlantic), Arizona (metro Phoenix and Tucson), Nevada (Las Vegas), Texas (El Paso and San Antonio) and the west coast (the Cities of Seattle, Portland, Pasadena, Oxnard, and Camarillo and the Goleta, Calleguas Municipal, Santa Clara Valley, and Monterey Peninsula Water Districts). Pertinent conclusions of the EBMUD Technical Memorandum include:

- ASR projects are in use throughout California and the United States; conditions are highly variable but meet applicable water quality standards for potable water supply.
- Research in the ASR field has expanded over time;
- ASR is a tested and relied upon method of water storage, particularly in the role of providing supplemental and/or drought supplies;
- Studies and permit required monitoring data have shown that generally speaking, ASR projects lead to water quality improvements and do not negatively impact the groundwater;

- As urban water needs become more pressing, ASR projects are becoming more common. Some ASR projects are quite large, with injection rates ranging up to 80 mgd and total volume of water stored over time approaching 300,000 AF. By comparison the City of Roseville ASR project proposes a maximum single year injection volume of 13,786 AF based on 20% water conservation and available water before buildout.

2.1.7 Applicable Plans and Policies

As outlined in the following plans and policies, conjunctive use is a recommended water supply management tool for water purveyors located within the American River Watershed and North American Sub basin which is the sub basin underlying the City. Regional Conjunctive Use Goals are framed by the following plans and policies that support the proposed project and suggest that the City should pursue conjunctive use as part of its overall water supply strategy.

Water Forum Agreement

The WFA is the result of the efforts of a diverse group of community stakeholders. The stakeholder group was formed in 1994 with the goal of formulating elements of a solution to meet future regional water supply needs. Participants in the Water Forum have two coequal objectives:

- Provide a reliable and safe water supply for the region's economic health and planned development to the year 2030.
- Preserve the fishery, wildlife, recreational, and aesthetic values of the Lower American River.

Water Forum stakeholders developed an integrated package of actions that are working to meet these two co-equal objectives. Each element of the package is necessary for a regional solution to work. These elements are:

- Increase surface water divisions;
- Actions to meet customers' needs while reducing diversion impacts on the lower American River in drier years;
- An improved pattern of fishery flow releases from Folsom Reservoir;
- Lower American River Habitat Management, which also addresses recreation in the lower American River;
- Water conservation;
- Groundwater management; and
- Water Forum successor efforts.

Purveyor Specific Agreements (PSAs) were developed that describe in detail how each of the elements will be implemented by the respective purveyors. Purveyors included the City, Placer County Water Agency, the San Juan Water District, as well as other regional water agencies. The PSAs are compiled into a Memorandum of Understanding that each stakeholder's authorizing body has executed. In return for signing the final WFA, water purveyors receive regional support for water supply projects, including site-specific infrastructure projects. A copy of the City's PSA is included in Appendix D.

The City's Water Forum PSA memorializes the City's agreed upon dry year reduced surface water diversions as well as the City's commitment to the overall Water Forum process and successor efforts including a commitment to exploring conjunctive use opportunities.

An outgrowth of the WFA was the Regional Water Master Plan (RWMP), which calls for developing equitable, cost-effective water resource management strategies for enhancing water supply reliability, and operational flexibility for water users of Folsom Lake, the lower American River, and the connected groundwater basins.

Regional Water Authority (RWA)

The Regional Water Authority (RWA) is a Joint Powers Authority (JPA) formed as a policy forum to discuss and address regional water issues. One of the principal missions of the RWA is to help implement conjunctive use program prescribed by the WFA and the RWMP. The RWA has 19 members (including each of the Cooperating Agencies). Each is a signatory of the Water Forum Agreement.

Groundwater Management Plan

In September 2002, SB 1938 was signed into law. SB 1938 amended existing law related to groundwater management by local agencies. The law requires any public agency seeking State funds administered through California's Department of Water Resources (DWR) for the construction of groundwater projects or groundwater quality projects to prepare and implement a groundwater management plan with certain specified components. Prior to this, there were no required plan components. Requirements include establishing basin management objectives, preparing a plan to involve other local agencies in a cooperative planning effort, and adopting monitoring protocols that promote efficient and effective groundwater management.

Assembly Bill 3030, the Groundwater Management Act [Sections 10750-10756 of the California Water Code] provides a systematic procedure for a local agency to voluntarily develop a groundwater management plan. The City, along with PCWA and the City of Lincoln, completed a SB 1938 and AB 3030 compliant groundwater management plan in August 2007. The Plan, titled Western Placer County Groundwater Management Plan, set basin management objectives and goals that address the basin's groundwater safe yield for the basin, groundwater quality, and conjunctive use as a management strategy.

City of Roseville Urban Water Management Plan

The City recently prepared and adopted a 2010 Urban Water Management Plan (UWMP). This plan was prepared to comply with the Urban Water Management Planning Act of the California Water Code. UWMPs must be developed by urban water providers supplying more than 3,000 customers or supplying more than 3,000 acre-feet of water annually and submitted to the DWR every 5 years. The UWMP describes the availability of water and discusses water use, recycled water use and water conservation.

City of Roseville Water Conservation Ordinance

In 1991, the City developed and adopted the Roseville Water Conservation and Drought Mitigation Ordinance as documented in the City's Municipal Code Chapter 14.09. Under this ordinance, the City has authority to declare water shortage conditions and implement drought related water conservation mitigation measures consistent with surface water cut backs outlined in the City's Water Forum Purveyor Specific Agreement.

In February 2008, the City of Roseville adopted Ordinance 4629 which added Sections 14.09.200-14.09-220 and amended Sections 14.09-020 – 14.09.090 of the Roseville Municipal Code regarding water conservation. The purpose of this ordinance is to ensure compliance with all federal, state and local requirements relating to water conservation and drought mitigation including the City's Water Forum Purveyor Specific Agreement. Ordinance 4629 provides an approach to conservation that reflects there are now more water customers billed on metered rates, which creates additional tools to achieve conservation.

City of Roseville Landscape Ordinance

In 2006, the State enacted legislation requiring the DWR to update the State Model Water Efficient Landscape Ordinance. The update model ordinance contains several new landscape and irrigation design requirements aimed at reducing water waste in landscape irrigation. All local use agencies are required to adopt the model ordinance, or develop an ordinance that is at least as effective by January 2010. The City of Roseville adopted an Ordinance tailored to meet the City's need that is based on, and is at least as effective as, the model ordinance. The new Water Efficient Landscape Ordinance has been incorporated into the City's Zoning Ordinance as Chapter 19.67 and supersedes the City's 1993 Water Efficient Landscape Requirements.

City of Roseville General Plan

The following City of Roseville General Plan goals, policies and Implementation Measures relate to the Proposed ASR Program:

Public Facilities Element – Water Systems

Goal 1: Maintain a water system that adequately serves the existing community and planned growth levels, ensuring the ability to meet projected water demand and to provide needed improvements, repairs and replacements in a timely manner.

Goal 3: Ensure that safe drinking water standards are met and maintained in accordance with State Department of Health Services and EPA regulations.

Policy 7: Provide emergency back-up system to add sufficient reliability to the system as determined by the Environmental Utilities Department.

Policy 9: Monitor water quality regularly and take necessary measures to prevent contamination.

Policy 11: Develop and implement an aquifer storage and recovery program.

Implementation Measure 2 Water System Master Plans: The City will update the Groundwater Management Plan as needed to further the City's desire to increase water supply reliability through aquifer storage and recovery (ASR). This management plan would identify groundwater basin management objectives and monitoring protocols in accordance with State requirements.

Implementation Measure 9 Capital Improvement Plan: Plan for expansion of the City's water treatment and delivery system in its five-year Capital Improvement Plan (CIP). The Plan shall establish priorities for improvements to the water supply system, including expansion of the water treatment plant, construction of larger pipelines, storage facilities, water production and groundwater wells, and improvements to the back-up system. The five-year Plan shall specify estimated costs and phasing of improvements so that they are funded appropriately and provided in a timely manner (implements Policies 7 and 11).

The ASR Program is proposed consistent with the above Public Facilities Element goals, policies and implementation measures, particularly Policy 7 which calls for an emergency backup system for water supply reliability, Policy 11 which calls for development and implementation of an aquifer storage and recovery program, and Implementation Measures 2 and 9 which call for updating the Groundwater Management Plan to include ASR and for construction of larger storage facilities and more groundwater wells.

Open Space and Conservation Element – Groundwater Recharge and Water Quality

Goal 2: Enhance the quantity and quality of groundwater resources.

Policy 4: Continue to monitor and participate in, as appropriate, regional activities affecting water resources, groundwater and water quality.

Policy 5: Continue to monitor groundwater resources and investigate strategies for enhanced sustainable use. Areas where recharge potential is determined to be high shall be considered for designation as open space.

Implementation Measure 12 Aquifer Storage and Recovery: Through the Environmental Utilities Department, investigate the potential for development and implementation of an Aquifer Storage and Recovery (ASR) program. A successful ASR Program would allow the City to maximize sustained use of the groundwater basin in conjunction with surface water supplies, while providing a strong backup water supply during critically dry years consistent with the City's commitments contained in the Water Forum Agreement.

The ASR project is proposed consistent with the above Open Space and Conservation Element goals, policies and implementation measures, particularly Goal 2 which calls for enhancing the quantity and quality of groundwater resources, Policy 5 which calls for strategies that enhance sustainable use of groundwater, and Implementation Measure 12 which calls for development of an ASR Program.

2.1.8 History of ASR in Roseville – Pilot Projects

The City of Roseville's ASR program is currently a demonstration-level project conducted in partnership with the DWR and the Central Valley Regional Water Quality Control Board (RWQCB).

In 2003 the City conducted a limited pilot project, referred to in this EIR as the Phase 1 Pilot Study. The Phase 1 Pilot Study was designed to test ASR at the Diamond Creek Well located in Leonard Duke Davis Park near the City's northern boundary.

Data collected during the Phase 1 Pilot Study helped to provide an understanding of local changes in groundwater elevations and quality, and to explore the feasibility of additional ASR testing potentially leading to an operational ASR Program in Roseville. The pilot study demonstrated favorable conditions with no adverse impacts to groundwater levels and no adverse water quality impact to the native groundwater in the aquifer. A report titled "The Pilot Scale Cycle Testing at Diamond Creek Well" summarizing results of the Phase I Pilot Study was completed in December 2004 and submitted to the Central Valley RWQCB. The conclusions of the report describe a successful ASR cycle test and recommended that a longer-term ASR demonstration test be performed at the Diamond Creek Well site to further evaluate the operational characteristics of the groundwater aquifer.

During the Phase I Pilot Study the only constituent in the injected water that posed a concern to the Central Valley RWQCB was Disinfection By-Products (DBPs) such as trihalomethanes (THMs) and haloacitic acids (HAAs). These constituents are the by-product of water treatment disinfection with chlorine and do not normally occur in groundwater. Although THM concentrations in the extracted water were elevated relative to native groundwater, the concentrations during the pilot study were well below Title 22 drinking water standards. The THM concentrations in the extracted water were comparable to those typically found in the City's drinking water. Based on the water quality results of the Phase I Pilot study, it was determined that beneficial uses of the water were not impacted.

Following this testing, City staff worked cooperatively with RWQCB staff and other Sacramento area water purveyors in an attempt to develop a regulatory framework specifically designed for ASR projects. The development of this framework proved difficult and consequently in August 2005, the RWQCB instead approved a waiver for a two-year program based in part on the proposed regulatory framework. Consistent with this waiver, in 2006 the City initiated a second pilot ASR project referred to in this EIR as the Phase 2 Test. Beginning December 14, 2005 the Phase 2 Test injected over a period of 142 days more than 830 AF of treated drinking water into the local aquifer located beneath the Diamond Creek Well. Injection was halted on May 5, 2006. Beginning on July 17, 2007 this water was extracted from the aquifer and delivered to customers surrounding the well. This continued through February 2008, when the required volume of water was extracted and pumping ceased. Approximately 697 million gallons, (2,140 AF) of water was extracted during the Phase 2 Test.

Data collected from the Phase 2 Test provided a greater understanding of the local aquifer's response to more prolonged ASR operations. The test yielded additional information on groundwater migration as well as changes in groundwater quality which helped to quantify and better understand the mechanism(s) for changes in DBP concentrations. This information was used to further refine the basic parameters of the proposed city-wide ASR Program evaluated in this EIR.

In addition to better understanding the geo-hydrologic characteristics of the aquifer, the Phase 2 Test also allowed the City to learn about customer sensitivity to switching between surface water and groundwater. Even though the groundwater delivered to customers met all applicable drinking water standards, during the test the City received complaints regarding the water's taste and odor, referred to as aesthetic qualities in this EIR. Customers also complained of spotting residue (referred to as a cosmetic effect in this EIR), perceived health effects, and some complained that valves in water lines began leaking during the Phase 2 Test. One reason for a higher complaint rate during the Phase 2 test compared to the Phase I Pilot Study was that the injected water was stored in the underground aquifer for a longer period allowing for greater groundwater migration and aquifer contact time. In addition a much greater amount of groundwater was extracted compared to the volume injected to ensure all DBPs associated with injected water were removed from the aquifer as required by the RWQCB. As a result the extracted water was more typical of groundwater (i.e., harder with more minerals) when compared to the City's typical surface water supply which in comparison is softer with less mineral deposits. These and other ASR Program/groundwater concerns were expressed in Notice of Preparation (NOP) comments and at subsequent community meetings. Unlike the Phase 2 Demonstration Project which required over extraction of injection water and therefore, delivery of undiluted groundwater, the proposed ASR Program would result in greater aquifer mixing of surface and groundwater prior to delivery.

2.2 Proposed Aquifer Storage and Recovery Program

While water demands have been steadily increasing over time, Roseville and the surrounding region have also been affected by:

- Extended drought and wet periods;
- Increased push to dedicate surface water for environmental purposes;
- State mandates that require twenty percent conservation by 2020; and
- Ongoing and potential impacts to surface water quality and groundwater quality.

2.2.1 Project Purpose and Objectives

As discussed in Section 2.1.2 groundwater is an important component of the City's water supply portfolio, particularly during dry years. The purpose of the ASR Program is to address the above challenges while improving groundwater supply and reliability consistent with adopted regional and City groundwater management goals and policies. The project goals and objectives include:

- Maximize the City's ability to fully utilize its surface water entitlements while improving the City's overall water supply reliability, operational flexibility, and use of existing City infrastructure.
- Manage the groundwater aquifer for its storage capabilities, particularly in light of the regulatory restrictions associated with surface storage, and as a sustainable resource to ensure groundwater availability in times of drought.
- Develop a cost-effective means for water supply storage. Meet regional conjunctive use program goals as outlined in the City's General Plan, Water Forum Purveyor Specific Agreement, Western Placer County Groundwater Management Plan and Integrated Regional Water Management Plan.
- Ensure no net impact to aquifer from potential use during dry and drier years.
- Obtain approval for ASR operations from Regional Water Quality Control Board.

2.2.2 Project Components

The following project components are required for operation of the proposed ASR program. Some of these components are existing while others would require construction.

Water Supply and Treatment - Barton Road Water Treatment Plant (Existing): The proposed project would use the City's existing surface water supplies conveyed from Folsom Lake as the source for treated injection water. Raw water from Folsom Lake would be treated at the City's existing Barton Road Water Treatment Plant in Granite Bay (Figure 2-1: Vicinity Map). Utilizing conventional water treatment methods including flocculation[2], sedimentation, filtration, and disinfection, treated water would flow through the City's existing water distribution pipelines to injection well sites.

ASR Injection/Extraction Wells (Existing and Proposed): The ASR program would involve the use of thirteen (13) specially designed and metered wells capable of both water injection and groundwater extraction. The only exception would be Hewlett Packard Well which would be an injection only well. Figure 2: ASR Well Sites shows the existing and planned location of proposed ASR wells; while Table 2-1: ASR Program Wells, provides a status summary for each well.

[2] Flocculation refers to the water treatment process by which fine particulates are caused to clump together to effectively be filtered from the water.

As shown in Figure 2-2, ASR wells are proposed primarily on the City's western side. Well sites average between 0.5 and 1 acre, and are currently in varying stages of development. As shown in Table 2-1, the City has constructed six wells, all of which are equipped for both extraction and injection. Seven more wells have been planned as components of previously approved Specific Plan projects, and approved along with certification of those Specific Plan EIRs.

The City's municipal wells typically include "top side" (above ground) and below ground (well casing) improvements. Top side improvements typically include a small structure to house and secure the above ground ASR well equipment and support infrastructure such as pumps, electrical and disinfection equipment (Figure 2-3: Typical "Top Side" Well Improvement). Top side improvements can also be protected by perimeter fencing to enclose and secure the above ground infrastructure. The type of top side improvement typically depends on site specific conditions and the potential need for noise mitigation (which is normally accomplished with a building). As indicated in Table 2-1, of the 13 planned ASR wells, 6 are existing and of those, 4 have existing top side improvements. Seven wells remain to be drilled and a total of nine wells still require some form of top side improvement.

Top side improvements would accommodate a chlorination facility to add chlorine and fluoride to the extracted groundwater before it enters the distribution system. Currently the City's practice is to add chlorine to the well water using a sodium hypochlorite solution. There are several methods available for using sodium hypochlorite. One method allows for onsite generation while another method uses liquid stored in onsite storage vessels. Either method may be used under the ASR program. Using the onsite generation method, the chlorination facility generates sodium hypochlorite by using salt, electricity, and water. Because the concentration of the solution is sufficiently diluted, the generation equipment does not require special handling or containment. Adequate ventilation of the chlorination facility would expel and dilute the generated hydrogen gas during the formation of the sodium hypochlorite solution. Alternatively, the initial construction may include the use of commercially available Sodium Hypochlorite solution until the decision is made to go into production. This would entail the use of chemical tanks and offloading capabilities to handle up to 500 gallons of up to 12 percent solution Hypochlorite. During operations this may require chemical deliveries by truck weekly.

TABLE 2-1. ASR PROGRAM WELL SITES

Well No.	Well Name & Plan Area	Constructed	CEQA Status for Well Construction	Top Side Infrastructure
4	Darling*	1958	Completed	Completed
5	Oakmont*	1977	Completed	Completed
6	Diamond Creek	2003	Completed	Completed
7	Woodcreek North	2008	Completed	Completed
8	Hayden Parkway (Fiddyment Ranch)	Drilled in 2006.	Completed as part of West Roseville Specific Plan	Addressed in this EIR
9	West Side Dr	Drilled in 2006.	Completed as part of West Roseville Specific Plan.	Addressed in this EIR
11	Woodcreek West	Yet to be drilled.	None. Addressed in this EIR	Addressed in this EIR
12	Del Webb	Yet to be drilled.	Addressed in this EIR	Addressed in this EIR
13	Hewlett Packard (HP)	Yet to be drilled.	None. Addressed in this EIR	Addressed in this EIR
14	Fiddyment Road	Yet to be drilled.	Completed as part of West Roseville Specific Plan.	Addressed in this EIR
TBD	Sierra Vista Specific Plan #1	Yet to be drilled	Completed as part of Sierra Vista Specific Plan.	Addressed in this EIR
TBD	Sierra Vista Specific Plan #2	Yet to be drilled	Completed as part of Sierra Vista Specific Plan	Addressed in this EIR
TBD	Creekview	Yet to be drilled	Completed as part of Creekview Specific Plan	Addressed in this EIR

* Have been retrofitted for injection (ASR) capability.

Water Supply Distribution System (existing): Once groundwater has been extracted from the aquifer it would be pumped into the existing City of Roseville potable water supply distribution system and delivered to customers. The change between surface and groundwater supplies can and typically occurs without customer notice.

Monitoring Equipment: Water processed at the treatment plant and injected and extracted at well sites is metered for volume and monitored for water quality. Monitored components include biological, metals, organic and inorganic materials, and solvents. The frequency of water quality monitoring varies depending on the chemical constituent tested, ranging from constant daily online analyzers, to daily, weekly, quarterly, annually, and every three years, consistent with State Department of Health regulations. Monitoring occurs at the points of source water intake (i.e., Folsom Lake/Barton Road Water Treatment Plant, and well sites) in the distribution system, and at customer homes on an as-needed basis.

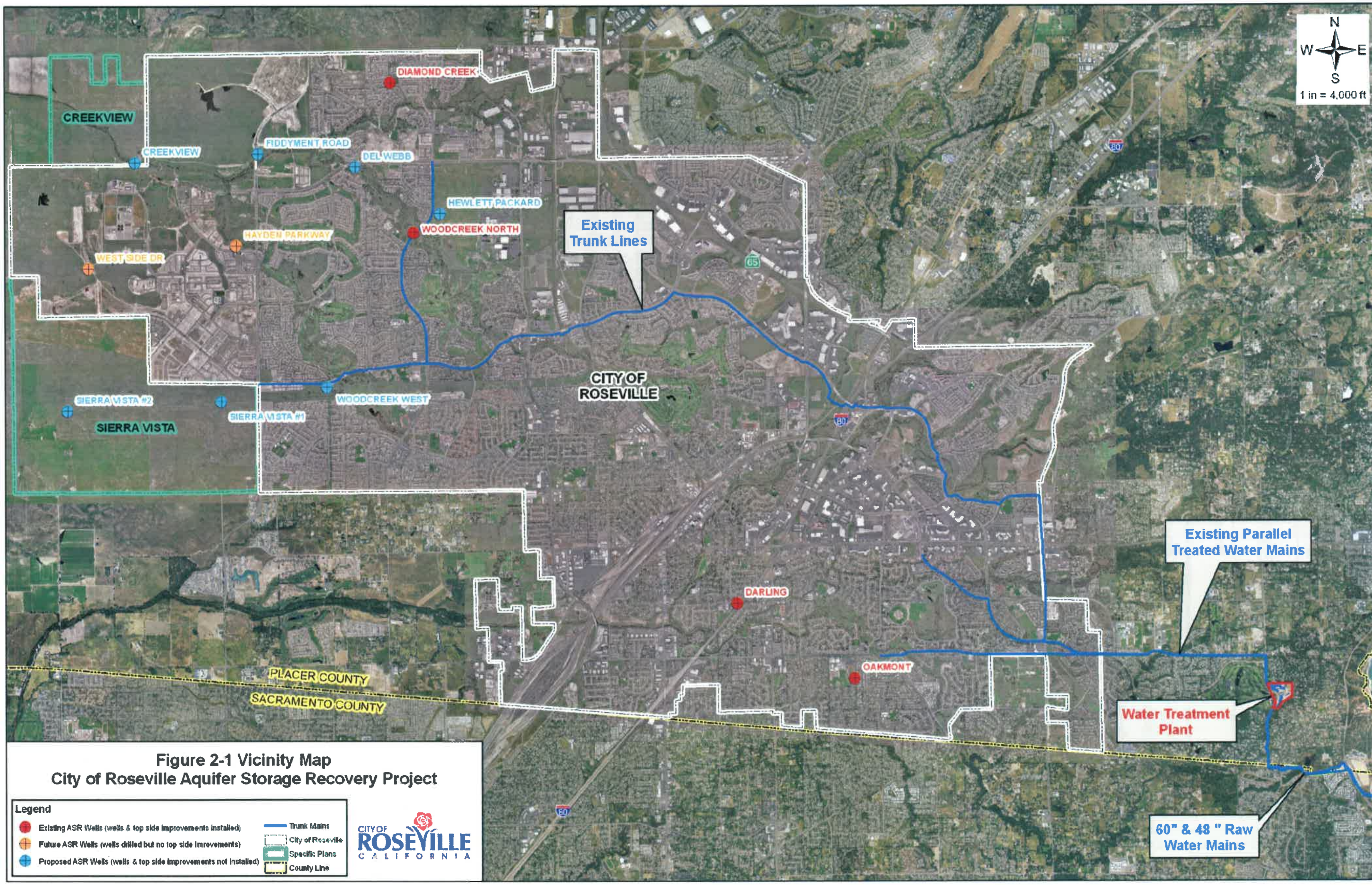

Figure 2-1 Vicinity Map
City of Roseville Aquifer Storage Recovery Project

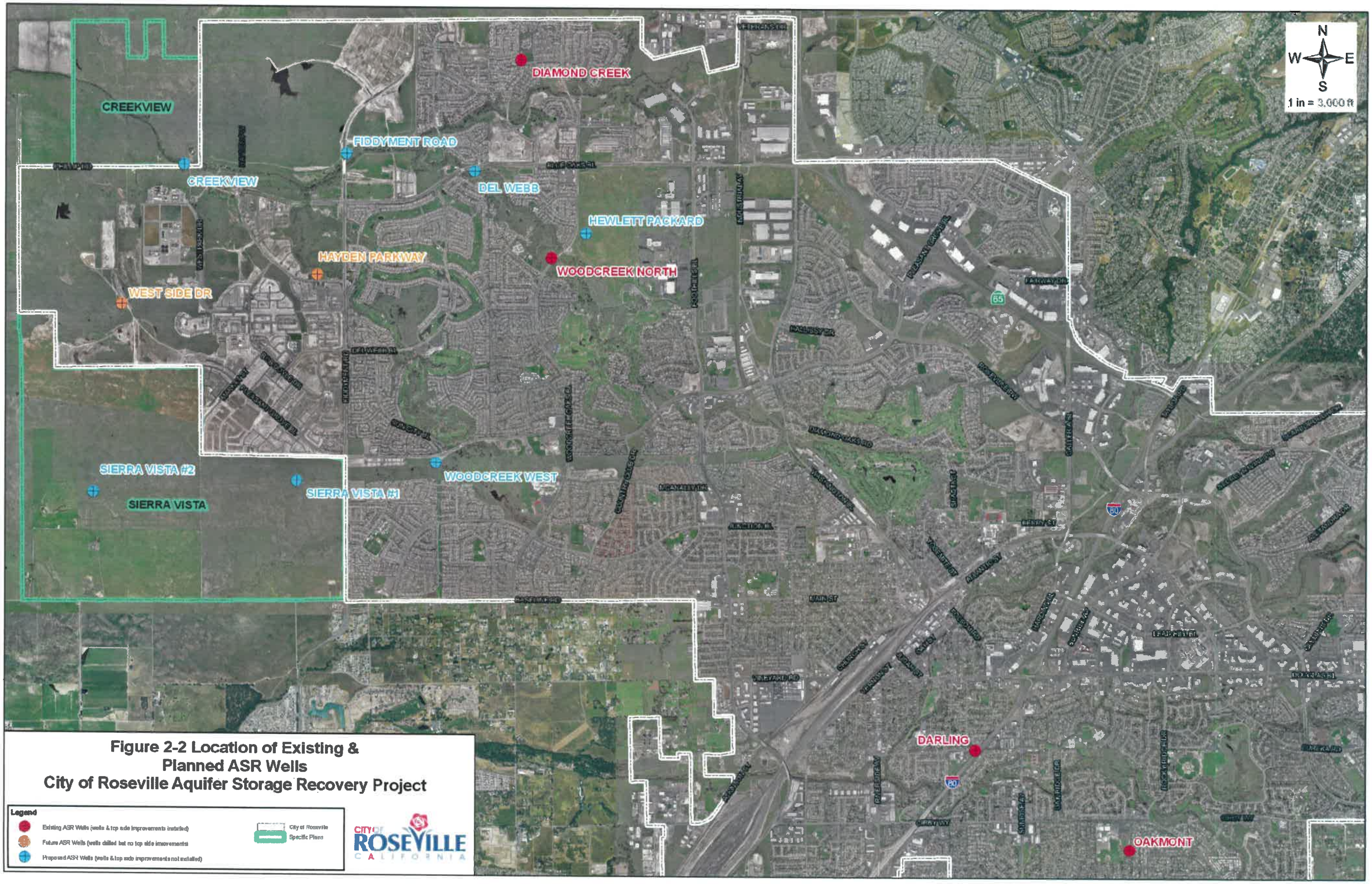

Figure 2-2 Location of Existing & Planned ASR Wells
City of Roseville Aquifer Storage Recovery Project

Figure 2-3 Typical "Top Side"
Well Improvement
City of Roseville Aquifer Storage Recovery Project

CITY OF ROSEVILLE CALIFORNIA

2.2.3 Operational Characteristics

The Proposed ASR Program involves injecting surface water obtained from Folsom Lake under existing City water supply contracts into the North American Sub basin aquifer (basin number: 5-21.64 as defined in DWRs Bulletin 118) for storage and subsequent extraction and use within the City's water service area (Figure 2-1). Raw water taken from Folsom Lake would be treated utilizing available treatment capacity at the City's Barton Road Water Treatment Plan. Most injection would occur during fall, winter, and spring months when water is typically plentiful in Folsom Lake and system water demands are lowest. Summer injection would occur on a more limited basis due to higher seasonal customer demands in the summer months. Typically the geologic formation where groundwater is extracted for municipal drinking water yield is from the Mehrten formation. The storage zone for ASR operations would also mainly be the Mehrten formation, which generally exceeds a depth of 300 feet below surface in the project area. At that depth water can be safely injected into the aquifer without potential to saturate surface soils or otherwise influence surface water levels.

Under existing operations groundwater extraction can be necessary when the City's surface water supplies are cut back in response to drought conditions. Under the City's proposed ASR Program, injection and extraction could also occur during normal water years, maximizing conjunctive use and operational flexibility. For example, extraction during normal water years could occur to meet other system operational goals or to meet possible regulatory requirements that may be imposed on the proposed ASR Program to "manage" or control the migration of injected water. Such requirements would be determined through the RWQCB Waste Discharge Permitting process. Operational flexibility (the amount of water available at any given time) can be increased by timing required withdrawals to occur during peak demand periods, known as "shaving the peak." Peak shaving refers to supplementing surface water supplies temporarily with groundwater when treatment requirements are highest due to higher summer irrigation demands. These operational parameters, as well as projected injection and extraction quantities, are further described below.

2.2.4 Operational Parameters: Injection and Extraction Volumes

Proposed ASR Program operational parameters were developed based on projected water demands, a minimum twenty percent conservation factor, the quantity of water available for injection based on water year classification, and treatment plant capacity. Detailed analysis for available water considered for ASR injection is contained in a technical memorandum entitled "Development of an Excel-Based Solution for Generating Pumping Files for ASR Transport Scenarios" of Appendix E of the Antidegradation Analysis (Appendix E). This study used the same three water year types identified in the Water Forum Agreement. The three water year types used are: a wet/normal water year, a drier water year, and a critical (driest) water year. The water year classifications are defined based upon the amount of unimpaired inflow from the American River into Folsom Lake between March and November each year. If the annual unimpaired flow is below 400,000 acre-feet per year, the water year is considered critical (driest). Annual unimpaired flow above 950,000 acre-feet per year is considered a normal/wet year. Unimpaired flow between those two spectrums is considered a drier water year. The estimated unimpaired flow and the available supply from the American River for the proposed ASR Program are provided in figures 2-4 and 2-5 below.

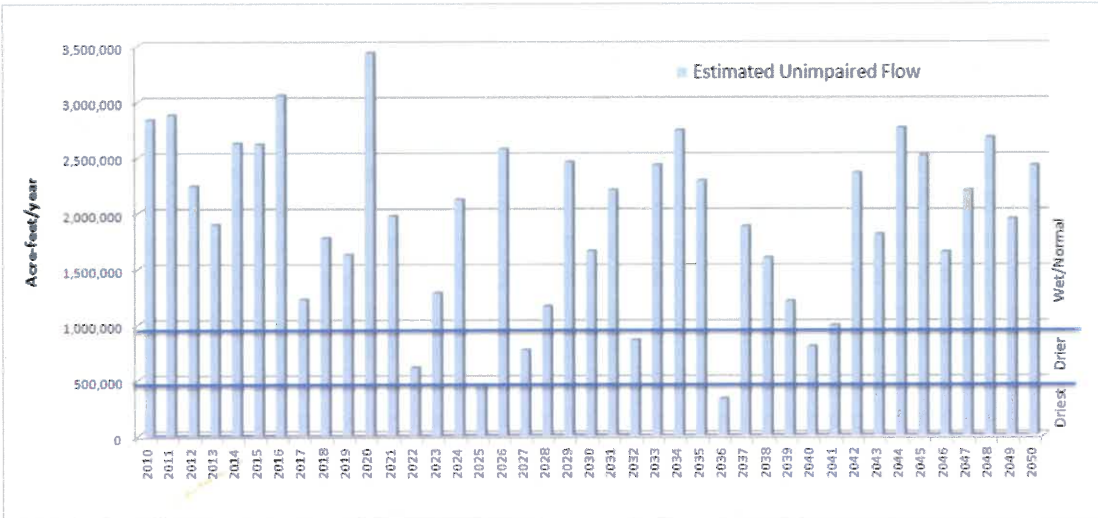

Figure 2-4. Estimated Unimpaired Flow and Water Year Classifications

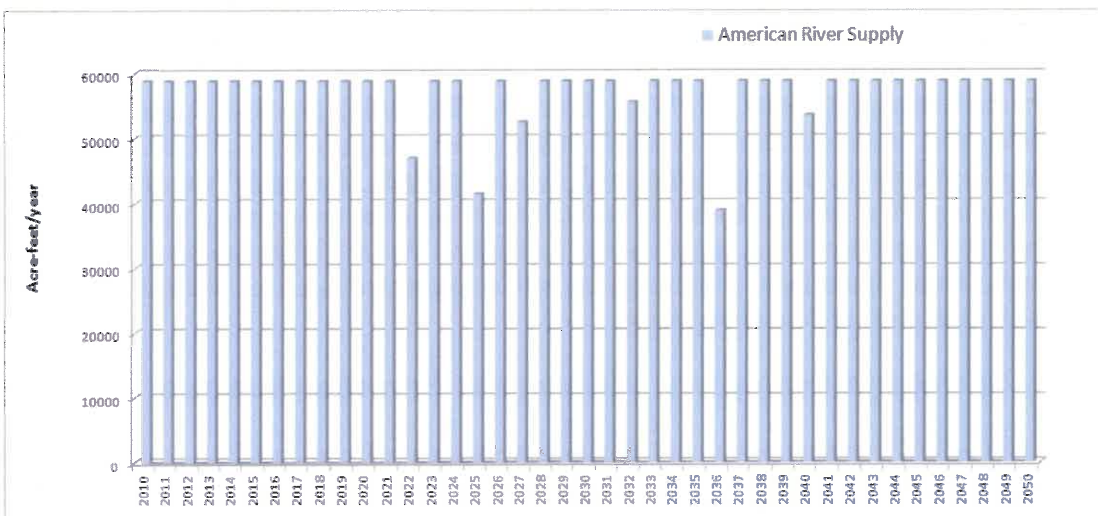

Figure 2-5. Available Supply for Roseville from American River

The water year classifications impact both the available supply for injection and the demand for extraction. The minimum amount of water available for injection could be as low as 0 AF a year during a driest year and as much as 13,786 AF during a wet year based on population demand and a 20% conservation factor as mandated by State law. As the City approaches buildout when all water supply contracts are being utilized to meet municipal demands, the amount of water available for injection will decrease, as shown in Figure 2-6.

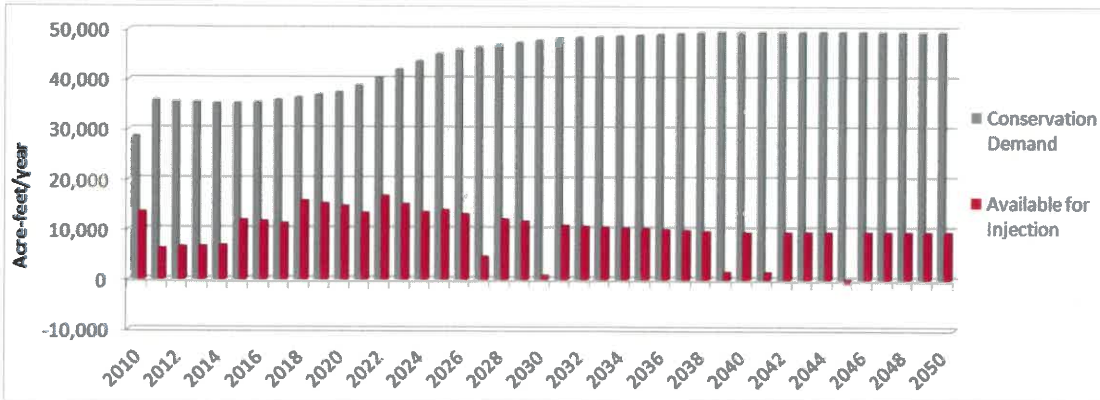

Figure 2-6. Projected Demand with Conservation and Available for Injection

Aquifer Blending

Blending will occur intermittently in the underground aquifer during injection and extraction cycles. Injected water that is subject to shorter periods of aquifer storage will better retain the original surface water characteristics (i.e., relatively low TDS and sodium levels). Frequent injection and extraction cycles would retain the injected water near the wellhead zone of influence for extraction capability. Blending could also be achieved through peaking shaving operations as discussed below.

Peak Shaving

To increase operational flexibility, the ASR program includes the potential for peak shaving. Peak shaving refers to supplementing surface water supplies with groundwater during high demand periods. This could occur during summer months when treatment requirements are highest, when the water treatment plant capacity is reduced for maintenance, or to potentially meet permit requirements.

2.2.5 Construction Methods

This section discusses basic construction methods for infrastructure improvements necessary to implement the ASR Program and optional elements. These methods are considered as part of the impact analysis presented in Chapter 4.0.

ASR Wells: ASR wells are designed and constructed one at a time although it is possible that one or more could be packaged together, bid and constructed as a single project.

The first order of work would include mobilization of equipment and materials to the well site over approximately a one-week period. Equipment and materials would be stored on-site for the duration of construction. A site yard/staging area would be established, and a project trailer may be moved onto the construction site. Depending on the site location, a temporary fence may be installed around the construction site to ensure public safety and site security.

Well construction would take place over a period of 8 weeks and would require approximately 14 days of continuous (24-hour/day) drilling operations sometime during the 8 week period. Intermittent twenty four-hour drilling operations are necessary to avoid caving of the borehole and possible loss of the well prior to completion. ASR Wells would be drilled to a depth of about 500 feet. The materials excavated from the borehole will be contained and stored on site, and then removed for off-site disposal at an approved location.

Pump tests will then be carried out to evaluate the pump design parameters and to gather data on pumping volume, water quality, and groundwater level. Groundwater extracted from the well during the testing will be discharged to nearby stormwater facilities. The volume of groundwater discharged into the stormdrain will be regulated to ensure that it is within capacity of existing facilities.

Water discharged from the well will also be tested before discharge and any water that does not meet RWQCB standards for release into the stormwater system will be contained and treated onsite before discharge or will be transported offsite for treatment and disposal.

Top Side Improvements: After the well has been drilled, the construction of "top side improvements" would take place over a 12 to 18 month period. This includes constructing a building enclosure, any related driveways, landscaping, all mechanical piping and appurtenances, chlorination facility, electrical equipment, and instrumentation controls. The construction period would be reduced for well sites that do not require a building enclosure for top side improvements. During the top side infrastructure phase, typical construction related dust, noise, and traffic will be experienced.

Construction demobilization will take place over a two-week period following the completion of top side improvements. Construction equipment will be transported off site. The site yard/staging area would be broken down and support apparatus transported off-site and construction fences removed. The area would be generally cleaned up to ensure trash or unused materials are not left on or near the site.

2.2.6 Environmental Commitments

In addition to the City Mitigating Ordinances, Guidelines and Standards that apply to all development activities in the City (discussed in Chapter 1.0 Introduction), the proposed ASR Program also includes environmental commitments. Environmental commitments include a variety of Best Management Practices (BMPs) and other measures intended to avoid project generated short- and long-term effects on the physical and human environment. This includes preparation of special handling and contingency plans before project activities are initiated, as well as including provisions in contract specifications for contractor implementation during project construction. Environmental commitments include all mitigation measures identified in the ASR Program Initial Study (Appendix A). Because Initial Study mitigation measures are incorporated into the EIR Project Description they are not listed as mitigation measures in the Impacts and Mitigation Measures Summary Table (Table 3-1) contained in Chapter 3.0. The ASR Program's environmental commitments are listed below.

Traffic Control Plan: The City will require the contractor to implement a construction traffic management plan. This plan will identify general methods for construction traffic management to minimize delays. These methods may include (but are not limited to):

- Appropriately sequencing activities (e.g., segment phasing, timing of grading, hours of construction) to minimize effects on traffic flow.
- Maintaining traffic flow in the project area to the extent possible.
- Maintaining bicycle and pedestrian access.
- Limiting road closures to off-peak traffic periods.
- Coordinating with the press, emergency service providers, and the community by posting information on the City's Road Closures & Detours Web page, and contacting providers with advance warning of construction activities.

Special Handling Guidelines for Drilling Muds and Pump Test Discharges: As discussed above, ASR Wells would be drilled to a depth of about 500 feet. The drilling process will generate excess materials including drill muds. The City will require that the contractor identify techniques for onsite storage and disposal of muds and/or any other materials that require special handling during construction.

Once drilling is complete pump tests will be conducted to evaluate pump design parameters and to gather data on pumping volume, water quality, and groundwater level. The City will require the contractor to identify procedures to address pump test water quality to ensure discharge water does not impact receiving waters or exceed the design capacity of the stormwater conveyance system. Construction water will comply with all existing stormwater discharge requirements prior to discharge or disposal.

Placer County Air Pollution Control District (APCD) Rules: The Placer County APCD NOP comment letter dated August 5, 2009 recommends including the following APCD adopted district Rules or sections there of as construction document notes: Rule 202, 228 (section 401.1, 401.4, 401.5, 402) , and 318. The City will ensure applicable adopted Rules are included as notes on construction documents.

ASR Program Initial Study Mitigation Measures

The NOP for the proposed project included an Initial Study, which identified resource areas that would potentially be impacted by the proposed project. Resource areas not impacted by the project were identified in the Initial Study and not further evaluated in this EIR. Resource areas subject to potentially significant impacts are evaluated in this EIR. Resource areas that could be mitigated to less than significant were identified, along with the following mitigation measures, which are considered part of the proposed project.

I.S.-AQ-1: Air Quality Mitigation Measures

- Clean earth moving construction equipment with water, or sweep clean, once per day, or as necessary (e.g., when moving onsite), consistent with National Pollutant Discharge Elimination System (NPDES) BMP's, local ordinances and municipal codes. Water shall be applied to control dust as needed to prevent dust impacts offsite. Operational water truck(s) shall be onsite, as required, to control fugitive dust. Construction vehicles leaving the site shall be cleaned, as needed, to prevent dust, silt, mud, and dirt from being released or tracked off-site.

- Spread soil binders on unpaved roads and employee/equipment parking areas. Soil binders shall be non-toxic in accordance with state and local regulations. Apply approved chemical soil stabilizers, or vegetated mats, etc. according to manufacturer's specifications, to all-inactive construction areas (previously graded areas which remain inactive for 96 hours).
- Minimize diesel idling time to a maximum of 10 minutes.
- Utilize existing power sources (e.g., power poles) or clean fuel generators rather than temporary diesel power generators, if feasible.

I.S.-Bio-1: Survey for Wetlands

During preliminary engineering for well sites located on undeveloped property, a survey for wetlands shall be conducted by a qualified biologist in accordance with the following:

- A wetland delineation shall be prepared in accordance with the requirements of the Federal Clean Water Act and U.S.Army Corps of Engineers.
- If no wetlands are documented during the survey, no further mitigation or agency consultation is required.
- If wetlands are present, the City shall, as feasible, avoid impacts to the resource.
- If avoidance measures do not eliminate the impacts to wetlands, the City shall obtain required approvals from the U.S. Army Corps of Engineers per Section 404 of the Federal Clean Water Act.

I.S.-Bio-2: Survey for Riparian Habitat and Special Status Species

During preliminary engineering for well sites located on undeveloped property, or an area that may otherwise disturb riparian habitat or a special status plant species, a survey for special status plant species shall be conducted by a qualified biologist in accordance with the following:

- If no riparian habitat or special status species are documented during the survey, no further mitigation or agency consultation is required.
- If riparian habitat or special status species are identified on the project site, the City shall, as feasible, avoid impacts to the resource.
- If feasible avoidance measures do not eliminate the impact to special status species, the City shall consult with and obtain approvals from the applicable regulatory agency, and determine appropriate measures for further protection or mitigation of the impact.

I.S.-Bio-3: Construct Outside the Nesting Season or Conduct Preconstruction Raptor Nesting Surveys:

To avoid disturbance of raptor breeding and nesting activity, including nesting of sensitive raptors, project activities will be avoided during the typical raptor breeding season of March through August, to the extent feasible. If construction must take place during the typical nesting season, preconstruction surveys will be conducted by a qualified biologist no more than 30 days prior to initiation of proposed development activities. Surveys will be conducted to determine if active nesting is occurring on or directly adjacent to the study area. Survey results will then be submitted to the California Department of Fish and Game (DFG). If active nests are found on or immediately adjacent to the site, consultation will be initiated with DFG to determine appropriate avoidance measures. If no nesting is found to occur, necessary tree removal and other project activities could then proceed. Implementation of preconstruction raptor surveys and appropriate avoidance measures will reduce impacts to a less-than-significant level.

I.S.-Hazard-1

Prior to initiating ground-disturbing activities, the City shall evaluate areas where drilling would occur to evaluate the potential for historical or existing hazardous materials. This evaluation shall include visual inspections of the site for evidence of hazardous materials releases (i.e., dumping) or evidence of nearby land uses, which may indicate the use of hazardous materials or hazardous waste generation (i.e., aboveground storage tanks, placarding). If such evidence is observed, the City shall retain a qualified consultant to evaluate the potential for hazardous materials releases at the site prior to initiating construction to determine whether these releases may constitute a potential recognized environmental condition. If such a condition is determined to exist, the City shall prepare and implement a remediation plan prepared in accordance with the applicable regulatory agency (i.e., Department of Toxic Substances Control or RWQCB) prior to proceeding with construction.

2.2.7 Project Schedule

Final EIR certification is targeted for February 2012 and RWQCB permit approval is anticipated shortly thereafter. Assuming the necessary permit approvals are obtained, on this schedule, the City's current goal is to begin ASR operations as soon possible. Initial operations would be limited to what can be accomplished with existing infrastructure.

Most likely ASR Program infrastructure construction would be prioritized and programmed over several years. Construction of the remaining ASR Wells and top side improvements could begin in summer 2012. It is expected the ASR Program would be fully operational with the proposed wells by 2050.

The above schedule is based on the City's current plans and funding. Grants or other similar opportunities, or changes in growth, could alter implementation plans or the order of well construction.

2.2.8 Required Permits and Approvals

The ASR Program would require approvals by the City and permits from state agencies. Table 2-2 lists those agencies that would have some form of project approval involvement and therefore serve as Responsible Agencies under CEQA. Permits issued by these agencies for ASR operations will identify requirements for ASR operation, monitoring and reporting.

TABLE 2-2.
RESPONSIBLE AGENCIES AND REQUIRED PERMITS AND APPROVALS

Regulatory Agency	Type of Review, Permit or Approval	Reason for Permit or Approval
Roseville City Council	Project and CEQA Approval	City Council serves as the CEQA Lead Agency for EIR Certification and ASR Program approval
Roseville Public Works Department/Environmental Utilities Department	Improvement Plans, Grading and/or Encroachment Permit review	Compliance with City Design & Construction Standards, Mitigating Policies and Standards
Roseville Planning and Redevelopment Department	Review of improvement plans for consistency with City of Roseville Native Oak Tree Ordinance (if applicable)	Compliance with City Tree Protection policies
Roseville Fire Department	Hazardous Materials Use and Storage	CUPA (City's Unified Program Agency)
State/Regional Water Quality Control Board – Central Valley	Waste Discharge Permit Approval or general order Waste Discharge Requirements Permit	Required for groundwater injection operations
California Department of Public Health	Domestic Water Supply Permit Amendment	Required for all municipal water supply facilities

2.2.9 Citations Referenced in this Chapter

City of Roseville, *Sierra Vista Specific Plan Final EIR*. 2010.

City of Roseville, *Urban Water Management Plan*. July. 2002.

CHAPTER 3.0
Summary of Impacts and Mitigation Measures

3.1 Introduction

This section provides a summary of the "proposed project" in accordance with the CEQA Guidelines Section 15123. As stated in Section 15123(a), "an EIR shall contain a brief summary of the proposed action and its consequences. The language of the summary should be as clear and simple as reasonably practical." As required by the CEQA Guidelines, this chapter includes:

A summary description of the proposed project;

A synopsis of environmental impacts and recommended mitigation measures;

Identification of the alternatives evaluated; and

A discussion of areas of controversy associated with the proposed project;

Table 3-1 at the end of this chapter provides a summary of the impacts determined in this DEIR and the mitigation measures proposed to avoid or substantially minimize significant and potentially significant impacts.

3.2 Summary Description of the Proposed Project

The Aquifer Storage and Recovery Program (ASR) is proposed by the City to improve water supply reliability, maintain groundwater as a sustainable resource, improve operational flexibility, and meet regional conjunctive use program goals. ASR is a process where treated surplus surface water is injected through specially designed groundwater wells into the groundwater aquifer for storage. It is later recovered, when needed, for municipal use thereby increasing the City's water supply reliability during peak demand times, or during dry rainfall years. The City is exploring ASR as a component of the its overall water supply strategy in order to maximize the ability to fully utilize allocated surface water; manage the groundwater aquifer for its cost-effective, large-scale storage capability not otherwise readily available above-ground; meet regional conjunctive use program goals as outlined in the City's General Plan and Regional Water Management Plans; and ensure no net impact to the groundwater aquifer from potential use during dry and drier years.

The amount of surface water available for injection and the demand for extraction will vary based on the type of water year (i.e., wet/normal water year, or a drier water year). The minimum amount of water available for injection could be as low as 0 AF a year during a driest year and as much as 13,786 AF during a wet year based on population demand and a 20% conservation factor as mandated by State law.

The ASR program would involve the use of thirteen (13) specially designed and metered wells capable of both water injection and groundwater extraction. Figure 2-2. ASR Well Sites shows the existing and planned location of proposed ASR wells; while Table 2-1. ASR Program Wells, provides a status summary for each well.

As shown in Figure 2-2, ASR wells are proposed primarily on the City's western side. Well sites average between 0.5 and 1 acre, and are currently in varying stages of development. As shown in Table 2-1, the City has constructed six wells, all of which are equipped for both extraction and injection. Seven more wells have been planned as components of previously approved Specific Plan projects, and approved along with certification of those Specific Plan EIRs.

The City's municipal wells typically include "top side" (above ground) and below ground (well casing) improvements. Top side improvements typically include a small structure to house and secure the above ground ASR well equipment and support infrastructure such as pumps, electrical and disinfection equipment (Figure 2-3. Typical "Top Side" Well Improvement).

3.3 Environmental Impacts and Recommended Mitigation Measures

In accordance with CEQA Guidelines Section 15123, the summary section of an EIR should identify significant effects of the Proposed Project, as well as discuss alternatives that would avoid or substantially minimize these effects. Table 3-1, "Summary Table of Impacts and Mitigation Measures" presented at the end of this chapter, provides a summary of the EIR identified project impacts, the level of significance of the impact before mitigation, recommended mitigation measures for significant impacts, and the level of significance after implementation of the mitigation measures. The Summary Table also lists issue areas found to be less than significant based on analyses and mitigation measures contained in the Initial Study. All Initial Study mitigation measures have been incorporated into the project and are presented in Project Description, Section 2.2.6 Environmental Commitments.

The City issued a Notice of Preparation (NOP for the Proposed Project on June 30, 2009. The NOP was issued to solicit comments from public agencies and the public on issues of concern relative to the proposed project that should be considered in the EIR. In accordance with CEQA Guidelines Section 15063 (c)(3)(A), an Initial Study (Appendix A) was prepared to focus the scope of the EIR on the potentially significant effects of the proposed project, and explain the reasons for determining that potentially significant effects would not be significant, or would be less than significant with the application of mitigation measures.

3.4 Summary of Alternatives

CEQA requires that an EIR must describe a range of reasonable alternatives to the project which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project. The EIR need not consider every conceivable alternative, but must consider a "reasonable range of potentially feasible alternatives that will foster informed decision making and public participation." (CEQA Guidelines, § 15126.6, subd. (a).)

This EIR evaluates the following alternatives to the proposed project:

Alternative 1: No Project Alternative

Alternative 2: Upgrade Water Treatment Plant to Ultraviolet (UV) and Ozone with Separate Pipeline

Alternative 3: Surface Storage Alternative

Alternative 4: On-Site Groundwater Treatment at ASR Wells

The following is a brief description of each Alternative; Chapter 6 provides an Alternatives Analysis which further explores impacts associated with each alternative

3.4.1 .Alternative 1: No-Project Alternative

Analysis of a No-Project Alternative is required (CEQA Guidelines §15126.6) to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the project. This Alternative was ultimately rejected because under the No-Project Alternative, the wells would not include injection of surface water, but would supply extracted groundwater only as needed; nor would the No-Project Alternative attain the primary goals and objectives of the proposed ASR Program.

3.4.2 Alternative 2: Upgrade Water Treatment Plant to UV and Ozone with Separate Pipeline

The Water Treatment Plant (WTP) UV/Ozone with Separate Pipeline Alternative would modify the Water Treatment Plant to disinfect filtered water with UV or ozone to minimize the formation of disinfection byproducts, including chloroform. The process would require construction of an additional treatment system using UV reactors or ozone injectors, and separate pipeline for conveyance to ASR well sites, specifically for water to be injected.

3.4.3 Alternative 3: Surface Storage Alternative

The Surface Storage Alternative would require construction of above-ground storage. Specifically, a water basin or reservoir adequately sized to store excess raw water from the City's entitled surface water allocation will need to be constructed. This alternative would require identifying and procuring a suitable site, as well as design and construction of infrastructure to convey and treat the water at the City's Barton Road Water Treatment Plant.

3.4.4 Alternative 4: Onsite Groundwater Treatment at ASR Wells

The Onsite Groundwater Treatment Alternative would entail construction of water treatment facilities at ASR well sites to treat groundwater to the equivalent of surface water in terms of appearance, odor, and taste. This would be accomplished using a reverse osmosis membrane filtration system prior to delivery to water customers.

3.4.5 Environmentally Superior Alternative

Alternative 2, the WTP upgrade with a Separate Pipeline, would be the environmentally superior alternative. Compared to the Surface Storage Alternative and Onsite Treatment Alternative, the WTP Plant upgrade with a Separate Pipeline would require significantly less land area, and consequently fewer associated impacts (e.g., land use, transportation, biologic and cultural resource impacts). The WTP Upgrade/Pipeline Alternative also meets the water quality objectives of the local RWQCB, and provides additional water reliabilities and water resources for the City in drought or emergencies. Ultimately the infrastructure costs required to implement the WTP Upgrade and Separate Pipeline would render the Alternative economically infeasible.

3.5 Areas of Controversy

The City issued a NOP for the proposed project on June 30, 2009. The NOP was issued to solicit comments from public agencies and the public on issues of concern relative to the proposed project that should be considered in the EIR. Public scoping meetings for the project were held on July 15 and July 29, 2009 These meetings were also for the purpose of soliciting comments from the public on project effects and alternatives.

At the local level, the project has generated some public controversy. The controversy is primarily due to the experience residents cited during a demonstration phase of the ASR Program. Residents identified concerns regarding:

1. Water quality, including:
    - Increased hardness of water and the associated effects on skin, plumbing, household items and clothing,
    - Odor, taste, and appearance of ASR water,
    - Potential for health effects due to higher sodium levels and other constituents, and in particular on the aging population, and
    - General water quality concerns including potential for surface water contamination, mixing with contaminated groundwater in other areas, and the testing and monitoring process.
2. If the ASR water would be used to support new development.

Seven comment letters were received in response to the NOP, in addition to verbal and written comments received at the scoping meetings. Comments received address the above-mentioned areas of controversy. All issues raised in these comment letters are addressed within this DEIR, and letters received are attached as Appendix B of this DEIR.

TABLE 3-1: SUMMARY OF IMPACTS AND MITIGATION MEASURES

Impact Statement	Mitigation Measure	Significance	
		Before Mitigation	After Mitigation
4.2 Hydrology and Water Quality			
4.2-1: Potential Changes to Groundwater Quality – Injection Water	No mitigation is required.	LTS	LTS
4.2-2: Potential Changes to Drinking Water Quality – Extracted Water .	No mitigation is required.	LTS	LTS
4.2-3: Potential Health Effects from Groundwater Use – Effects to Taste, Odor and Aesthetics (Secondary Drinking Water Standards)	ASR water would meet all primary potable water quality standards for public water systems. While customers may notice a decrease in aesthetic, or secondary standards, these would be considered adverse but less than significant impact as the secondary standards are not enforceable, but rather are guidelines for predicting consumer acceptance. Therefore, the potential for decreased secondary standards would be considered adverse, but would not trigger a CEQA threshold that would be categorized as a significant impact.	LTS	LTS
4.3 Noise			
4.3-1: Short Term Drilling Noise Levels at Nearest Residences. Implementation of the proposed project would result in well drilling noise in the vicinity of the Woodcreek West, Del Webb, and Hewlett Packard well sites. The predicted noise levels at the adjacent residences range between 75 dB and 78 dB Leq. Therefore, the noise levels would exceed the nighttime noise level standard of 45 dB Leq by approximately 30 dB. Although well drilling activities are temporary (expected to occur for no more than one to two weeks) the noise levels would be substantial and would be a cause for annoyance. This is considered to be a potentially significant impact.	**4.3-1:** Use of sound attenuation measures during well drilling operations. One such method to reduce noise levels is to erect a temporary sound barrier on the sides facing the residences. An example would be barriers such as noise blanket panels mounted to steel framing. Noise blanket panels can be mounted horizontally or vertically and attached to vertical steel I-beam supports. Such barriers can reduce overall noise levels by approximately 17 dB. ~~**4.3-2**: Under §9.24.140 of the City of Roseville Noise Ordinance, the City Council can, by resolution, adopt a temporary noise level standard of 50 dB Leq during the drilling operations. This noise level is adequate to allow a reasonable interior environment for sleeping in urban areas. Based on typical construction, the exterior to interior noise level reduction is expected to be 25 dB, with closed windows and doors. With implementation of MM4.2-1 the interior noise levels are expected to be approximately 43 dB to 46 dB Leq.~~ 3	PS	SU

NI = No Impact *LTS = Less-than-significant* *PS = Potentially Significant* *S = Significant* *SU = Significant and Unavoidable*

Impact Statement	Mitigation Measure	Significance Before Mitigation	Significance After Mitigation
4.3-2: Temporary Construction Noise Levels at Nearest Residences. Implementation of the proposed project would result in short-term construction activities associated with individual development projects in the Plan area. These construction activities could potentially expose sensitive receptors to noise levels in excess of the applicable noise standards and/or result in a noticeable increase in ambient noise levels. Therefore, this impact is considered potentially significant.	**4.3-3:** Short-Term Construction-Generated Noise Levels: Although impacts related to short-term construction-generated noise were considered to be less than significant with implementation of the project, the following mitigation ~~is provided to~~ ensure impacts ~~remain at~~ a less-than-significant level. Construction contractors shall implement the following measures during construction activities: • Construction equipment shall be properly maintained per manufacturers' specifications and fitted with the best available noise suppression devices (i.e., mufflers, silencers, wraps, etc). Shroud or shield all impact tools, and muffle or shield all intake and exhaust ports on power equipment. • Construction operations and related activities associated with the proposed project shall comply with the operational hours outlined in the City of Roseville Municipal Code Noise Ordinance; construction operations shall be limited to between the hours of 7 a.m. and 7 p.m. Monday through Friday and between 8 a.m. and 8 p.m. Saturday and Sunday. • Construction equipment should not be idled for extended periods of time in the vicinity of noise-sensitive receptors. • Locate fixed and/or stationary equipment as far as possible from noise sensitive receptors (e.g., generators, compressors, rock crushers, cement mixers). Shroud or shield all impact tools, and muffle or shield all intake and exhaust ports on powered construction equipment. • Where feasible, temporary barriers shall be placed as close to the noise source or as close to the receptor as possible and break the line of sight between the source and receptor where modeled levels exceed applicable standards. Acoustical barriers shall be constructed material having a minimum surface weight of 2 pounds per square foot or greater, and a demonstrated Sound Transmission Class (STC) rating of 25 or greater as defined by American Society for Testing and Materials (ASTM) Test Method E90. Placement, orientation, size, and density of acoustical barriers shall be specified by a qualified acoustical consultant.	~~LTS~~ PS	LTS

NI = No Impact *LTS = Less-than-significant* *PS = Potentially Significant* *S = Significant* *SU = Significant and Unavoidable*

Impact Statement	Mitigation Measure	Significance Before Mitigation	Significance After Mitigation
4.3-3: Well Pump (Operational) Noise Levels Implementation of the proposed project would result in increases in stationary source noise associated with the proposed residential and commercial land uses. These stationary noise sources could potentially exceed the City's noise standards (hourly and maximum) and result in a noticeable increase in ambient noise levels.	**4.3-~~4~~ 3:** Reduce noise levels associated with the well pump by providing a full or partial enclosure. The enclosure can take the form of a block house or surrounding barrier designed to accommodate a pump motor 5-feet in height, and elevated off the ground by 18 inches. A full enclosure with a roof would sufficiently reduce noise levels, however, ventilation openings should be located on the side of the building opposite the nearest residences. If a traditional barrier is constructed around the well site, it would need to be a minimum of 8-feet in height. A variety of suitable sound attenuation options would be available. In order to ensure that sound levels are adequately mitigated, a qualified acoustical expert shall be consulted regarding placement, orientation, size, and density of acoustical barriers.	PS	LTS
4.3-4: Ground-Borne Noise and Vibration Levels at Sensitive Receptors. Implementation of the proposed project could result in exposing sensitive noise-receptors to ground-borne noise and vibration levels during well drilling. These ground-borne noise and vibration levels could result in annoyance or architectural/structural damage. Therefore, this impact is considered ~~potentially~~ Less than significant. Based on the extent of ground-borne vibration during drilling of previous wells, the distance of adjacent development, and the absence of historic architectural resources, this impact would be less than significant.	~~Based on the extent of ground-borne vibration during drilling of previous wells, the distance of adjacent development, and the absence of historic architectural resources, this impact would be less than significant.~~ None Required	~~PS~~ LTS	LTS

Impacts Previously Identified as Less than Significant in the NOP/Initial Study (Appendix A)

Aesthetics

- Agricultural Resources
- Air Quality
- Greenhouse Gas Emissions and Global Climate Change
- Biological Resources

NI = No Impact *LTS = Less-than-significant* *PS = Potentially Significant* *S = Significant* *SU = Significant and Unavoidable*

Impact Statement	Mitigation Measure	Significance	
		Before Mitigation	After Mitigation
• Cultural Resources			
• Geology, Soils and Seismicity			
• Hazards and Hazardous Materials			
• Land Use Planning			
• Mineral Resources			
• Public Services			
• Traffic and Circulation			
• Transportation and Circulation			
• Utilities and Service Systems			
5.0 CEQA Considerations			
5.2.3. Potentially Growth Inducing Impacts	No mitigation is required.	PS	PS

NI = No Impact *LTS = Less-than-significant* *PS = Potentially Significant* *S = Significant* *SU = Significant and Unavoidable*

CHAPTER 4.0
Environmental Setting, Impacts, and Mitigation Measures

4.1 Approach to the Environmental Analyses

Sections 4.2 and 4.3 of this Draft Environmental Impact Report (DEIR) present a discussion of existing conditions, environmental impacts associated with implementation of the proposed project, mitigation measures to reduce the level of impact, and residual impacts (i.e., impacts that would be significant and unavoidable despite the application of proposed mitigation measures).

As discussed in Section 1.5 "Scope of the EIR," the Notice of Preparation (NOP) for the Aquifer Storage and Recovery Program, prepared by the City, dated June 30, 2009, and included in this document as Appendix A identified that implementation of the proposed project would result in "no impact" or "less-than-significant" impacts in the following areas; therefore these areas are not analyzed in this DEIR:

- Agricultural Resources
- Air Quality and Global Climate Change
- Biological Resources
- Cultural Resources
- Geology and Soils
- Hazards and Hazardous Materials
- Land Use and Planning
- Mineral Resources
- Population and Housing
- Public Services
- Recreation
- Transportation/Traffic
- Utilities and Service Systems

Sections 4.2 and 4.3 address the following resource areas, which were identified in the NOP to have potentially significant impacts and therefore warrant further analysis in this DEIR:

- Hydrology and Water Quality
- Noise

Each section in this DEIR that addresses the resource areas listed above (Sections 4.2 and 4.3) includes the following components:

Regulatory Background: This subsection presents information on the laws, regulations, plans and policies that relate to the issue area being discussed. Regulations originating from local, state, and federal levels are discussed as applicable.

Existing Conditions: This subsection presents the existing environmental conditions in the project area and surrounding area as appropriate, in accordance with Section 15215 of the CEQA Guidelines. The discussions of the environmental setting focus on information relevant to the specific issues under evaluation.

Environmental Impacts: This subsection identifies the impacts of the proposed project on the existing environment, in accordance with CEQA Sections 15125 and 15143. Before presenting an evaluation of impacts, the section describes the analysis methodology and the thresholds of significance used to identify impacts. Project impacts are identified numerically and sequentially within the section. An impacts statement precedes the discussion of each impact, providing a summary of the impact and its level of significance. The discussion that follows the impact statement includes the analyses and evidence upon which the conclusion is made regarding the level of impact. Note that analysis of Cumulative Impacts and Growth-Inducing Impacts are presented in Chapter 5 of this DEIR.

Mitigation Measures: This subsection identifies feasible mitigation measures intended to avoid or substantially reduce significant impacts of the proposed project, in accordance with CEQA Guidelines Sections 15002(a)(3), 15021(a)(2), and 15091(a)(1). Each mitigation measure is identified numerically and corresponds with the specific impact reduced by the measure. This subsection also identifies whether the mitigation measures would reduce impacts to less-than-significant levels. Significant and unavoidable impacts are identified, if applicable, in this subsection. Significant and unavoidable impacts are also identified in Chapter 3.

4.2 Water Quality

This section addresses potential effects of the project related to water quality and groundwater resources. Water quality is described based on site-specific information and published technical information, as indicated in footnoted references. The primary sources of information referenced for this section are listed below, and are available for review at the City's Corporation Yard, 2005 Hilltop Circle, Roseville.[1]:

- Central Valley Regional Water Quality Control Board, *Water Quality Control Plan (Basin Plan), Central Valley Region, Sacramento River and San Joaquin River Basins*. 1998.
- California Department of Water Resources, *California's Groundwater, Bulletin 118*. 2003.
- MWH, *Groundwater Impact Analysis*. June 2003.
- MWH, *City of Roseville Pilot Scale Cycle Testing at Diamond Creek Well, Final Report*. December 2004.

[1] By appointment is recommended (916)774-5750.

- MWH, *City of Roseville Aquifer Storage & Recovery (ASR) Program Phase II - Demonstration Testing at the Diamond Creek Well, Final Report*. February 2009.
- MWH, *Western Placer County Groundwater Management Plan*. November 2007.

During circulation of the Notice of Preparation (NOP), comments were received regarding the use of groundwater as a potable water supply and requested that the EIR address potential water quality effects, including:

- Antidegradation Analysis in accordance with Section 13000 of the Water Code and State Board Resolution No. 68-16 ("Statement of Policy with Respect to Maintaining High Quality Waters in California");
- Potential health effects, and especially potential effects specific to the elderly, and sodium content;
- Hard water characteristics and effects;
- Taste and odor of ASR water comparative to the existing surface water supply; and
- Groundwater/aquifer contamination.

Copies of comments submitted on the NOP can be viewed in Appendix A of this DEIR.

4.2.1 Environmental Setting

Geologic Setting

Geologic setting information presented below is based on DWR Bulletin 118 (Department of Water Resources (DWR) prepared Bulletin 118, Evaluation of Ground Water Resources: Sacramento County in July 1974.

The rock underlying the Sacramento region consist of sediments that were deposited during the Cretaceous and early Tertiary Periods. Because rock formations do not contain significant water bearing units, the geologic setting focuses on the water-bearing formations (aquifers) created by these continental deposits. Continental deposits consist of a sequence of sands, silts, and clays that have accumulated over a history of erosional sequences and volcanic eruptions. The base is the marine sediments consisting of sandstone and shale that were deposited about a hundred million years ago when an ancient sea covered what is now the Sacramento and San Joaquin Valleys. These deposits were formed in a saltwater environment and still retain saltwater characteristics; therefore, these deposits are generally not considered a viable source of water in the region. Above the saltwater deposits, there are five water-bearing formations, from bottom to top: Ion Formation, Valley Springs Formation, Mehrten Formation, Turlock Lake Laguna Formation, and River Bank Formation as shown in Figure 4-1 below.

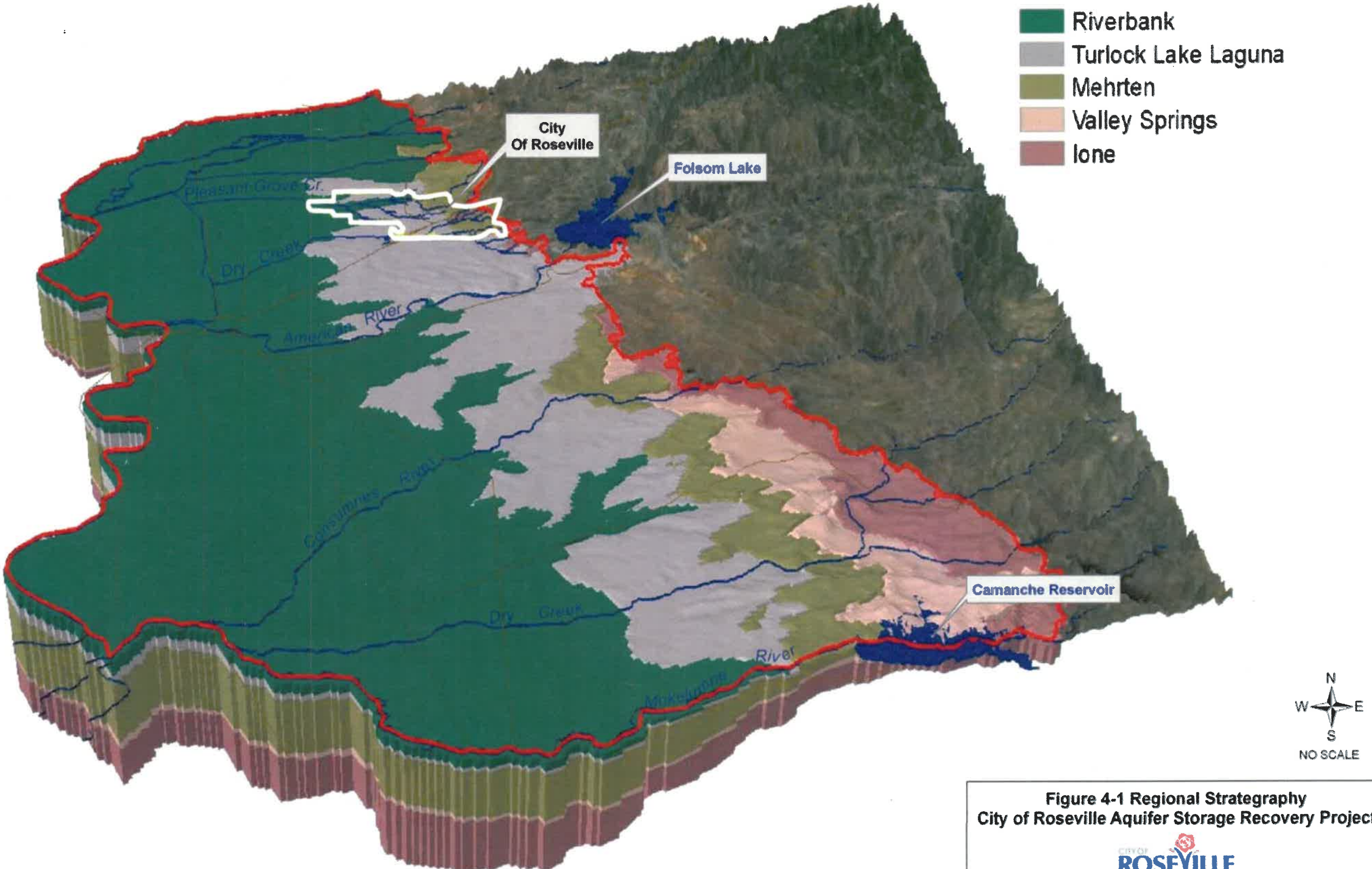

Figure 4-1 Regional Strategraphy
City of Roseville Aquifer Storage Recovery Project

CITY OF ROSEVILLE CALIFORNIA

The oldest formation is the Ione Formation which consists of sands, gravels, and clays deposited during the Eocene epoch. The Ione Formation outcrops to the east, where freshwater remains at shallow depths. The Ione Formation dips to the west and is over 2,000 feet below the Sacramento River. The Ione Formation typically has low permeability; although secondary fracturing near the outcrops is believed to provide a source of water to the unit.

On top of the Ione Formation is the Valley Springs Formation which was formed during a series of volcanic eruptions during the Miocene period. This formation consists of lenses of light colored sands with beds of silts and clays, with a characteristic olive green color. Recent geophysical surveys in northeastern Placer County have identified this formation near its outcrop to be lightly productive in localized areas. However, this unit is generally low in permeability and is not considered a significant water-bearing unit in the region.

Above the Valley Springs Formation is the Mehrten Formation. This formation consists of volcanic sands with beds of impermeable tuff-breccia, forming localized semi-confining units. Because of the permeability from the sand lenses and localized confining units, Mehrten formation is a productive water bearing formation for which the proposed ASR Project is targeted.

Above the Mehrten Formation is the Turlock Lake Laguna Formation (formerly the Fair Oaks Formation). This formation differs from the previous formations as it was formed with continental deposits through erosions. This formation consists of silts, sands, and clays, with hardpan deposits and consolidated gravels.

The youngest formation is the Riverbank Formation (formerly the Victor Formation), overlying the Turlock Lake Laguna Formation. This formation consists of sands, silts, and clays from floodplain and alluvial fan deposits. The majority of this unit contains buried hardpan which restricts the vertical infiltration of groundwater. The alluvial fan deposits, formed by streams and rivers with unconsolidated materials, recharge the underlying groundwater aquifers.

Hydrogeology Setting

The proposed project is located within western Placer County in the Sacramento Valley, within the Great Valley Geomorphic Province of California, a broad structural trough bounded by the tilted block of the Sierra Nevada on the east and the complexly folded and faulted Coast Ranges on the West, a wedge-like formation, becoming thicker moving east to west, filled with a sequence of Jurassic to Holocene continental and marine sediments. The geologic formations on the east side of the Sacramento Valley are typified by alluvial (water deposited) sediments derived from erosion of the Sierra Nevada Mountains. The surrounding area of the project area consists of transitional formations between the alluvial deposits of the Great Valley and the granite material characteristic of the Sierra Nevada. The Sierra Nevada province is generalized as a belt of metamorphic, volcanic, and igneous rocks sheared, deformed, and intruded during tectonic and volcanic activity.

Surficial Soils

The Soil Survey Manual (SSM), prepared by the United States Department of Agriculture Soil Survey Division (United States Dept. of Agriculture, 1993) was used as a guideline for soil classification. The soil data for the purpose of this project was categorized into five classifications established from the Natural Drainage Classes and Hydrologic Soil Groups published in the SSM. In the project area the predominant soil cover includes Type C/D or Type D soils, except in areas along major rivers (Figure 4-2). The five categories are as follows:

Type A Soils - Excessively drained to somewhat excessively drained soils, meaning that water is removed from the soil rapidly. Soils are typically coarse-textured and have high hydraulic conductivity in the upper half of the horizon. Examples of type A soils include coarse sands, tailings, and alluvial deposits and these soil types typically occur along major stream channels.

Type B Soils - Well drained soils, meaning that water is removed from the soil readily, not rapidly. Soils in the upper one meter of this horizon typically have higher conductivity in the lower half and moderately high hydraulic conductivity in the upper half of the one-meter interval. A representative type B soil is sandy loam.

Type C Soils - Moderately well drained soils, meaning that water is removed from the soil slowly during portions of the year. Soils typically have moderately high hydraulic conductivity in the upper half of the horizon and moderately low hydraulic conductivity in the lower half. Examples of type C soils include silty sands, silty loam, and clayey sands.

Type C/D Soils - Somewhat poorly drained soils, meaning that water is removed slowly and soil is wet for significant periods during the growing season. Soils typically have moderately low hydraulic conductivity. Examples of type C/D soils include sandy clays and silty clays.

Type D Soils - Poorly drained to very poorly drained soils, meaning that water is removed very slowly and free water typically is present at shallow depths or at the surface. Soils typically have low hydraulic conductivity. Examples of type D soils include clays, hardpan, and floodplain deposits.

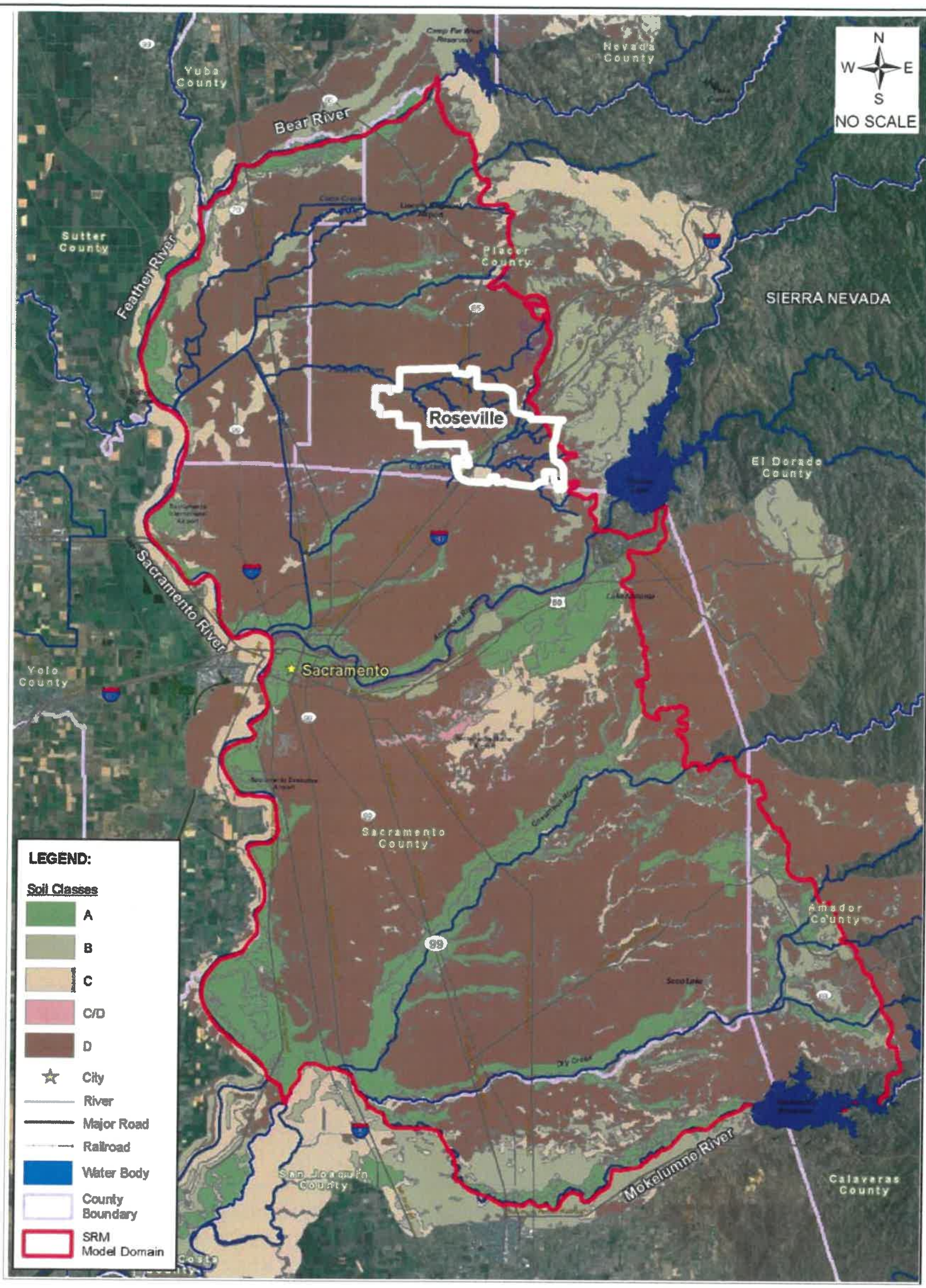

Figure 4-2 Soil Type Classifications
City of Roseville Aquifer Storage Recovery Project

CITY OF ROSEVILLE CALIFORNIA

Groundwater Recharge

Under natural conditions, groundwater recharge results from precipitation and infiltration of excess stormwater and/or irrigation water. However, only lands with sufficiently permeable soil permit percolation. The rate and quantity of water reaching the saturation zone depends on factors that include the amount and duration of precipitation, soil type, moisture content of the soil, and vertical permeability of the unsaturated zone.

Regional groundwater flows to the southwest following the natural topographic nature of the basin. The rocks of the Sierra Nevada bound the basin to the east, providing inflow from ungauged watersheds; however, the rocks of the Sierra Nevada behave as a no-flow boundary in the immediate vicinity of the Roseville Area (MWH 2005). A network of streams entering the model along the eastern periphery near Roseville provides a source of inflow.

Soils containing hardpan occupy over half the valley on the east side of the Sacramento River (which includes the project area) and these hardpans severely restrict downward movement of water. Soil Group D (poor infiltration) accounts for the majority of soil cover in the project area. The abundance of Group D soils limits percolation and groundwater recharge under existing conditions. The U.S. Geologic Survey (USGS) estimates that only 1.6 percent of the total natural recharge in the Sacramento Valley basin can be attributed to the Placer County sub area. Consequently, the project area is not considered a significant recharge source in the regional context.

Regional Groundwater – North American Subbasin

According to DWR Bulletin 118, long-term hydrographs since the 1960s show a consistent decline of 20 feet in groundwater levels from the mid-1960s to about 1980. From 1980 through 1983, groundwater levels recovered by about 10 feet and remained stable until the beginning of the 1987 – 1992 drought, at which time groundwater levels declined by 15 feet. From 1995 to 2000 most water levels recovered by up to 20 feet leaving them generally higher than levels prior to the 1987 through 1992 drought. These stable groundwater levels indicate that groundwater pumping is currently in balance with the natural groundwater recharge rate.

The upper portion of the groundwater basin has historically been pumped by agricultural and irrigation users and the Mehrten Formation aquifer has been used for urban water purveyors within the greater Sacramento area. Over the past several decades, agricultural land has been converted to urban uses. With the land conversions, pumping demands have decreased, especially for heavy pumping uses such as rice farming. It is expected that basin pumping demands will continue to decrease over time.

As shown in Figure 4-3, Roseville is located in the North American River Groundwater Sub-basin (Sub-basin) which underlies north Sacramento, south Sutter and west Placer Counties including the City. The Sub-basin is a component of the larger Sacramento Valley Groundwater Basin. The Sub-basin is defined by the Bear River on the north, the Feather River and Sacramento Rivers on the west, the American River on the south and a north/south line extending from the Bear River south to Folsom Lake that passes about 2 miles east of the City of Lincoln. The Sub-basin encompasses approximately 351,000 acres.

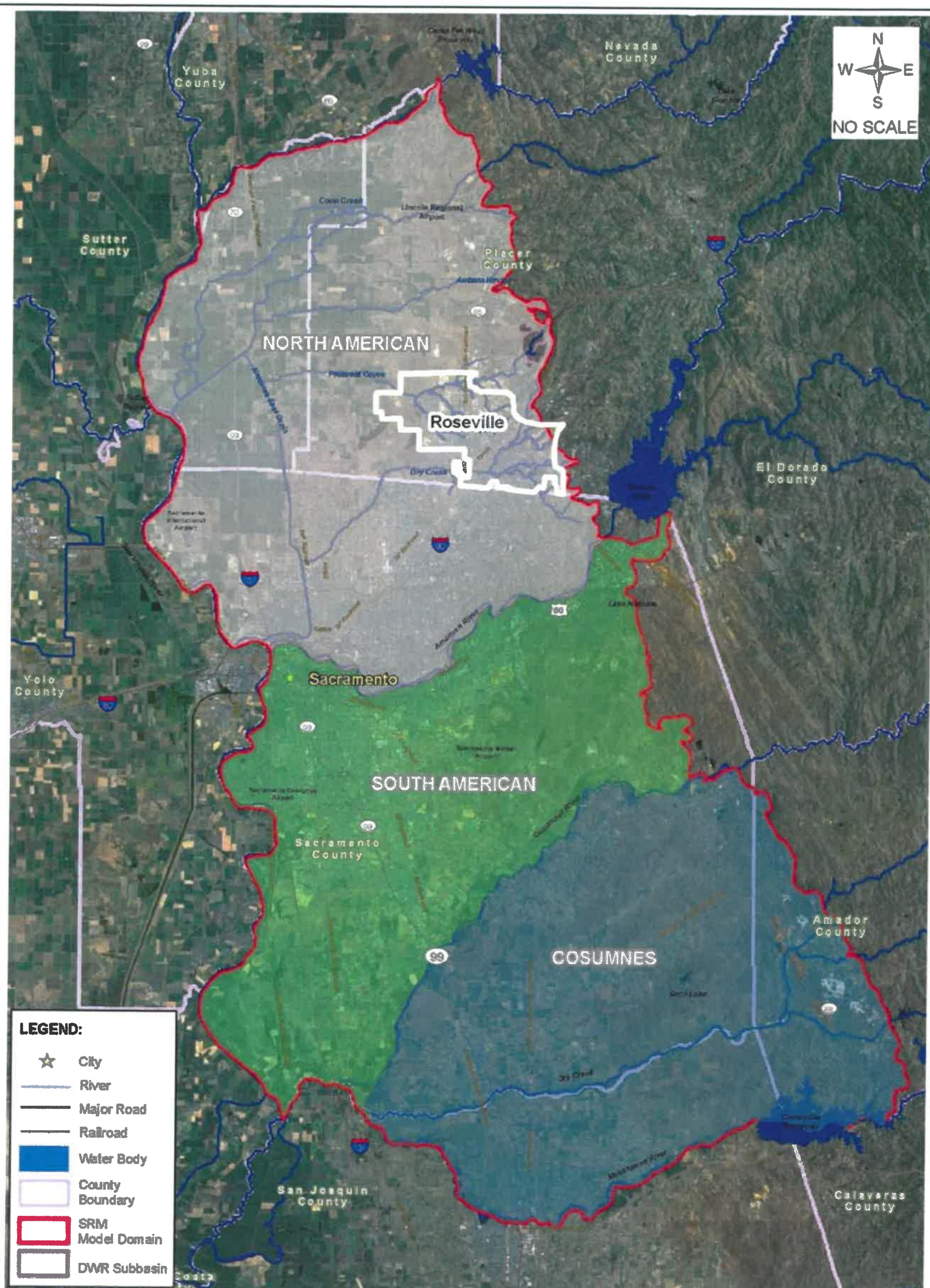

Figure 4-3 - North American Sub-Basin
City of Roseville Aquifer Storage Recovery Project

CITY OF ROSEVILLE CALIFORNIA

Several studies of the groundwater sub-basin have been prepared. The California Department of Water Resources (DWR) prepared Bulletin 118, Evaluation of Ground Water Resources: Sacramento County in July 1974. This Bulletin describes the various geologic formations that constitute the water-bearing deposits underlying the project area. The storage capacity of the North American Sub-basin is estimated by DWR to be approximately 4.9 million acre-feet. (For reference, Folsom Lake at its full capacity is approximately 961,000 ac-ft.) In 1998 the Sub-basin was studied by the Placer County Water Agency (PCWA) in the Placer Groundwater Management Plan. In June 2003, the City commissioned Montgomery Watson Harza (MWH) to prepare a study entitled Groundwater Impact Analysis for Proposed Reasons Farm Land Retirement Plan and in November 2007, the Cities of Roseville and Lincoln along with PCWA and the California American Water Company (CAW) completed the Western Placer Groundwater Management Plan (WPGMP). The WPGMP was prepared in an effort to maintain a safe, sustainable and high-quality groundwater resource to meet backup, emergency and peak demands within a zone of the North American River Groundwater Sub-basin.

On a local scale, groundwater elevations have been measured by the City at several different occasions within the last five to seven years. Groundwater elevations were measured when production wells such as Diamond Creek Well, Woodcreek North Well, Hayden Parkway Well, West Park Well #1 were drilled for municipal supply in the development of subdivisions such as Sun City, Diamond Creek/Oaks, West Park, and Fiddyment Ranch. Groundwater elevations were also measured prior to the City's two phases of ASR Pilot Testing and Demonstration Testing. In November 2009 the State Legislature amended the Water Code with Senate Bill SBx7-6, which mandates a statewide groundwater elevation monitoring program to track seasonal and long-term trends in groundwater elevations and report the tracking data to DWR. The intent for the law is that collection and evaluation of such data on a statewide scale is an important fundamental step toward improving management of California's groundwater resources.

Based on these static groundwater elevations, groundwater flow is determined to be a southwest flow direction. Detailed data and calculations of the groundwater flow direction are reported in the reference documents, *City of Roseville Pilot Scale Cycle Testing at Diamond Creek Well, Final Report, 2004* and *City of Roseville Aquifer Storage & Recovery (ASR) Program Phase II - Demonstration Testing at the Diamond Creek Well, Final Report, 2009* both completed by MWH. In addition to the baseline groundwater elevations, groundwater elevations were also measured from the Diamond Creek Well, Woodcreek North Well, and West Park Well during the storage and extraction phases of the longer term Phase II Demonstration Testing ~~to determine~~ the ~~effects of groundwater~~ gradient from ASR operations. A summary of the local groundwater for the demonstration test is included in Table 4-1. It was observed that no adverse groundwater elevations were observed during the injection and extraction of water within the aquifer from the Phase II Demonstration Test.

TABLE 4-1. GROUNDWATER ELEVATIONS AND GRADIENT DURING DEMONSTRATION TESTING

	Location	DCW	WCN	W-77 (L)	W-77 (M)	Groundwater Flow	
	Distance from DCW	0 feet	7,400 Feet	16,700 feet	16,700 feet		
Test Phase	Date	Groundwater Elevation, famsl	Groundwater Elevation, famsl	Groundwater Elevation, famsl	Groundwater Elevation, famsl	Groundwater Flow Direction	Groundwater Gradient
Storage	12/31/2006	18.92	9.909	-11.10	-11.14	S 41° W	0.002
	1/3/2007	19.43	10.729	-10.40	-10.44	S43° W	0.002
	1/18/2007	19.41	10.952	-10.11	-10.14	S43° W	0.002
	1/31/2007	19.75	11.322	-9.67	-9.72	S43° W	0.002
	2/14/2007	19.68	11.343	-9.34	-9.39	S43° W	0.002
	2/28/2007	19.94	11.781	-8.82	-8.87	S44° W	0.002
	3/28/2007	20.12	11.790	-8.59	-8.66	S45° W	0.002
	4/24/2007	20.32	12.115	-8.18	-8.28	S43° W	0.002
	5/22/2007	n/a(1)	11.646	-10.78	-10.89	n/a(3)	n/a(3)
	6/27/2007	19.95	10.698	-13.54	-13.66	S45° W	0.002
Extraction	7/25/2007	9.08	7.936	-15.11	-15.17	S78° W	0.002
	8/1/2007	-33.54	n/a(2)	-15.46	-15.53	n/a(3)	n/a(3)
	8/14/2007	-33.20	n/a(2)	-15.97	-16.05	n/a(3)	n/a(3)
	9/11/2007	-33.84	n/a(2)	-16.43	-16.51	n/a(3)	n/a(3)
	10/9/2007	-35.81	n/a(2)	-15.26	15.35	n/a(3)	n/a(3)
	11/6/2007	-38.36	n/a(2)	-14.33	-14.42	n/a(3)	n/a(3)
	12/12/2007	-41.12	n/a(2)	n/a(4)	n/a(4)	n/a(3)	n/a(3)
Post-Extraction	1/15/2008	-27.92	n/a(2)	-12.34	-12.45	n/a(3)	n/a(3)
	2/29/2008	19.95	n/a(2)	n/a(1)	n/a(1)	n/a(3)	n/a(3)
	3/26/2008	19.95	n/a(2)	n/a(1)	n/a(1)	n/a(3)	n/a(3)

DCW Diamond Creek Well
WCN Woodcreek North Well
(L) Well screened in the Laguna Formation (486-506 feet below ground surface)
(M) Well screened in the Mehrten Formation (584-594 feet below ground surface)
(1) Groundwater elevation was not recorded by instrument due to low battery and/or, malfunction.
(2) Groundwater elevation was collected due to transducer removal to allow construction activities.
(3) Groundwater flow direction and/or gradient was not estimated due to an incomplete data set.
(4) Groundwater elevation was not available.

Water Quality

This section describes the baseline water quality conditions for the City's surface and groundwater supplies.

Water Quality – Treated Surface Water

Treated surface water delivered from the City's Barton Road Water Treatment Plant would be the source water for injection under the City's ASR Program. Table 4-2 below lists laboratory testing results for the primary regulated water quality constituents for water produced by the City's Barton Road Water Treatment Plant. Table 4-2 also compares these with applicable standards and test results for the same constituents as measured in local groundwater samples. The City's surface water supply is considered to be of very high quality. As shown in Table 4-2 nearly all constituents of concern were found to be non-detectable and the City's treated surface water complies with all primary Maximum Contaminant Leverls (MCLs). The federal Safe Drinking Water Act (SDWA) requires the United States Environmental Protection Agency (EPA) to establish drinking water standards to protect public health. These drinking water standards regulate the amount of contaminants allowed in water supplied by public water systems for municipal supply. Primary MCLs are enforceable standards, set to protect public health and secondary MCLs are set for taste, odor, and aesthetics and they are not enforceable standards. Table 4-2 below presents the most stringent MCLs which are predominately state drinking water standards and serve as the water quality significance threshold for this DEIR.

TABLE 4-2.
DRINKING WATER STANDARDS AND CITY WATER QUALITY

Parameters (all units are in mg/L or as indicated)	MCL	Groundwater	Treated Surface Water
Primary Maximum Contaminant Levels – Inorganic Chemicals			
Aluminum (added during the surface water treatment process)	1	ND	ND – 0.03
Antimony	0.006	ND	ND
Arsenic	0.010	ND – 0.004	ND
Asbestos (MFL = million fibers per liter; for fibers >10 microns long)	7 MFL	ND	ND
Barium	1	ND – 0.15	ND – 0.01
Beryllium	0.004	ND	ND
Cadmium	0.005	ND	ND
Chromium, Total	0.05	ND – 0.008	ND
Cyanide	0.15	ND	ND
Fluoride (added during the surface water treatment process)	2	ND – 0.2	0.7
Mercury (inorganic)	0.002	ND	ND
Nickel	0.1	ND	ND
Nitrate (as NO3)	45	5 – 8	ND – 0.2
Nitrite (as nitrogen, N)	1 as N	ND	ND
Perchlorate	0.006	ND	ND
Selenium	0.05	ND	ND
Thallium	0.002	ND	ND
Primary Maximum Contaminant Levels – Radionuclides (Radioactivity) (units are picocuries per liter (pCi/L), unless otherwise stated)			
Gross alpha particle activity	15	ND – 3.48	ND – 0.09
Gross beta particle activity	50	No data	ND – 1.5
Radium-226	--	ND – 0.2	ND – 0.67
Radium-228	--	ND – 0.57	ND – 0.31
Radium-226 + Radium-228	5	ND - <1	ND - <1
Strontium-90	8	ND – 0.94	ND
Tritium	20,000	ND	ND – 581
Uranium	20	ND – 1.99	ND

Parameters (all units are in mg/L or as indicated)	MCL	Groundwater	Treated Surface Water
Primary Maximum Contaminant Levels – Volatile Organic Chemicals (VOCs)			
Benzene	0.001	ND	ND
Carbon tetrachloride	0.0005	ND	ND
1,2-Dichlorobenzene	0.6	ND	ND
1,4-Dichlorobenzene (p-DCB)	0.005	ND	ND
1,1-Dichloroethane (1,1-DCA)	0.005	ND	ND
1,2-Dichloroethane (1,2-DCA)	0.0005	ND	ND
1,1-Dichloroethylene (1,1-DCE)	0.006	ND	ND
cis-1,2-Dichloroethylene	0.006	ND	ND
trans-1,2-Dichloroethylene	0.01	ND	ND
Dichloromethane (Methylene chloride)	0.005	ND	ND
1,2-Dichloropropane	0.005	ND	ND
1,3-Dichloropropene	0.0005	ND	ND
Ethylbenzene	0.3	ND	ND
Methyl tertiary butyl ether (MTBE)	0.013	ND	ND
Monochlorobenzene	0.07	ND	ND
Styrene	0.1	ND	ND
1,1,2,2-Tetrachloroethane	0.001	ND	ND
Tetrachloroethylene (PCE)	0.005	ND	ND
Toluene	0.15	ND	ND
1,2,4-Trichlorobenzene	0.005	ND	ND
1,1,1-Trichloroethane (1,1,1-TCA)	0.2	ND	ND
1,1,2-Trichloroethane (1,1,2-TCA)	0.005	ND	ND
Trichloroethylene (TCE)	0.005	ND	ND
Trichlorofluoromethane (Freon 11)	0.15	ND	ND
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	1.2	ND	ND
Vinyl chloride	0.0005	ND	ND
Xylenes	1.75	ND	ND
Primary Maximum Contaminant Levels – Non-Volatile Synthetic Organic Chemicals (SOCs)			
Alachlor	0.002	ND	ND
Atrazine	0.001	ND	ND
Bentazon	0.018	ND	ND
Benzo(a)pyrene	0.0002	ND	ND
Carbofuran	0.018	ND	ND
Chlordane	0.0001	ND	ND
Dalapon	0.2	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	ND	ND
2,4-Dichlorophenoxyacetic acid (2,4-D)	0.07	ND	ND
Di(2-ethylhexyl)adipate	0.4	ND	ND
Di(2-ethylhexyl)phthalate (DEHP)	0.004	ND	ND
Dinoseb	0.007	ND	ND
Diquat	0.02	ND	ND

Parameters (all units are in mg/L or as indicated)	MCL	Groundwater	Treated Surface Water
Endrin	0.002	ND	ND
Endothal	0.1	ND	ND
Ethylene dibromide (EDB)	0.00005	ND	ND
Glyphosate	0.7	ND	ND
Heptachlor	0.00001	ND	ND
Heptachlor epoxide	0.00001	ND	ND
Hexachlorobenzene	0.001	ND	ND
Hexachlorocyclopentadiene	0.05	ND	ND
Lindane	0.0002	ND	ND
Methoxychlor	0.03	ND	ND
Molinate	0.02	ND	ND
Oxamyl	0.05	ND	ND
Pentachlorophenol	0.001	ND	ND
Picloram	0.5	ND	ND
Polychlorinated biphenyls (PCBs)	0.0005	ND	ND
Simazine	0.004	ND	ND
2,4,5-TP (Silvex)	0.05	ND	ND
2,3,7,8-TCDD (dioxin)	3x10-8	ND	ND
Thiobencarb	0.07	ND	ND
Toxaphene	0.003	ND	ND
Primary Maximum Contaminant Levels – Disinfectants and Disinfection Byproducts			
Total Trihalomethanes	0.08	ND – 0.0011	0.0075 – 0.068
Bromodichloromethane	--	ND	ND – 0.0048
Bromoform	--	ND	ND – 0.0017
Chloroform	--	ND – 0.0011	0.0068 – 0.065
Dibromochloromethane	--	ND	ND – 0.00075
Haloacetic Acids	0.06	ND	ND – 0.045
Monochloroacetic acid	--	ND	ND
Dichloroacetic acid	--	ND	ND – 0.021
Trichloroacetic acid	--	ND	ND – 0.028
Monobromoacetic acid	--	ND	ND
Dibromoacetic acid	--	ND	ND
Secondary Maximum Contaminant Levels – Consumer Acceptance Contaminant Levels			
Aluminum (added during the surface water treatment process)	0.2	<0.01	ND – 0.03
Copper	1	ND	ND – 0.001
Foaming Agents (MBAS)	0.5	ND	ND
Iron	0.3	ND – 0.1	ND – 0.08
Manganese	0.05	ND	ND – 0.03
Methyl-tert-butyl ether (MTBE)	0.005	ND	ND
Odor – Threshold	3 Units	No data	No data
Silver	0.1	ND	ND
Thiobencarb	0.001	ND	ND

Parameters (all units are in mg/L or as indicated)			MCL	Groundwater	Treated Surface Water
Turbidity			5 Units	0 – 0.5	1 – 2
Zinc			5	ND – 0.06	ND
Secondary Maximum Contaminant Levels – Consumer Acceptance Contaminant Level Ranges					
Parameters (all units are in mg/L or as indicated)	Recommended	Upper	Short Term	Groundwater	Treated Surface Water
Total Dissolved Solid (TDS)	500	1,000	1,500	300 – 550	50 – 61
Specific Conductance (µS/cm)	900	1,600	2,200	410 – 800	75 – 97
Chloride	250	500	600	150 – 172	3 – 5
Sulfate	250	500	600	23 – 33	6 – 10

Water Quality - Groundwater

On a regional basis, there are areas of good-quality groundwater and marginal quality groundwater in the North American sub-basin. Generally, groundwater quality in the northern part of the basin is characterized as good, although some contaminated areas do exist towards the southern part of the basin. The former McClellan Air Force Base in North Sacramento County, Aerojet in Rancho Cordova, and the Union Pacific Rail Yard in Roseville have been identified as major sources of groundwater impairments in the subbasin (DWR, 2003). Past chemical disposal and storage practices contributed to the groundwater contamination and were accepted methods but are now known to cause environmental contamination and are no longer being used. These contamination sites are regulated and their groundwater treatment systems are managed by the Regional Water Quality Control Board(RWQCB) and other regulatory agencies. Existing groundwater conditions at these locations are further described below.

McClellan Air Force Base has groundwater contamination up to 400 feet below groundwater surface in some areas but the groundwater moves in a south-westerly direction which is down gradient from the City. Due to the capacity of groundwater pumps used in municipal water supplies, the cone of influence is generally no more than 500 feet. Being down gradient from the City and based on the typical municipal well construction, McClellan Air Force Base contamination poses no groundwater quality threat within the City or the proposed project.

The Aerojet General Corporation site covers 5,900 acres in Ranch Cordova, approximately 5 miles south of the City. Since 1953, the company has manufactured, stored, and disposed of a number of chemicals for military, agricultural, and industrial chemicals according to EPA Superfund website at: http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dec8ba3252368428825742600743733/60508b9cae7346f088257007005e9436!OpenDocument.

The contamination has impacted residential wells and municipal supply wells. The contamination is being monitored and managed by EPA, California Department of Toxic Substance and Control (DTSC), and the CVRWQCB. Due to the extent of the contamination, several local cities and agencies are also closely involved with the cleanup effort. Since the contamination site is away from the City based on the groundwater travel direction, the Aerojet contamination site will not have an impact or be impacted by the proposed project.

The Union PacificRail Yard is located within the City boundary. Contamination at this site stems from fuel related operations and past previously accepted methods for chemical disposal and storage. The contamination is confined to the property and treatment systems have been installed to carry on the cleanup process. The rail yard does not pose a threat to the City's groundwater supply due to its extended distance from City wells (the nearest being the Darling Way Well .) located approximately 3,000 feet from the contamination) and because the contamination is small in area and limited to the property boundary.

According to Bulletin 118, other localized areas of contamination exist throughout the basin but they are generally smaller in scope and extent of contamination (DWR, 2003). These contaminations are generally underground storage tanks (USTs) or former dry cleaning facilities with limited contaminant releases in the shallow aquifer. The CVRWQCB and Placer County closely monitor these sites to ensure no further contaminations emanate from these sites and that treatment operations meet clean up goals.

From a local perspective, groundwater quality in the upper aquifers of Riverbank, Turlock Lake Laguna, and Mehrten formations, is regarded as superior to that of the lower aquifers of Victor and Ion formations. Water from the upper aquifers generally does not require treatment other than disinfection. Data available from the City's Diamond Creek well, located in the north western portion of the City, are representative of the quality of the groundwater under the proposed project area. This data along with water quality data collected from the City's other wells indicate that groundwater in the area contains high levels of minerals and salts compare to surface water but generally contains low levels of metals with neutral pH, as shown in Table 4-2. Natural concentrations of total dissolved solids (TDS)/specific conductance, chloride, sodium, bicarbonate, boron, fluoride, nitrate, iron manganese, and arsenic may be at elevated levels within the basin for certain uses (DWR Bulletin 118) but the groundwater meets all potable water standards.

Comments were received in response to this DEIRs Notice of Preparation related to atrazine, dibromochloropropane (DBCP), arsenic, and nitrates. Atrazine and DBCP are man- made pesticides that do not naturally occur in the environment. Monitoring data from the California Department of Public Health (CDPH) by all public water purveyors from 1984 to 2010 in the North American subbasin have shown no detectable levels of atrazine or DBCP in the groundwater. A list of all regulated drinking water contaminants and their regulatory levels is presented in Table 4-2. Arsenic and nitrate occur naturally in the environment as well as anthropogenic sources. The natural source of arsenic is the geological formation for which the water passes through and nitrates are formed during degradation of organic materials. Anthropogenic arsenic contamination stems from chemical processing and storage facilities while nitrates come from improper sewage disposals and over application of fertilizers. The City has monitored for arsenic and nitrate for all its groundwater wells and the levels are within drinking water standards. The City has storm water programs, industrial waste discharge programs, and source water protection programs to ensure future contaminations of both groundwater and surface water are limited within the City. The City also works with other public water suppliers, such as the Regional Water Authority (RWA) and Western Placer County

Groundwater Management Plan partners to monitor groundwater quality and other regulatory agencies to track and monitor contaminations.

Disinfection Byproducts (DBPs)

DBPs form when disinfectants (such as chlorine) react with naturally occurring organic matter present in the water (e.g., decomposing plant material, runoff, and etc.). Disinfectants are necessary in drinking water treatment process because they provide protection against waterborne disease-causing pathogens such as bacteria, viruses, protozoa, and other organisms.

The two most common types of DBPs in disinfected drinking water are trihalomethanes (THMs) and haloacetic acids (HAAs or HAA5). The regulated THMs consist of the following compounds: chloroform, bromodichloromethane, dibromochloromethane, and bromoform and the regulated haloacetic acids are: monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid. These DBPs, if consumed in excess over many years, may lead to increased health risks. As such, THMs and HAAs are regulated contaminants and their limits are regulated in drinking water. Both the federal and California drinking water standards set the limit for THMs at 80 mg/L and HAAs at 60 mg/L.

Because the City's primary water source is surface water from Folsom Lake and the addition of chlorine to disinfect the water during treatment, DBPs form in the treated surface water. The City monitors the concentrations of chlorine and DBPs in the water distribution system to ensure proper amounts of disinfectant are used to minimize the DBP formations yet continue to protect the water system against harmful pathogens.

Because run off and decomposition do not infiltrate to groundwater, typically there is little naturally occurring organic matter present in the groundwater and there are no naturally occurring DBPs in the groundwater. By using the distribution system water as the source of injection in the proposed ASR Project, DBPs are introduced into the aquifer.

During the City's two cycles of ASR testing, both groundwater and treated surface water were monitored for baseline conditions and during all three Pilot Test phases (injection phase, storage phase, and extraction phase). Water quality samples collected were used to evaluate the presence of DBPs and assess the potential long-term effect of injection, storage, and recovery cycles on local groundwater quality. Specifically, results from the Phase II Demonstration Testing at Diamond Creek Well from November 2005 through March 2008 provided valuable information of the behavior of DBPs. Monitoring showed that HAAs concentration decreased below detection limit within 4 ½ months and remained below for the rest of the testing period. This is an indication of natural attenuation such as microbial breakdown, sorption reaction, and etc. within the aquifer. THM concentrations throughout testing predominantly consist of chloroform. The remaining three species (bromoform, dibromochloromethan, and bromodichloromethane) concentrations were consistently below or detected just above the reporting limit of 0.5 ug/L. Figure 4-4 and Figure 4-5 below shows the monitoring data for THMs and HAAs versus time, respectively, during the Demonstration Testing. As expected, the concentration of DBPs in groundwater is lower than the water delivered to customers in the vicinity of the Diamond Creek Well because native groundwater contains very little or no DBPs.

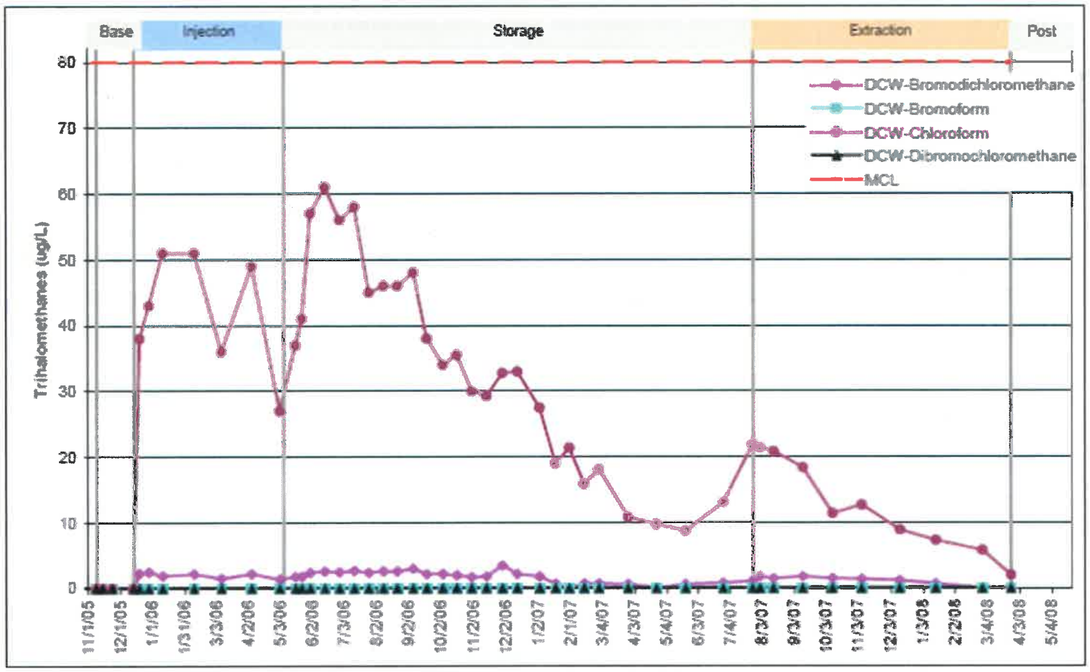

Figure 4-4.
THMs vs. Time in Diamond Creek Well (DCW) During Demonstration Testing

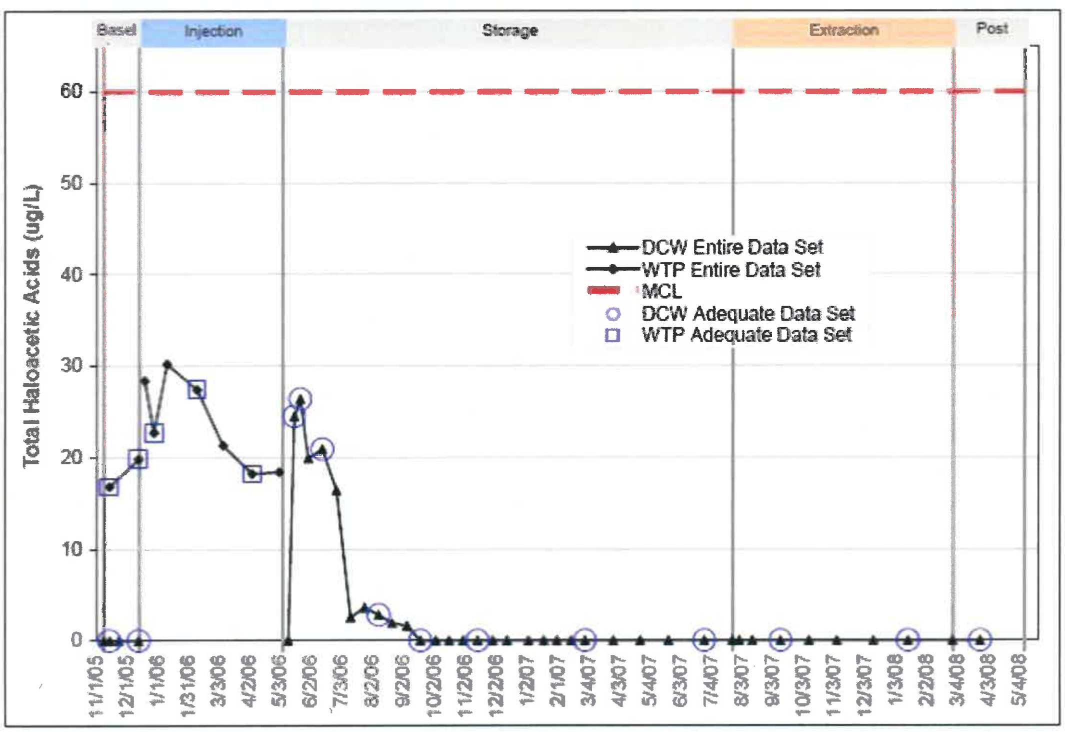

Figure 4-5.
HAAs vs. Time in Diamond Creek Well (DCW) During Demonstration Testing

Fluoride

Fluoride is a naturally occurring element in the environment but groundwater in the North American Subbasin has low concentrations. The levels range from none detected to 0.2 mg/L. The City adds fluoride to its water for dental protection for over 40 years. Prior to 2011, the optimal level of fluoride was between 0.8 mg/L to 1.0 mg/L based on ambient temperature of the region. In January 2011, both the EPA and US Department of Health and Human Services Agency (HHS) announced a recommend water systems practicing fluoridation level of 0.7 mg/L. Since the groundwater contains small concentrations of fluoride, similar to the DBPs, a decline in fluoride concentrations in the aquifer is expected as injected water is mixed with native groundwater.

Regulatory Setting

Drinking Water

Federal: The Federal SDWA requires the EPA to establish drinking water standards to protect public health. These drinking water standards regulate the amount of contaminants allowed in water supplied by public water systems for municipal supply. Primary MCLs are enforceable standards, set to protect public health.

National Secondary Drinking Water Regulations (NSDWRs or secondary standards) are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to water systems but does not require systems to comply.

Comments received in response to this DEIR's Notice of Preparation raised questions relative to groundwater risk management. Future contaminants and their impact to public health are highly uncertain and speculative. To strengthen the scientific basis of risk assessment information and the approach used to establish MCLs, time is needed to gather data to support development and promulgation of future regulations. As result of the 1996 Safe Drinking Water Act, EPA must also review each National Primary Drinking Water Regulation at least once every six years and revise them, if necessary. This effort is used to identify new health effect information, changes in technology, and/or other factors that may provide a health or technical basis to support a regulatory revision that will maintain or strengthen public health protection.

In a related effort, EPA also must follow a process to identify and list unregulated contaminant that may need to be regulated in the future. To start, EPA must periodically publish a list of contaminants, called Contaminant Candidate List (CCL). From there, EPA must decide whether to regulate at five or more contaminants from the CCL in a process known as Regulatory Determinations based on health effects, occurrence, and analytical methods of these contaminants. EPA then uses this list of potential contaminant to prioritize research and data collection efforts to determine if a specific contaminant needs future regulations.

Furthermore, EPA also works with the National Drinking Water Advisory Council (NDWAC), a Federal Advisory Committee, to perform its duties and responsibilities including regulations, activities, functions, and policies required by the Safe Drinking Water Act.

State - As discussed above, the federal government delegates primary responsibility for administration and enforcement of the drinking water regulations to the states. Consequently state standards apply to drinking water regulation at the local level. The California Safe Drinking Water Act requires the CDPH to adopt drinking water standards to protect public health. Similar to federal drinking water quality standards, Primary MCLs are set to protect public health and are enforceable standards, while Secondary MCLs are set for esthetics such as taste and odor, and are not enforceable. All California Primary MCLs are required to be equal or more stringent than EPA's Primary MCLs. Key regulations governing the City's water quality are in Title 22, Division 4, Chapter 15 of the California Code of Regulation, entitled Domestic Water Quality and Monitoring (commonly referred to as Title 22, Title 22 monitoring, or Title 22 Testing). Title 22 requires that chemical and microbial primary MCLs not be exceeded for water provided to the public from a municipal water supply. These MCLs, which serve as this DEIR's CEQA thresholds of significance for drinking water quality, are listed in Table 4-2

Title 22 also sets the secondary MCLs for taste, odor, and aesthetics and these MCLs are not enforceable standards. Secondary MCLs consists of Consumer Acceptance Contaminant Levels and Consumer Acceptance Contaminant Level Ranges. The constituents and the secondary MCLs are also listed in Table 4-2. For Consumer Acceptance Contaminant Level Ranges, no fixed consumer acceptance level has been established. Constituent concentrations lower than the "Recommended" limits are generally desirable for consumer acceptance. Constituent concentrations between the "Recommended" and "Upper" levels are acceptable if it is neither reasonable nor feasible to provide more suitable waters. The "Short Term" constituent concentrations are acceptable on a temporary basis pending construction of treatment facilities or development of acceptable new water sources.

Title 22 also requires that public water systems obtain a domestic water supply permit from the Department of Public Health, and the permit must be amended to reflect any changes to the water supply system. The City's most recent permit amendment was issued in June 2007. As wells are drilled, equipped, and put online for use as municipal water supplies, a permit amendment from DPH will be necessary to verify that the wells meet existing construction standards and are suitable for potable uses.

Local - City of Roseville: Similar to most local jurisdictions, the City does not have locally promulgated drinking water standards for the protection of public health. Instead the City relies on the state's Primary MCLs which as discussed above are equal to or more stringent than federal standards. The City also relies on the state's non-enforceable Secondary MCLs as guidelines for cosmetic and aesthetic constituents such as taste and odor. As drinking water rules and regulations change on the federal and state levels, the City endeavors to comply with all applicable laws and system permitting requirements and adjusts operational parameters when necessary to meet applicable standards.

Groundwater

U.S. EPA Water Quality Standards regulations require that every state have an "antidegradation policy." Each state's policy must, at a minimum, be consistent with the principles set in the federal regulations. However, these water quality standards apply to "waters of the United State" which include, essentially, all surface waters but not groundwater. Where groundwater is affected, the state or the local governments have their own rules and regulations.

The state agency that regulates water quality is the State Water Resources Control Board (SWRCB or State Board) and its nine Regional Water Quality Control Boards (RWQCBs). The SWRCB sets statewide policy, coordinates or supports RWQCBs, and reviews RWQCB actions. Each RWQCB is semi-autonomous and makes water quality decisions for its region including issuing permits, setting water quality goals, and taking enforcement actions against permit violators. The SWRCB and the RWQCBs are responsible for ensuring implementation and compliance with the provisions of the federal Clean Water Act (CWA) and California's Porter-Cologne Water Quality Control Act.

The RWQCB regulates water quality based on 1) the designated beneficial uses of a water body to be protected, 2) adopted criterion designed to protect those uses, and 3) an antidegradation policy. Each water body has a designated beneficial use; for groundwater in the North American Subbasin, the beneficial uses are:

MUN – municipal and domestic supply, and

AGR – irrigation and stock watering, and

IND – industrial service supply, and

PRO – industrial process supply

To protect the designated beneficial uses, the RWQCB applies water quality objectives contained in the Basin Plan and other water quality criteria to the receiving water. For constituents not listed in applicable rules and in the absence of an adopted numeric objective, the RWQCB interprets narrative water quality objectives using water quality criteria developed from other sources. The Regional Board then uses these objectives and criteria to determine whether the proposed project will cause or contribute to a violation of an applicable water quality standard. For groundwater in the City where industrial service and process supplies are included within the service area, the main water quality standards and criteria should focus on the drinking water standards for municipal and domestic supply (MUN) beneficial use and irrigation and stock watering (AGR) beneficial use.

Antidegradation policies and their related guidance documents have been issued at both the federal and state levels for surface water quality. These policies are intended to protect existing water quality. For groundwater, California's SWRCB's Antidegradation Policy, Resolution No. 68-16 applies. The SWRCB adopted Resolution No. 68-16 as a policy statement to implement the Legislature's intent that waters of the state shall be regulated to achieve the highest water quality consistent with the maximum benefit to the people of the state. Therefore, the state policy requires that changes in water quality must:

- Be consistent with maximum benefit to the people of the State,
- Not unreasonably affect present and anticipated beneficial uses of water, and
- Not result in water quality less than that prescribed in water quality control plans or policies.

4.2.2 Impacts and Mitigation Measures

Areas of Analysis

This section reviews the potential for project impacts in the following areas:

- Groundwater quality
- Drinking water quality
- Potential Health Effects, and especially potential effects specific to the elderly, and sodium content
- Hard water characteristics and effects
- Taste and odor of ASR extracted water

Standards of Significance

For purposes of this DEIR, the City consulted with the CDPH and RWQCB to determine the appropriate water quality significance threshold for the ASR Program. Based on consultation with the agencies, a significant impact would occur if proposed ASR operations would violate primary federal and state drinking water standards as set forth in Table 4-2.

IMPACT 4.2 – 1	POTENTIAL CHANGES TO GROUNDWATER QUALITY – Injection Water
Applicable Policies and Regulations	Drinking Water Standards (Federal and State Drinking Water Standards)
Significance with Policies and Regulations	Less Than Significant
Mitigation Measures:	None Required
Significance after Mitigation:	Less Than Significant

The RWQCB's principle concern with the City's proposed ASR project is the introduction of DBPs and fluoride into the groundwater system as a result of injecting treated drinking water into the underlying aquifer and changing its water chemistry. With the lower concentration of DBPs and fluoride in the native groundwater, the City's proposed injection water could increase levels of these constituents in the receiving natural groundwater. These levels of chloroform and fluoride are allowed under drinking water regulations because of the need for public health protection.

To ensure groundwater impacts do not occur as a result of ASR operations, the RWQCB regulates the quality of "injection water" consistent with the drinking water standards as listed in Table 4-2. The determination of the antidegradation analysis (Appendix E) is that the levels of DBPs, specifically chloroform, and fluoride resulting from the City's ASR Program is acceptable as it is consistent with State's antidegradation policy for the maximum benefit to the people of State.

As shown in Table 4-2, water delivered from the City's WTP complies with all drinking water quality standards and is considered of extremely high quality from a cosmetic and/or aesthetic standpoint. Because the quality of injection water is of better quality than the drinking water standards which is the regulatory threshold for injection water, there would be no impact to groundwater quality as a result of ASR Program operations. Related impacts are considered less than significant and no mitigation beyond existing treatment processes is required.

IMPACT 4.2 – 2	POTENTIAL CHANGES TO DRINKING WATER QUALITY – Extracted Water
Applicable Policies and Regulations	Federal Primary MCLs, California Primary MCLs
Significance with Policies and Regulations	Less Than Significant
Mitigation Measures:	None Required
Significance after Mitigation:	Less Than Significant

Currently, the City provides treated surface water as its primary supply source. Raw water from Folsom Lake is conveyed to the City's Barton Road Water Treatment Plant (WTP) in Granite Bay which has a capacity of 100 million gallons per day (MGD). The water treatment processes consist of flocculation, sedimentation/clarification, filtration, and disinfection. The water is also fluoridated for dental benefits prior to distribution to City water customers. Treated water meets all federal and state water standards.

Currently, the City uses groundwater in emergency and backup situations. The City adds additional chlorine and fluoride to ensure final concentrations are met for disinfection and dental protection purposes. All groundwater must meet primary drinking water standards within the distribution system. As a municipal water supply purveyor, water provided must meet all primary MCLs regardless of its sources.

Treated water from the City's water distribution system will be the source water for the ASR program. Therefore, all water quality standards will be met prior to injection. Prior to customer delivery, all water pumped from ASR wells must also meet primary drinking water standards. As shown in Table 4-2, the local native groundwater meets primary MCL standards and because injected water also meets primary MCL standards, it is reasonable to conclude that water extracted from ASR wells will also continue to meet all primary MCLs as was the case during the Phase 2 Pilot Test. Consistent with normal groundwater extraction operations, the City will add chlorine and fluoride to ASR extracted groundwater just prior to entering the distribution system to ensure disinfection and dental protection goals are met. Therefore, this is considered a less than significant impact.

As discussed in the Drinking Water Regulatory Setting above, secondary drinking water standards for taste, odor, and aesthetics are not enforceable standards with no fixed consumer acceptance level although consumer acceptance contaminant level ranges are identified. As shown in Table 4-2, secondary standard constituent concentrations lower than the "Recommended" limits are generally considered desirable for consumer acceptance. Constituent concentrations between the "Recommended" and "Upper" levels are acceptable if it is neither reasonable nor feasible to provide more suitable waters. The "Short Term" constituent concentrations are acceptable on a temporary basis pending construction of treatment facilities or development of acceptable new water sources.

Table 4-3 compares some secondary constituents for aesthetics for the City's treated surface water and groundwater. City's surface water is considered soft water with low concentrations of dissolved minerals and therefore, as shown in Table 4-3, low concentrations of TDS, specific conductance, and hardness. Hardness is not a regulatory parameter but it is based on the concentration of Total Dissolved Solids (TDS). Typical classification of water hardness is shown in Table 4-4.

Groundwater is typically harder than surface water because as water moves through soil and rocks, it dissolves small amounts of the naturally occurring minerals such as calcium and magnesium and carries them into the groundwater aquifer. Hard water does not pose a health risk but can be aesthetically unpleasing due to the mineral buildup or spotting on plumbing fixtures, shower doors, dishes, and glasses. It can also have undesirable odor and taste, although these attributes are subjective as further discussed below.

TABLE 4-3. BACKGROUND WATER QUALITY

Parameters (mg/L unless noted)	Recommended Drinking Water Standards	Groundwater	Treated Surface Water (Folsom Lake)
Sodium	Not regulated (EPA Guidance = 20 mg/L)	71 – 85	3 – 5
Specific Conductance (µS/cm)	900	410 – 800	75 – 97
Total Dissolved Solids	500	300 – 500	50 – 61
Hardness as CaCO3	Not regulated	120 – 160	31 – 33
Hardness (in grains/gallon)	Not regulated	7.0 – 9.3	1.8 – 1.9

TABLE 4-4. WATER HARDNESS CLASSIFICATIONS

Milligrams per liter (mg/L) or Parts per million (ppm)[2]	Grains per gallon	Classification
0 – 60	0 – 3.5	Soft
60 – 120	3.5 – 7.0	Moderately Hard
120 – 180	7.0 – 10.5	Hard
Over 180	Over 10.5	Very Hard

As shown in Table 4-3, although groundwater is harder than the treated Folsom Lake water, on average native groundwater ranges between the "Recommended" and "Upper" Consumer Acceptance Contaminant Level Ranges as shown in Table 4-2. Furthermore an evaluation of all water quality monitoring data within the basin indicates there is no exceedance of the "Short Term" Consumer Acceptance Contaminant Level Range established by CDPH for Secondary drinking water standards.

As discussed under Impact 4.2-1, the injection process would comply with all water quality standards and related waste discharge requirements. Similarly, groundwater extracted from ASR wells was found to meet all Primary potable water quality standards for public water systems. While the extracted groundwater meets Primary MCL

[2] General guidelines from United States Geological Survey (USGS) Water (http://water.usgs.gov/owq/hardness-alkalinity.html)

standards, as discussed above, there have been occasions when groundwater samples were found to exceed "aesthetic" or Secondary MCLs for Consumer Acceptance. As explained above, Secondary Standards are not enforceable, rather Secondary Standards are considered guidelines for predicting consumer acceptance. Consequently, Secondary Standards are not used as thresholds in this DEIR for the purpose of determining significant under CEQA. Nevertheless, because groundwater extracted from City wells has been found to occasionally exceed secondary standards for odor and TDS, related impacts are considered adverse but less than significant. Even though aesthetic impacts are considered less than significant from a CEQA perspective it is recognized that water customers may perceive a decrease in the aesthetic qualities of potable water during ASR extraction operations when compared to surface water. The degree to which this change is noticeable will depend on ASR Program operational factors including storage duration within the aquifer, rate of groundwater movement, and amount and rates of injection and extraction (as further discussed below). In general, the longer the aquifer storage time the more pronounced difference in aesthetic qualities can be expected. While the proposed ASR Program would result in the intermittent delivery of ASR extracted groundwater with potentially adverse aesthetic qualities, there are several issues that deserve consideration.

Aesthetic Qualities are Subjective. The finding of adverse but less than significant recognizes that water customers may perceive a decrease in the aesthetic qualities of potable water during ASR extraction operations when compared to surface water. Based on results of two City sponsored taste tests conducted in 2010 to gauge consumer reaction to differing degrees of surface/groundwater blends, the degree to which aesthetic changes in water quality are noticeable is considered subjective and varies between customers. Taste test results showed that there was no clear preference for the type of water (surface water or groundwater). Subjects were presented with 5 blends of water ranging from 100% surface water to 100% groundwater. Key finding of this informal taste survey are shown in Table 4-5:

TABLE 4-5. SURFACE WATER TO GROUNDWATER SURVEY

Surface Water to Groundwater Percentage	Percentage of Volunteers Who Could Accept as Everyday Drinking Water
100% Surface Water, 0% Groundwater	85.1%
75% Surface Water, 25% Groundwater blend	84.0%
50% Surface Water, 50% Groundwater blend	87.0%
50% Surface Water, 50% Groundwater blend	76.9%
0% Surface Water, 100% Groundwater	63.3%

The ASR Program Allows Aquifer Blending Which Dilutes Adverse Aesthetic Qualities - In general, the City's native groundwater supply has more mineral content than surface water supply and as a result is considered by some to be less aesthetically pleasing for potable uses compared to treated surface water. However, the hard water and high mineral content of groundwater may be reduced under the proposed project as a result of aquifer blending. Aquifer blending occurs when treated surface water is injected into the groundwater aquifer during ASR operations allowing the two water types to mix and blend. When conducted on a regular basis, this blending will improve the aesthetic qualities of extracted groundwater because it will be a mixture of injected treated surface water and native groundwater. Absent ASR operations, when backup water supplies are needed, customers would receive only native groundwater with no opportunity for aquifer blending using treated surface water.

The degree to which blending occurs will depend on what is required operationally to meet water supply and demand, permit requirements, and in part on cost/feasibility considerations. For example, aquifer blending could be accomplished during initial ASR operations with no additional infrastructure or operational costs. Ultimately, the extent that blending occurs is not regulated or otherwise necessary to meet any water quality regulatory requirements but would occur as a function of normal operations subject to the variability described above.

It should be noted that during the Phase 2 Test, because the City was required to extract three times the amount of water injected, customers eventually began receiving pure native groundwater which contributed to the related number of complaints received.

An Operational ASR Program allows for More Continuous Exercising of the Aquifer Which Should Result in Improved Aesthetic Qualities Compared to Delivery of Native Groundwater Absent ASR - Currently, under normal hydrological conditions when the City's surface water contract is not subject to cuts by the Bureau of Reclamation, groundwater is not used. Groundwater is currently only used as an emergency and backup supply and consequently when the switch is made the negative aesthetic characteristics are more noticeable. Under the proposed ASR Program, injection and extraction operations would occur on a more frequent basis particularly during summer high demand periods to aid in "shaving" peak hour demands. These conditions would occur intermittently during peak irrigation periods and would be short in duration. As a result, the negative aesthetic qualities of the harder groundwater are expected to diminish when ASR Program operations are sufficiently cycling injection and extraction phases, which would have a beneficial impact to water taste and odor.

Groundwater is Widely Used in the Region as a Primary Water Supply - For years water purveyors in the greater Sacramento Region have utilized both surface water and groundwater sources. Some purveyors, such as the City of Roseville and the City of Folsom, utilize surface water primarily (or 100% of the time). Other purveyors, such as Sacramento Suburban Water District and California American Water Company, utilize mostly groundwater unless surface water is provided via other agreements. This wide-spread use further indicates that local groundwater is acceptable for potable uses from an aesthetic quality standpoint.

IMPACT 4.2 – 3	POTENTIAL HEALTH EFFECTS FROM GROUNDWATER USE
Applicable Policies and Regulations	Federal Primary MCLs, State Primary MCLs
Significance with Policies and Regulations	Less than Significant
Mitigation Measures:	None Required
Significance after Mitigation:	Less Than Significant

During the Notice of Preparation scoping meetings convened for this analysis, the potential for health risks associated with sodium levels in groundwater was identified as an issue of concern. In order to accurately address this issue, the City consulted with medical professionals[3]. Specifically, they were asked to respond to the health concerns raised in the NOP comments, using as a baseline the City's 2008 Water Quality Report, which analyzed water from the DCW, and treated Folsom Lake water. Information obtained from these licensed medical professionals is the basis for the discussion below.

As shown in Table 4-2, the sodium concentration of groundwater is higher than treated Folsom Lake water. The sodium content of groundwater is low, however, when compared to the sodium content of typical foods in the American diet. For example, one cup of 2% milk contains 130 mg of sodium. One would need to drink 7.5 cups of groundwater in order to consume the amount of sodium equivalent to one cup of 2% milk. Additional comparisons of sodium content in a variety of foods and beverages are shown in Table 4-6.

Individuals with certain medical conditions such as high blood pressure, kidney disease, and congestive heart failure may have been advised by their physician to limit their sodium intake. Assuming an adult weighs approximately 150 pounds and drinks 2 liters (about 8 cups) of groundwater a day, he or she would be consuming about 140 mg of sodium a day from drinking groundwater. Most medically prescribed sodium restrictions are between 1,500 mg to 2,000 mg sodium a day. At 17.5 mg sodium per cup, well water would provide a negligible amount of sodium even for a medically restricted sodium diet. For persons following a very low sodium diet, 500 mg per day, the DCW water could potentially provide a significant portion of daily sodium depending on quantity of water consumed. However, such a diet restriction is followed by a relatively small number of people and those patients are more likely to already be drinking bottled water with limited sodium content.

Medical professionals were also asked about concerns regarding other constituents in water, in addition to sodium. Calcium and magnesium are slightly higher in DCW water compared to treated surface water. This could actually provide some cardiovascular health benefit. Numerous studies have shown lower mortality rates from heart attacks and stroke in areas where the water has higher magnesium content. The data is less conclusive for calcium content and cardiovascular disease benefits.

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[3] Jeannie Gazzaniga-Moloo PhD, RD
Registered Dietitian
Nutrition Counselor*Speaker*Writer
Spokesperson, American Dietetic Association

Chris Palkowski, MD
Physician-in-Chief
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TABLE 4-6. SODIUM CONTENT IN COMMON FOODS AND BEVERAGES

Food/Beverage	Common Measure	Sodium Content, mg
ASR Water	1 cup	17.5 mg
2% Milk	1 cup	130 mg
Apple Juice (unsweetened, without added ascorbic acid)	1 cup	7 mg
Grapefruit Juice (raw)	1 cup	2 mg
Carbonated beverage, Club Soda	1 cup (8 fluid oz.)	50 mg
Carbonated beverage, Ginger Ale	1 cup (8 fluid oz.)	17 mg
Carbonated beverage, Sprite, lemon-lime, without caffeine	1 cup (8 fluid oz.)	22 mg
Lemon Juice	1 cup	51 mg
Orange Juice (from concentrate)	1 cup	2 mg
Table Salt	1 teaspoon	2,325 mg
Ready to serve pasta/marinara sauce	1 cup	1,203 mg
Canned, Chicken Noodle, ready to serve soup	1 cup	850 mg
Progresso Healthy Classics Chicken Noodle, canned, ready to serve	1 cup	460 mg
Tomato products, canned, puree, no salt added	1 cup	70 mg
Yogurt, plain, low-fat	1 8-oz container	159 mg
Cottage Cheese, lowfat, 1% milkfat	1 cup	918 mg
Broccoli, raw	1 cup	20 mg
Carrots, raw	1 cup	76 mg
Celery, raw	1 cup	96 mg
Cereal - ready to eat - General Mills Cheerios	1 cup	213 mg
Cereal - ready to eat - General Mills, Total Raisin Bran	1 cup	239 mg

Source: USDA National Nutrient Database for Standard Reference, Release 18, (www.nal.usda.gov/fnic/foodcomp/Data/SR17/wtrank/sr17a307.pdf)

ASR water would be distributed intermittently, and would be, predominantly, blended with treated surface water, which would have the effect of reducing the concentration of sodium. Additionally, in reasonable amounts, the sodium concentration of groundwater would not exceed standards for typical low-sodium diets. As noted above, persons following a very low sodium diet, 500 mg per day or less, are more likely to already be drinking bottled water. Consultation with a personal physician is recommended for anyone that has ongoing concerns regarding sodium levels in water. For the general population, the potential for adverse health effects due to sodium would be considered less than significant.

4.3 Noise

4.3.1 Introduction

This section includes a description of the properties of sound and the human perception of noise, ambient noise conditions in the vicinity of the existing and proposed well sites, and a summary of applicable regulations. This section also provides an analysis of noise impacts associated with the project, including a discussion of the construction or drilling of well sites, the top-side well pump operations, and compatibility of surrounding land uses with on-site noise levels. Mitigation measures are recommended, as necessary, to reduce significant and potentially significant noise impacts. This information is summarized from the following technical studies:

- City of Roseville General Plan, 2010 as amended
- City of Roseville Noise Ordinance
- j.c.brennan & associates, Roseville Aquifer Storage and Recovery Project, Noise Assessment, August 13, 2009
- West Roseville Specific Plan FEIR, February 2004 (SCH No. 2002082057)
- Sierra Vista Specific Plan FEIR, May 2010 (SCH No. 2008032115)
- Creekview Specific Plan FEIR, December 2010 (SCH No. 2008032017)

The documents listed above are available for review during normal business hours at the City of Roseville Permit Center, 311 Vernon Street, Roseville, 95678. No comments regarding noise were received in response to the Notice of Preparation. Existing Conditions

Acoustic Fundamentals

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves, through a medium, to human (or animal) ears. The vibrating object (e.g., vocal chords, the string and sound board of a guitar, the diaphragm of a radio speaker) is the source of the disturbance that moves through the medium. If the pressure variations occur frequently enough (at least 20 times per second), then they can be heard, and are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second or Hertz (Hz).

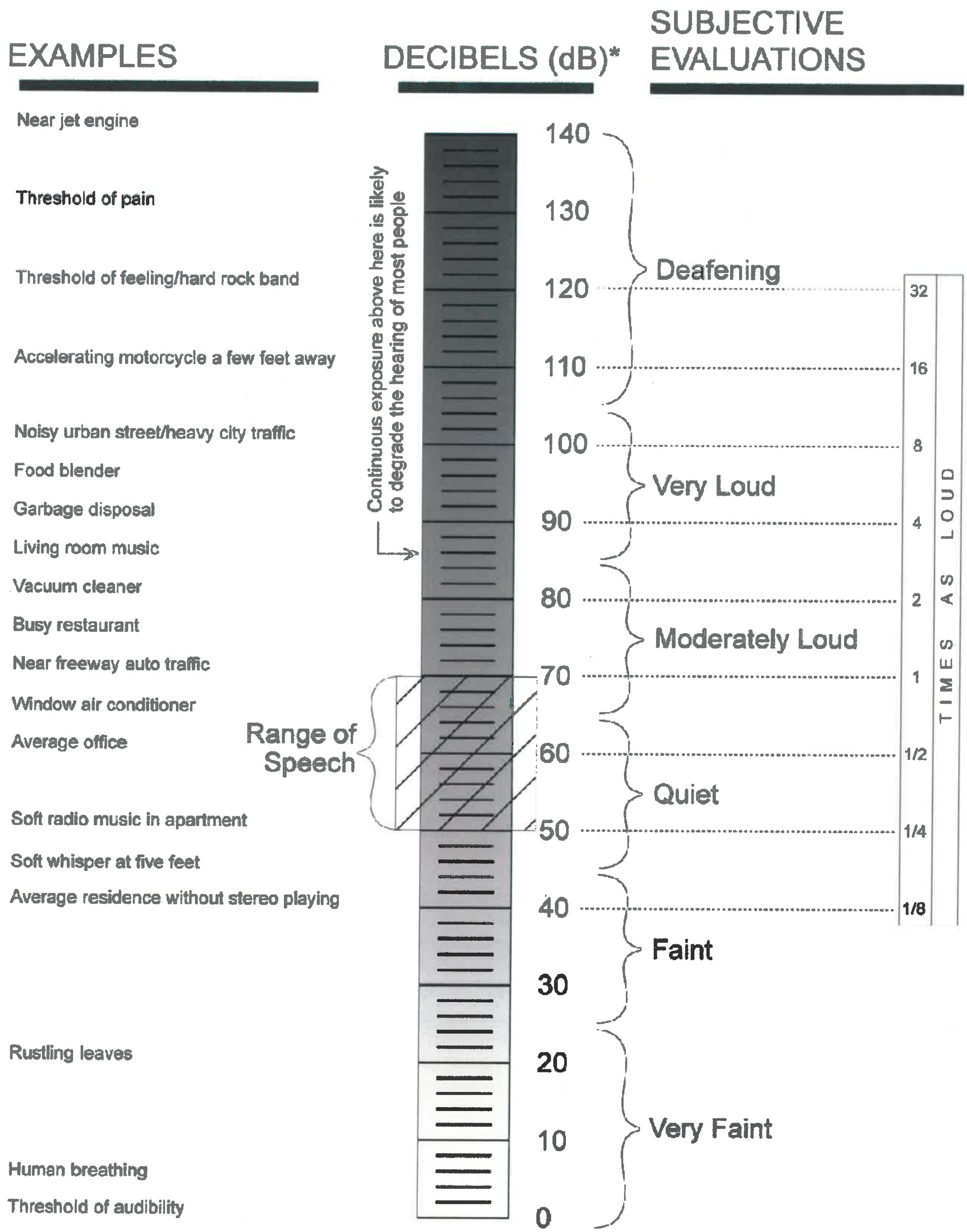
Sound and the Human Ear

Directly measuring sound pressure fluctuations would require a very large and cumbersome range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals) as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed at 120 dB, and changes in levels (dB) correspond closely to human perception of relative loudness.

The perceived loudness of sound is dependent on many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated using A-weighted sound levels. The human ear is not equally sensitive to loudness at all frequencies in the audible spectrum. To better relate overall sound levels and loudness to human perception, frequency-dependent weighting networks were developed. There is a strong correlation between the way humans perceive sound and A-weighted sound levels, (abbreviated dBA). For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels expressed in this section are in terms of A-weighted sound levels, but are expressed as dB, unless otherwise noted.

The decibel scale is logarithmic, not linear, meaning that two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70 dBA sound is half as loud as an 80 dBA sound, and twice as loud as a 60 dBA sound.

With regard to human perception of increases in sound levels expressed in dB, a change of 1 dB is generally not perceivable, excluding controlled conditions and pure tones. Outside of controlled laboratory conditions the average human ear barely perceives a change of 3 dB. A change of 5 dB generally fosters a noticeable change in human response, and an increase of 10 dB is subjectively heard as a doubling of loudness. Typical indoor and outdoor noise levels are presented on Figure 4-6.



* dB are "average" values as measured on the A-scale of a sound-level meter

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Source: EDAW 2005, Downtown Roseville Specific Plan Draft EIR

Figure 4-6 - Typical Noise Levels
City of Roseville Aquifer Storage Recovery Project

CITY OF ROSEVILLE CALIFORNIA

Noise Descriptors

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (L_{eq}), which corresponds to a steady-state A weighted sound level containing the same total energy as a time varying signal over a given time period (usually one hour). The $L_{eq\,q}$ is the foundation of the composite noise descriptor L_{dn}, and shows very good correlation with community response to noise.

The day/night average level (L_{dn}) is based on the average noise level over a 24-hour period, with a + 10 decibel weighting applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based on the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because L_{dn} represents a 24-hour average, it tends to disguise short-term variations in the noise environment. CNEL is similar to L_{dn}, but includes a +3 dB penalty for evening noise. Table 4-7 identifies the various noise descriptors.

TABLE 4-7. NOISE DESCRIPTORS

Name	Description
Lmax (Maximum Noise Level)	The highest A/B/C weighted integrated noise level occurring during a specific period of time.
Lmin (Minimum Noise Level)	The lowest A/B/C weighted integrated noise level during a specific period of time.
Peak	The highest weighted or un-weighted instantaneous peak to peak value occurring during a measurement period.
Ln (Statistical Descriptor)	The noise level exceeded "n" percent of a specific period of time, generally accepted as an hourly statistic. An L10 would be the noise level exceeded 10 % of the measurement period.
L_{eq} (Equivalent Noise Level)	The energy mean (average) noise level. The steady state sound level which, in a specified period of time contains the same acoustical energy as a varying sound level over the same time period.
L_{dn} (Day-Night Noise Level)	The 24-hour L_{eq} with a 10 dB "penalty" applied during nighttime noise-sensitive hours, 10:00 p.m. through 7:00 a.m. The L_{dn} attempts to account for the fact that noise during this specific period of time is a potential source of disturbance with respect to normal sleeping hours.
CNEL (Community Noise Equivalent Level):	The CNEL is similar to the L_{dn} described above, but with an additional 5 dB "penalty" for the noise-sensitive hours between 7:00 p.m. to 10:00 p.m., which are typically reserved for relaxation, conversation, reading, and television. If using the same 24-hour noise data, the CNEL is typically 0.5 dB higher than the L_{dn}.
SEL (Sound Exposure Level)	The SEL describes the cumulative exposure to sound energy over a stated period of time.
SENEL (Single Event Noise Exposure Level)	An SEL where, the measurement period is defined by the start and end times of a single noise event, such as an automobile pass-by, aircraft flyover, or individual industrial operations.

Sound Propagation

As sound (noise) propagates from the source to the receptor, the attenuation, or manner of noise reduction in relation to distance, is dependent on surface characteristics, atmospheric conditions and the presence of physical barriers. The inverse-square law describes the attenuation over distance in relation to the radiation pattern in which sound travels from the source to receptor. A point source generates sound uniformly outward in a spherical pattern with an attenuation rate of 6 dB per doubling of distance (dB/DD). Conversely, a line source (like a roadway) generates sound uniformly outward in a cylindrical pattern with an attenuation rate of 3 dB/DD. The surface characteristics between the source and the receptor may result in additional sound absorption and/or reflection. Atmospheric conditions such as wind speed, temperature, and humidity also have a propensity to alter the propagation of the sound and affect noise levels at a receiver. Furthermore, the presence of a large object (i.e., barrier) between the source and the receptor can provide significant attenuation of noise levels at the receiver. The amount of attenuation or "shielding" provided by a barrier is dependent upon the size of the barrier, the location of the barrier in relation to the source and receivers, and the frequency spectra of the noise. Natural barriers such as berms, hills, or dense woods and manmade features such as buildings and walls can be used as noise barriers.

Effects of Noise on People

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

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

Noise typically produces effects in the first two categories. Workers in industrial plants, for example, are more likely to experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. There is wide variation in individual thresholds of annoyance, and different tolerances to noise tend to develop based on individual experience with noise. Furthermore, noise along with a number of environmental and physical variables may lead to interference with or interruption of sleep, relaxation, recreation, and communication. These interferences can result in varying degrees of annoyance. Although most interference may be classified as annoying, the inability to hear a warning signal may be considered dangerous. Noise can also be a contributor to diseases associated with stress (i.e., hypertension, anxiety, heart disease). The degree to which noise contributes to such both physiological and psychological effects on humans depends on the noise frequency, bandwidth, level, and exposure time.

Thus, an important way of predicting a human reaction to a new source of noise is the way it compares to the existing environment to which one has adapted, known as the ambient noise level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it.

With regard to increases in A-weighted noise level, the following relationships occur:

- a change of 1 dBA is generally not perceptible, except under controlled laboratory conditions;
- Outside of the laboratory, a 3 dBA change is considered just-perceivable;
- A change of at least 5 dBA is required before any noticeable change in human response would be expected; and
- a 10 dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

Vibration

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Sources of vibration include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) and those introduced by human activity (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as operating factory machinery, or transient in nature, such as explosions. Vibration levels can be depicted in terms of amplitude and frequency, relative to displacement, velocity, and acceleration.

Vibration amplitudes are commonly expressed in peak-particle-velocity (PPV) or root-mean-square (RMS) vibration velocity. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is typically used in the monitoring of transient and impact vibration, and has been found to correlate well to the stresses experienced by buildings (Federal Transit Administration (FTA) 2006, California Department of Transportation (Caltrans) 2004). PPV and RMS vibration velocity are normally described in inches per second (in/sec).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. The response of the human body to vibration relates well to average vibration amplitude; therefore, vibration impacts on humans are evaluated in terms of RMS vibration velocity. Similar to airborne sound, vibration velocity can be expressed in decibel notation as vibration decibels (VdB). The logarithmic nature of the decibel serves to compress the broad range of numbers required to describe vibration.

Typical outdoor sources of perceptible ground-borne vibration include construction equipment, steel-wheeled trains, and traffic on rough roads. Although the effects of vibration may be imperceptible at low levels, effects may result in detectable vibrations and slight damage to nearby structures at moderate and high levels, respectively. At the highest levels of vibration, damage to structures is primarily architectural (e.g., loosening and cracking of plaster or stucco coatings) and rarely results in damage to structural components. The range of vibration important to the proposed project occurs from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings (FTA 2006).

Existing Noise Environment

Existing Noise Sources

Traffic is the predominant source of existing noise at the existing and proposed ASR well sites, particularly at well sites already in developed areas. Well sites in currently undeveloped areas (such as the WRSP and Fiddyment Road sites) have minimal sources of noise, with only occasional noise such as airplane flyovers.

In terms of the potential noise impact from the proposed project, noise-sensitive land uses are defined as uses where exposure to noise could result in adverse effects; as well as uses where quiet is an essential element of the intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels.

The proposed project consists of public properties, in various stages of development, in most instances located near residential land uses. Noise-sensitive land uses located in the vicinity of the well sites consist of residential dwellings. Existing surrounding land uses are identified in Table 4-8, below:

TABLE 4-8.
EXISTING AND FUTURE CITY ASR WELL SITES: SURROUNDING LAND USES

Well No.	Well Name & Plan Area	Existing or Proposed	North	South	East	West
4	Darling	Existing	LDR	P/QP	P/QP	LDR
5	Oakmont	Existing	P/QP - LDR	LDR	LDR	P/QP
6	Diamond Creek	Existing	LDR	Park	Park/LDR	LDR
7	Woodcreek North	Existing	Park/OS	Park/OS	Park	Park
8	Hayden Parkway (Fiddyment Ranch)	Existing	LDR/Park	LDR	Park	LDR
9	West Side Dr (W-77)	Existing	LDR	OS	IND/OS	LDR
11	Woodcreek West	Proposed	LDR (across Pleasant Grove Blvd)	OS	OS	HDR
12	Del Webb	Proposed	LDR	OS	OS	OS
13	Hewlett Packard (HP)	Proposed	IND	IND	IND	LDR (across Woodcreek Oaks Blvd)
14	Fiddyment Road (F-66)	Proposed	LDR	OS	LDR (across Fiddyment Rd)	OS
TBD	Sierra Vista East	Proposed	PR	PR	PR	HDR
TBD	Sierra Vista West	Proposed	OS	PR	PR	MDR
TBD	Creekview (C-84)	Proposed	OS	REP (across Blue Oaks Blvd.)	OS	CC

LDR: Low Density Residential, OS: Open Space, IND: Industrial, P/QP: Public/Quasi-Public

Ambient Noise Survey

j.c. brennan & associates conducted an ambient noise survey between July 22 and July 23, 2009. The noise level measurements were conducted to determine typical background noise levels and for comparison to the project-related noise levels. Table 4-9 shows a summary of the existing ambient noise measurements. Figure 4-7 shows the locations of the noise monitoring.

TABLE 4-9. SUMMARY OF AMBIENT NOISE MEASUREMENTS

Site	Well	Date	Time	Duration	Measured Sound Level,dB		
					L_{eq}	Lmax	L50
1	Hewlett Packard #13	7-22-09	10:41 am	30 min.	61.8	67.0	61
			2:10 pm	30 min.	60.2	67.5	59
			10:30 pm	15 min.	54.8	67.5	52
2	Del Webb #12	7-22-09	11:33 am	30 min.	61.4	70.2	59
			3:00 pm	30 min.	59.9	71.0	58
			10:55 pm	15 min.	53.2	65.2	49
3	Woodcreek West #11	7-22-09	12:20 pm	30 min.	59.8	69.9	56
			4:05 pm	30 min.	61.1	73.2	55
			11:20 pm	15 min.	52.6	66.1	48
4	Westside Dr.	7-23-09	8:35 am	30 min.	51.0	56.5	44
			5:20 pm	30 min.	52.1	56.6	43
			10:10 pm	15 min.	46.6	52.2	41
5	Hayden Parkway #8	7-23-09	9:40 am	30 min.	58.9	66.5	54
			6:40 pm	30 min.	57.7	65.9	54
			10:55 pm	15 min.	52.1	64.9	50
6	Fiddyment Road #14	7-23-09	11:10 am	30 min.	49.6	54.2	43
			7:35 pm	30 min.	47.8	52.2	41
			11:35 pm	15 min.	43.0	49.0	40

Source: j.c. brennan & associates, Inc., 2009

Potential noise impacts associated with proposed well sites in the Sierra Vista and Creekview specific plan areas were analyzed in the Sierra Vista Specific Plan EIR (SCH No. 2008032115) and Creekview Specific Plan EIR (SCH No. 2008032017). In accordance with CEQA Guidelines Section 15150, the noise analyses in those EIRs are hereby incorporated by reference.

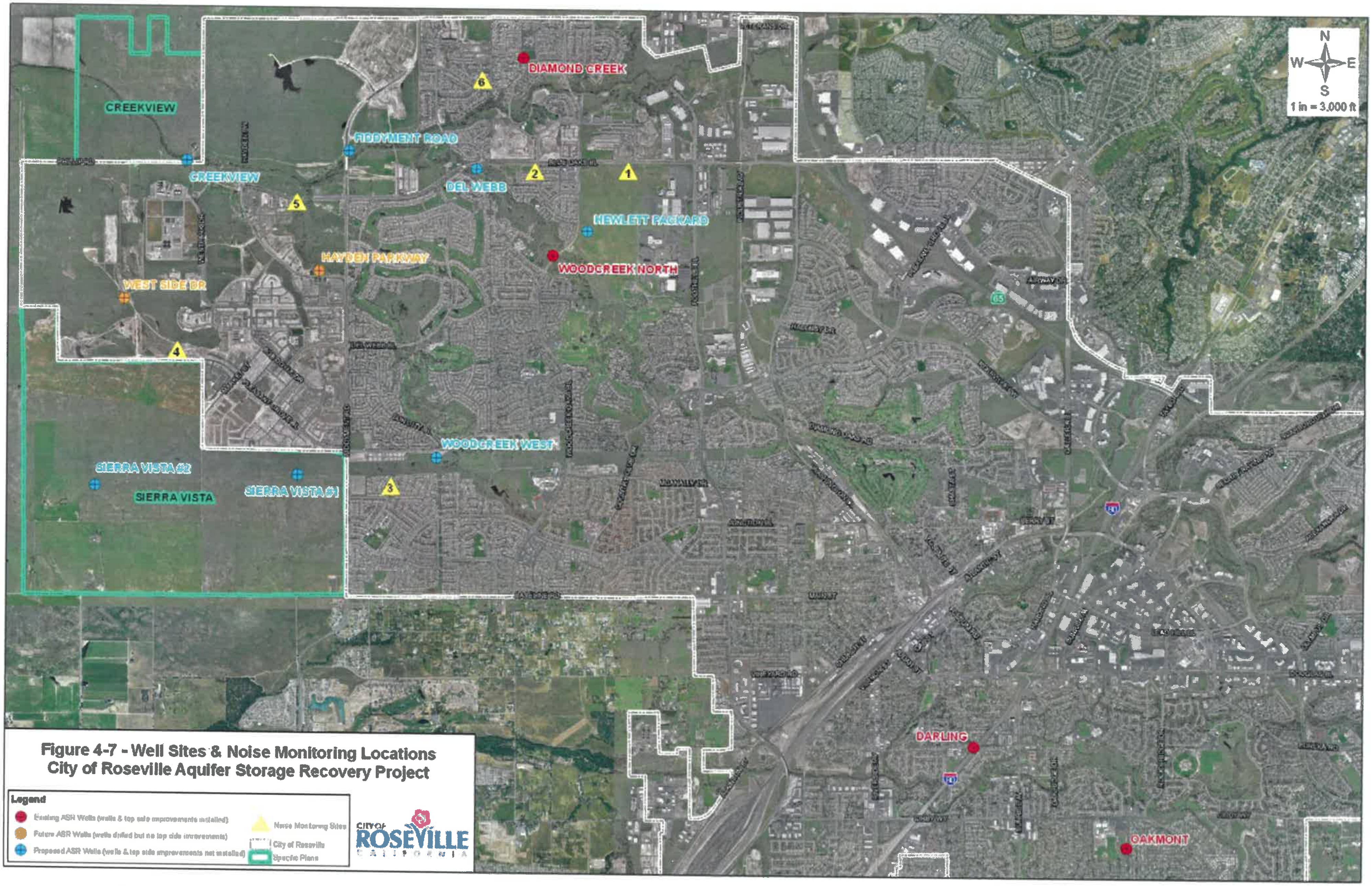

Figure 4-7 - Well Sites & Noise Monitoring Locations
City of Roseville Aquifer Storage Recovery Project

4.3.2 Regulatory Background

Various private and public agencies have established noise guidelines and standards to protect citizens from potential hearing damage and various other adverse physiological and social effects associated with noise. Applicable standards and guidelines are discussed below.

Federal Plans, Policies, Regulations, and Laws

The EPA Office of Noise Abatement and Control was originally established to coordinate federal noise control activities. After its inception the EPA's Office of Noise Abatement and Control issued the Federal Noise Control Act of 1972, establishing programs and guidelines to identify and address the effects of noise on public health and welfare, and the environment. Administrators of the EPA determined in 1981 that subjective issues such as noise would be better addressed at lower levels of government. Consequently, in 1982 responsibilities for regulating noise control policies were transferred to state and local governments. However, noise control guidelines and regulations contained in the rulings of the EPA in prior years remain upheld by designated federal agencies, allowing more individualized control for specific issues by designated federal, state, and local government agencies.

State Plans, Policies, Regulations, and Laws

The State of California has adopted noise standards in areas of regulation not preempted by the federal government. State standards regulate noise levels of motor vehicles, sound transmission through buildings, occupational noise control, and noise insulation.

Title 24 of the California Code of Regulations establishes standards governing interior noise levels that apply to all new multi-family residential units in California. These standards require that acoustical studies be performed before construction at building locations where the existing exceeds 60 dB L_{dn}. Acoustical studies are required to establish mitigation measures that will limit maximum levels to 45 dB L_{dn} in any habitable room. Although there are no generally applicable interior noise standards pertinent to all uses, many communities in California have adopted 45 dB L_{dn} as an upper limit for interior noise in all residential units.

The State of California General Plan Guidelines (Governor's Office of Planning and Research 2003), published by the state Governor's Office of Planning and Research (OPR), provides guidance for the acceptability of projects within areas of specific noise exposure. Table 4-10 presents acceptable and unacceptable community noise exposure limits for various land use categories. The guidelines also present adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

TABLE 4-10. OPR LAND USE NOISE COMPATIBILITY GUIDELINES

	Community Noise Exposure (L_{dn} or CNEL, dB)			
Land Use Category	Normally Acceptable[(1)]	Conditionally Acceptable[(2)]	Normally Unacceptable[(3)]	Clearly Unacceptable[(4)]
Residential-Low Density Single Family, Duplex, Mobile Home	<60	55–70	70–75	75+
Residential-Multiple Family	<65	60–70	70–75	75+
Transient Lodging, Motel, Hotel	<65	60–70	70–80	80+
School, Library, Church, Hospital, Nursing Home	<70	60–70	70–80	80+
Auditorium, Concert Hall, Amphitheater	--	<70	65+	--
Sports Arenas, Outdoor Spectator Sports	--	<75	70+	--
Playground, Neighborhood Park	<70	--	67.5–75	72.5+
Golf Courses, Stable, Water Recreation, Cemetery	<75	--	70-80	80+
Office Building, Business Commercial and Professional	<70	67.5–77.5	75+	--
Industrial, Manufacturing, Utilities, Agriculture	<75	70–80	75+	--

Source: Governor's Office of Planning and Research 2003

(1) Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

(2) New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

(3) New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Outdoor areas must be shielded.

(4) New construction or development should generally not be undertaken.

dB = A-weighted decibels; L_{dn} = day-night average noise level; CNEL = Community Noise Equivalent Level.

Local Plans, Policies, Regulations, and Ordinances

City of Roseville General Plan

The *City of Roseville General Plan Noise Element* contains goals and policies to protect citizens from exposure to excessive noise. The Noise Element establishes standards for various land use categories with respect to transportation and non-transportation noise sources. According to the Noise Element, transportation noise sources are defined as traffic on public roadways, railroad line operations and aircraft in flight. Non-transportation noise sources may include industrial operations; outdoor recreation facilities; heating, ventilating, and air conditioning (HVAC) units; loading docks; construction equipment; and others. The standards provide the basis for decisions on determining noise mitigation requirements. The following General Plan goals and policies are applicable:

Policy 1: Allow the development of new noise-sensitive land uses (which include but are not limited to residential, schools, and hospitals) only in areas exposed to existing or projected levels of noise from transportation noise sources which satisfy the levels specified in Table 4-11. Noise mitigation measures may be required to reduce noise in outdoor activity areas and interior spaces to the levels specified in Table 4-11.

Policy 6: Allow the development of new noise-sensitive uses only where the noise level due to fixed (non-transportation) noise sources satisfies the noise level standards of Table 4-12. Noise mitigation may be required to meet Table 4-12 performance standards.

Policy 7: Require proposed fixed noise sources adjacent to noise-sensitive uses to be mitigated so as not to exceed the noise level performance standards of Table 4-12

Policy 8: Require an acoustical analysis where proposed non-residential or other fixed noise sources are likely to produce noise levels exceeding the performance standards of Table 4-12 at existing or planned noise-sensitive uses.

An acoustical analysis shall be required as part of the environmental review process so that noise mitigation may be considered during project design (see Table 4-12).

Policy 9: Where noise mitigation measures are required to achieve the standards of Tables IX-1 and IX-3 (4-11 and 4-12 in this report), the emphasis of such measures should be placed on site planning and project design. These measures may include, but are not limited to, building orientation, setbacks, landscaping, and building construction practices. The use of noise barriers, such as soundwalls, should be considered as a means of achieving the noise standards only after all other practical design-related noise mitigation measures have been integrated into the project.

Policy 10: Regulate construction-related noise to reduce impacts on adjacent uses consistent with the City's Noise Ordinance.

TABLE 4-11.
MAXIMUM ALLOWABLE NOISE EXPOSURE TRANSPORTATION NOISE SOURCES (TABLE IX-1 OF THE ROSEVILLE GENERAL PLAN NOISE ELEMENT)

	Outdoor Activity Areas[1]	Interior Spaces	
Land Use	L_{dn} /CNEL, dB	L_{dn} /CNEL, dB	L_{eq}, dB2
Residential	60[3]	45	--
Transient Lodging	60[3]	45	--
Hospitals, Nursing Homes	60[3]	45	--
Theaters, Auditoriums, Music Halls	--	--	35
Churches, Meeting Halls	60[3]	--	40
Office Buildings	65	--	45
Schools, Libraries, Museums	--	--	45
Playground, Neighborhood Parks	70	--	--

Source: City of Roseville 2020 General Plan

(1) Outdoor activity areas for residential developments are considered to be the back yard patios of decks of single family dwelling, and the patios or common areas where people generally congregate for multi-family development. Outdoor activity areas for non-residential developments are considered to be those common areas where people generally congregate, including pedestrian plazas, seating areas and outside lunch facilities. Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use.

(2) As determined for a typical worst-case hour during periods of use.

(3) Where it is not possible to reduce noise in outdoor activity areas to 60 dB L_{dn} /CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB L_{dn} /CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.

(4) Where a proposed use is not specifically listed on this table, the use shall comply with the noise exposure standards for the nearest similar use as determined by the Planning Department. Commercial and industrial uses have not been listed because such uses are not considered to be particularly sensitive to noise exposure.

dB = A-weighted decibels; L_{dn} = day-night average noise level; L_{eq} = the equivalent hourly average noise level.

**TABLE 4-12.
NOISE ELEMENT PERFORMANCE STANDARDS FOR NON-TRANSPORTATION NOISE SOURCES OR PROJECTS AFFECTED BY NON-TRANSPORTATION NOISE SOURCES (TABLE IX-3 OF THE ROSEVILLE GENERAL PLAN NOISE)**

	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Noise Level Descriptor	As Measured At The Property Line Of Noise-Sensitive Uses	
Hourly L_{eq}, dB	50 dB	45 dB
Maximum level, dB	70 dB	65 dB

Source: City of Roseville 2020 General Plan

- Each of the noise levels specified above should be lowered by five dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. Such noises are generally considered by residents to be particularly annoying and are a primary source of noise complaints. These noise level standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings).
- No standards have been included for interior noise levels. Standard construction practices should, with exterior noise levels identified, result in acceptable interior noise levels.

dB = A-weighted decibels; L_{eq} = the equivalent hourly average noise level; Lmax = maximum noise level.

City of Roseville Municipal Code Noise Ordinance

The City of Roseville Noise Ordinance, Chapter 9.24 of the City of Roseville Municipal Code, establishes policies, performance standards, and exemptions for addressing noise complaints and general activities and sources of noise within the City. The Code includes noise standards, consistent with the General Plan Noise Element, for transportation and non-transportation sources that are identical to those presented above in Tables IX-1 and IX-3 of the Roseville General Plan Noise Element (Tables 4-11 and 4-12 in this analysis).

Noise Ordinance sections applicable to this analysis include:

Section 9.24.030: Exemptions

Private construction (e.g., construction, alteration or repair activities) between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday, and between the hours of 8:00 a.m. and 8:00 p.m. Saturday and Sunday; provided, however, that all construction equipment shall be fitted with factory installed muffling devices and that all construction equipment shall be maintained in good working order. (Ord. 3638 § 1 (part), 2001.)

Section 9.24.100 Sound Limits for Sensitive Receptors

It is unlawful for any person at any location to create any sound, or to allow the creation of any sound, on property owned, leased, occupied or otherwise controlled by such person, which causes the exterior sound level when measured at the property line of any affected sensitive receptor to exceed the ambient sound level by three dBA or exceed the sound level standards as set forth in Table 1, by three dBA, whichever is greater.

Section 9.24.140: Operational Standards for City Activities

Notwithstanding any other provisions of this chapter, city operations and activities are not subject to the provisions of this chapter. The city council may, by resolution, adopt operational standards for city activities to effectuate the purposes of this chapter. (Ord. 3638 § 1 (part), 2001.)

Community Ambient Noise Degradation

In addition to the criteria discussed above, another consideration in defining impact criteria is based on the degradation of the existing noise environment. In community noise assessments, it is "generally not significant" if no noise-sensitive sites are located within the Plan area, or if increases in community noise levels associated with implementation of the project would not exceed 3 dB at noise-sensitive locations in the project vicinity (Caltrans 1998).

Development Agreements

In addition to the mitigation measures required by the West Roseville , Sierra Vista, and Creekview Specific Plan EIRs, the well sites are subject to provisions of the development agreements pertaining to those specific plan areas. The development agreements include sections addressing potential noise from drilling groundwater wells, and direction to minimize noise by scheduling well drilling prior to construction of adjacent residential development. The West Roseville, and Sierra Vista development agreements, which have been approved, read as follows:

> *"...Developer shall drill the wells upon the earlier of the need for each well to provide water service to the Project, or prior to adjacent residential construction and concurrent with construction of adjacent roadways." (WRSP 1600: Provision 3.7.5, WRSP Fiddyment: Provision 3.7.5)*

> *"The Landowner shall contact the City Environmental Utilities Department prior to construction of the production wells. Landowner shall receive approval from the City of the well design and drilling method prior to commencement of this work. Wells shall be drilled at the time of occupancy of any residential units within 500 feet of the well site. Landowner shall include noise curtains for a particular well if at the time of construction of the well, homes are occupied between 500 and 1000 feet of the well." (Section 3.7.2 of Development Agreements associated with the Sierra Vista Specific Plan Area)*

Vibration Criteria

CEQA requires analysis of the potential for excessive ground-borne noise and vibration levels, however, it does not define the term "excessive" vibration. Numerous public and private organizations and governing bodies have provided guidelines to assist in the analysis of ground-borne noise and vibration; however, federal, state, and local governments have yet to establish specific ground-borne noise and vibration requirements. Publications of the FTA and Caltrans are two of the seminal works for the analysis of ground-borne noise and vibration relating to transportation and construction induced vibration. Caltrans guidelines recommend a standard of 0.2 inches per second (in/sec) PPV maximum for the protection of normal residential buildings and 0.08 in/sec PPV not be exceeded for the protection of old or historically significant structures (Caltrans 2004). With respect to human response within residential uses (i.e., annoyance), the FTA recommends a maximum acceptable vibration standard of 80 VdB (FTA 2006).

Construction activities, specifically well drilling, may have the potential to result in varying degrees of temporary ground vibration. Potentially, sensitive receptors located in close proximity to construction activities could be exposed to ground-borne vibration levels that exceed recommended FTA and Caltrans guidelines of 80 VdB and 0.2 in/sec PPV, respectively.

4.3.3 Environmental Impacts

Analysis Methodology

Noise-sensitive land uses and major noise sources in the vicinity of the project area were identified based on existing documentation (e.g., equipment noise levels and attenuation rates) and site reconnaissance data.

Potential long-term (operational) stationary source noise impacts were assessed based on existing documentation (e.g., equipment noise levels) and site reconnaissance data. This analysis also evaluates potential construction noise and vibration impacts based on previously constructed well projects in the City. To assess potential short-term construction noise impacts, sensitive receptors and their relative exposure (considering topographic barriers and distance) were identified. Noise levels of specific construction equipment were determined and resultant noise levels at those receptors were calculated.

Predicted noise levels were compared with applicable standards for determination of significance. Mitigation measures were developed for significant and potentially significant noise impacts.

Thresholds of Significance

Generally, a project may have a significant effect on the environment if it would substantially increase the ambient noise levels for adjoining areas or expose people to severe noise levels. In practice, more specific professional standards have been developed. These standards state that a noise impact may be considered significant if it would generate noise that would conflict with local planning criteria or ordinances, or substantially increase noise levels at noise-sensitive land uses.

For the proposed project, the significance of anticipated noise effects is based on a comparison between predicted noise levels and noise criteria defined by the City. For this project, noise impacts are considered significant if existing or proposed noise-sensitive land uses would be exposed to noise levels in excess of the *City of Roseville General Plan Noise Element* and *City of Roseville Municipal Code* standards as shown in Tables 4-10 and 4-11, or any of the following:

- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project, typically defined as more than 3 dB.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project, typically defined as more than 3 dB.
- Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.

Impact Analysis

IMPACT 4.3-1	SHORT-TERM DRILLING NOISE LEVELS AT NEAREST RESIDENCES
Applicable Policies and Regulations	City of Roseville Noise Ordinance Section 9.24.030
Significance with Policies and Regulations	Significant
Mitigation Measures:	4.3-1
Significance after Mitigation:	Significant and Unavoidable

The City contracted with noise consultants, j.c.brennan & associates, Inc. to assess potential noise impacts from well drilling operations. Based on similar well drilling projects, drill rig operations would be expected to generate noise levels of approximately 78 dB L_{eq} at a distance of 100 feet from the drilling platform, and approximately 50 dB L_{eq} at a distance of 600 feet from the drilling platform. There are a number of ancillary noise sources associated with drill rig operations including power generators, and the drill tower itself. Of these noise sources, the diesel generators and pumps were identified as the dominant noise producing component.

Since drilling operations would occur over 24-hour periods, in order to comply with the Roseville General Plan Noise Element and Noise Ordinance criteria, the noise levels would be required to comply with exterior noise level standards: hourly 45 dB L_{eq} and maximum 60 dB L_{eq}. Table 4-13 identifies the predicted drilling noise levels at the residences nearest to the proposed well drilling sites.

TABLE 4-13. PREDICTED DRILLING NOISE LEVELS AT NEAREST RESIDENCES

Well Name	Drilling Status	Nearest Residences	Predicted Noise Levels
Hayden Parkway	Drilled (2006)	Houses to north approximately 100 ft.	Not applicable
Westside Dr.	Drilled (2006)	Houses to west over 600 ft.	Not applicable
Woodcreek West	Not Drilled	Homes to north at approximately 100 ft.	78 db L_{eq}
Del Webb	Not Drilled	Homes to north and south at approximately 150 ft.	75 db L_{eq}
Hewlett Packard	Not Drilled	Homes to west at approximately 150 ft.	75 dB L_{eq}
Fiddyment Road	Not Drilled	Homes more than 800 ft. away	<45 dB L_{eq}

Source: jc brennan & associates, Inc. 2009

As indicated in Table 4-13, operational noise levels for typical construction activities associated with top-side improvements would generate noise levels up to 78 dB at distances of 100 feet, exceeding the City standards.

During drilling operations, interior noise levels would be mitigated to some extent by distance, and building features. Additionally, temporary sound barriers (such as noise blanket panels) can be utilized to reduce noise levels. These mitigating features are discussed in more detail below.

Noise from localized point sources (e.g., construction sites) typically decrease by 6 dB to 7.5 dB with each doubling of distance from source to receptor. Conservatively assuming an attenuation rate of 6 dB per doubling of distance, noise during drilling activities would have the potential to generate exterior hourly noise levels exceeding 55 dB L_{eq} at receptors located less than 800 feet of the acoustical center for construction operations.

Modern residential construction consistent with the universal building code (UBC) typically provides an exterior-to-interior noise level reduction of 25 dB to 30 dB with all exterior openings sealed. The City establishes a maximum allowable noise level of 45 dB L_{dn} for interior spaces of noise-sensitive uses.

Sound attenuation measures can be applied during well drilling operations to minimize noise levels. One such method to reduce noise levels is to erect a temporary sound barrier on the sides facing the residences. An example would be barriers such as noise blanket panels mounted to steel framing. Noise blanket panels can be mounted horizontally or vertically and attached to vertical steel I-beam supports. Such barriers can reduce overall noise levels by approximately 17 dB, and result in exterior noise levels of approximately 68 dB to 71 dB L_{eq}. This method of sound attenuation will be applied to the project as Mitigation Measure MM4.~~2~~3-1.

Under Section 9.24.140 of the City of Roseville Noise Ordinance, the City Council can, by resolution, adopt a temporary noise level standard of 50 dB L_{eq} during the drilling operations. This noise level is adequate to allow a reasonable interior environment for sleeping in urban areas. Based on typical construction, the exterior to interior noise level reduction is expected to be 25 dB, with closed windows and doors. With implementation of MM4.~~2~~3-1, the interior noise levels are expected to be approximately 43 dB to 46 dB L_{eq}. However adoption of the temporary noise ordinance would not have a mitigating effect on actual noise levels.

During well drilling operations at the Woodcreek West, Del Webb,and Hewlett Packard well sites, the predicted noise levels at adjacent residences would range between 75 dB and 78 dB L_{eq}. That noise level would exceed the City's nighttime noise level standard of 45 dB L_{eq} by approximately 30 dB. Although well drilling activities are temporary (expected to occur for no more than one to two weeks) the noise levels would be substantial and could be a cause for annoyance. The provisions of the WRSP, Sierra Vista, and Creekview Development Agreements, which apply to the Sierra Vista 1 and 2, Creekview, and Fiddyment wells;and Mitigation Measure 4.3-1, hanging flexible sound control curtains around the drilling apparatus and the drill rig, would be applied to the extent feasible, as determined by the Environmental Utilities Director. However, even with mitigation, the potential would exist that noise impacts during well drilling could exceed the City's interior noise standards. Consequently this impact is considered **significant and unavoidable**.

In addition to the DA requirements described above, the Sierra Vista Specific Plan EIR Mitigation requires implementation of Mitigation Measure 4.6-1. And 4.6-1(b) requiring that equipment warm up areas, water tanks, and equipment storage areas be located in an area as far away from existing residences as feasible. Mitigation Measure 4.6-1(d) requires that well drilling occur prior to construction of the adjacent subdivision. If construction timing for the wells occur after subdivision construction, then measures to reduce noise shall be used including; hanging flexible sound control curtains around the

SUSP EIR

drilling apparatus, and the drill rig, to the degree feasible, as determined by the Environmental Utilities Director, if located within 1,000-feet of an occupied residence. Even with implementation of MM 4.6-1, there is a potential that noise from construction activities would be significant, because construction-related noise would occur beyond the hours in which such noise is considered acceptable under the City's Noise Ordinance (i.e., between 7:00 a.m. and 7:00 p.m. on weekdays and 8:00 a.m. and 8:00 p.m. on weekends).

Similarly, the Creekview Specific Plan DA and EIR require implementation of Mitigation Measure 4.6-1(d), which directs that well drilling occur prior to construction of the adjacent subdivision. If construction timing for the wells occurs after subdivision construction, then measures to reduce noise shall be used, including hanging flexible sound control curtains around the drilling apparatus and the drill rig, to the degree feasible as determined by the Environmental Utilities Director, if located within 1,000-feet of an occupied residence. Even with implementation of MM 4.6-1, there is a potential that noise from construction activities would be significant, because construction-related noise would occur beyond the hours in which such noise is considered acceptable under the City's Noise Ordinance (i.e., between 7:00 a.m. and 7:00 p.m. on weekdays and 8:00 a.m. and 8:00 p.m. on weekends).

IMPACT 4.3-2	TEMPORARY CONSTRUCTION NOISE LEVELS AT NEAREST RESIDENCES
Applicable Policies and Regulations	City of Roseville Noise Ordinance Section 9.24.030
Significance with Policies and Regulations	Less than Significant
Mitigation Measures:	None
Significance after Mitigation:	Less than Significant

With the exception of the nighttime drilling operations, daytime construction activities will generate similar noise levels to that associated with home and commercial building construction. The City Municipal Code exempts construction-generated noise that occurs between the hours of 7 a.m. to 7 p.m. Monday through Friday, and 8 a.m. and 8 p.m. Saturday and Sunday from the applicable noise standards, provided that all construction equipment is fitted with factory installed muffling devices and maintained in good working order. In addition, the City's Noise Ordinance would be enforced to restrict top-side construction activities to occur between the hours of 7 a.m. to 7 p.m. Monday through Friday, and 8 a.m. to 8 p.m. Saturday and Sunday. Because construction activities would occur only during hours that are exempt from applicable noise standards, this **impact is considered less than significant and no mitigation beyond compliance with the City's Noise Ordinance is required.**

IMPACT 4.3-3	WELL PUMP NOISE (OPERATIONAL) NOISE LEVELS
Applicable Policies and Regulations	City of Roseville Noise Ordinance Section 9.24.030
Significance with Policies and Regulations	~~Potentially Significant~~ LTS
Mitigation Measures:	MM4.~~2~~-3 3
Significance after Mitigation:	Less than Significant

To assess the noise impacts associated with well pump operations, calculations were based on the type of pump that would be used for each well site, and the noise generated

This impact can be mitigated to LTS with implementation of MM 4.3-3

by the pump. Based on the data shown in Table 4-14, implementation of the proposed project would result in pump operational noise levels which would exceed the City's nighttime noise level standard of 45 dB L_{eq} at residences located nearest to the Woodcreek West, Del Webb, and Hewlett Packard and Hayden Parkway well sites. This is considered a **potentially significant impact.**

TABLE 4-14. PREDICTED WELL PUMP NOISE LEVELS AT NEAREST RESIDENCES

Well Name	Pumps Installed	Nearest Residences	Predicted Noise Levels	Increase in Noise Levels
Hayden Parkway drilled	No	Home to north at approximately 100 ft.	56 dBA	~ + 4 dB
Westside Drive Drilled	No	Homes to west more than 600 ft.	<45 dBA	No Increase
Woodcreek West	No	Homes to north at approximately 100 ft.	56 dBA	~ + 3 dB
Del Webb	No	Homes to north at approximately 150 ft.	51 dBA	No Increase
Hewlett Packard	No	Homes to west at approximately 150 ft.	51 dBA	No Increase
Fiddyment Road	No	Homes more than 800 ft.	<45 dBA	No Increase

Modeled by j.c. brennan associates, 2009

Noise levels associated with the well pumps can be reduced using a full or partial enclosure. The enclosure can take the form of a block house or surrounding barrier designed to accommodate a pump motor 5-feet in height, and elevated off the ground by 18 inches.

A full enclosure with a roof would sufficiently reduce noise levels, however, ventilation openings should be located on the side of the building opposite the nearest residences. If a traditional barrier is constructed around the well site, it would need to be a minimum of 8-feet in height.

A variety of suitable sound attenuation options would be available. In order to ensure that sound levels are adequately mitigated, a qualified acoustical expert shall be consulted regarding placement, orientation, size, and density of acoustical barriers.

The long term operation of the wells and pump stations will comply with the City of Roseville Noise Ordinance because pump stations will ~~be soundproofed,~~ using a variety of methods, to meet the City's exterior noise level standards. This impact would be mitigated to less than significant.

IMPACT 4.3-4	GROUND-BORNE NOISE AND VIBRATION LEVELS AT SENSITIVE RECEPTORS
Applicable Policies and Regulations	City of Roseville Noise Ordinance Section 9.24.030
Significance with Policies and Regulations	Less than Significant
Mitigation Measures:	None
Significance after Mitigation:	Less than Significant

Incorporate sound attenuation measures

Construction-Induced Vibration

Construction activities, particularly well drilling, create the potential for varying degrees of temporary ground vibration. However, based on vibration levels associated with construction of previous wells in the City, sensitive receptors located in close proximity to well drilling activities would not be exposed to noticeable ground-borne vibration. Additionally, no well sites are proposed near historically significant structures. Based on previous well drilling projects in the City, it is expected that vibration impacts associated with drilling activity would be **less than significant**. Implementation of Noise Ordinance requirements would further aid in minimizing vibration, such as locating fixed and/or stationary equipment as far as possible from noise sensitive receptors, and minimizing idling time of heavy equipment.

4.3.4 Mitigation Measures

Mitigation Measure 4.3-1: Use of Sound Attenuation During Well Drilling Operations

To reduce well drilling noise levels the contractor shall erect a temporary sound barrier, such as noise blanket panels mounted to steel framing, on the sides of the drilling rig facing the nearest adjacent residences. Noise blanket panels can be mounted horizontally or vertically and attached to vertical steel I-beam supports. Such barriers can reduce overall noise levels by approximately 17 dB, and result in exterior noise levels of approximately 68 dB to 71 dB L_{eq}.

Mitigation Measure 4.3-3: Reduce Well Pump (Operational) Noise Levels

Reduce noise levels associated with the well pump by providing a full or partial enclosure. The enclosure can take the form of a block house or surrounding barrier designed to accommodate a pump motor 5-feet in height, and elevated off the ground by 18 inches. A full enclosure with a roof would sufficiently reduce noise levels, however, ventilation openings should be located on the side of the building opposite the nearest residences. If a traditional barrier is constructed around the well site, it would need to be a minimum of 8-feet in height.

A variety of suitable sound attenuation options would be available. In order to ensure that sound levels are adequately mitigated, a qualified acoustical expert shall be consulted regarding placement, orientation, size, and density of acoustical barriers.

4.3.5 Residual Significant Impacts

Due to the requirement for 24-hour drilling, even with implementation of all feasible mitigation, residual short term well-drilling noise is considered potentially significant and unavoidable.

Chapter 5.0
CEQA Considerations

5.1 Introduction

Section 15126 of the CEQA Guidelines requires that all aspects of a project must be considered when evaluating its impact on the environment, including planning, acquisition, development, and operation. In compliance with §15126, this DEIR includes the following required analyses:

- Significant Environmental Effects
- Significant environmental effects that cannot be avoided if the proposed project is implemented
- Significant irreversible environmental changes that would result from implementation of the proposed project
- Growth-inducing impacts of the proposed project
- Cumulative Impacts
- Conclusion

5.2 Significant Environmental Effects

Chapter 3, Summary of Impacts and Mitigation Measures, and Sections 4.2 and 4.3, provide a comprehensive identification of the proposed project's environmental effects, including the level of significance both before and after mitigation.

5.2.1 Significant and Unavoidable Impacts

Section 15126 (b) of the CEQA Guidelines requires that an EIR describe any significant impacts that cannot be avoided, even with the implementation of feasible mitigation measures. The environmental effects of the proposed project on various aspects of the environment are discussed in detail in Chapters 4 and 5. Potentially significant impacts that cannot be avoided if the project is approved include:

- 4.3-1: Potentially Significant Noise Impacts at Nearest Residences due to Drilling Noise Levels (During Construction only), and/or
- 5.2.3: Potential to Induce Substantial Population Growth

5.2.2 Significant Irreversible Environmental Effects

Section 15126.2 (c) of the CEQA Guidelines requires a discussion of any significant irreversible environmental change that would be caused by the Proposed Project. Generally, a project would result in significant irreversible changes if:

- The primary and secondary impacts would generally commit future generations to similar uses (such as highway improvement which provides access to a previously inaccessible area); and/or

- The project would involve a large commitment of nonrenewable resources.

Operation of the ASR Program is intended to manage surface and groundwater resources by employing a conjunctive use strategy that promotes sustainability. Energy consumption for operational purposes would be minimal. The ASR program would not cause significant adverse irreversible environmental effects.

5.2.3 Growth Inducing Impacts

CEQA Guidelines (Section 15126.2 (d), require that an EIR evaluate the growth-inducing potential of a proposed project. Growth inducing is defined as:

> *"...the ways in which a proposed project could foster economic or population growth or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth... Also discuss the characteristics of some projects which may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively."*

Growth can be induced in a number of ways; through the elimination of obstacles to growth, which refers to the extent to which a proposed project removes infrastructure limitations or provides infrastructure capacity, or removes regulatory constraints that could result in growth unforeseen at the time of project approval.

The elimination of physical obstacles to growth is considered a growth-inducing effect. In terms of water supply, the following physical constraints to growth currently exist in the City:

- Limited surface water supplies available to the City;
- Limited capacity of the potable water treatment, storage and distribution system serving the western portion of the City; and
- Limited capacity of the recycled water system serving the western portion of the City.

The purpose of the ASR Program is to improve groundwater supply reliability rather than generate a new primary source of water supply. The ASR Program would not constitute a primary source of water supply for customers during normal years, nor would it increase the capacity of the distribution system or otherwise add infrastructure in direct support of new development. During normal years however, ASR operations would be conducted for the purpose of potable water storage and to meet peak demand as needed. This removes storage as an obstacle to growth. Also, it could be argued that the project could, indirectly, accommodate demands of new growth by increasing the certainty of the existing groundwater supply, which could allow for more accurate estimates of water available to serve potential growth areas. Therefore, this analysis conservatively assumes that any projects that generate an increase in water supply reliability could be considered an indirect growth-inducing impact. Potential impacts associated with growth inducement could include, but would not be limited to:

- Land Use Changes – land use changes could include urban infill and increased population density and potential annexation projects west and north of the current City limit;
- Traffic Impacts – traffic in the City could increase because of new development and increases in visitor travel and truck traffic serving the region;
- Air Quality Impacts – local air quality could continue to decline as a result of population growth and increased traffic. The local air basin currently does not meet state and federal air quality standards for ozone and particulate matter (PM10 and PM2.5); and/or
- Biological Impacts – the conversion of undeveloped land to homes, roads, businesses, and other uses could adversely affect habitats and associated wildlife.

Other potential impacts from growth include possible urban runoff effects of development from increases in impermeable surfaces, disturbance of known or unknown cultural resources due to ground disturbance, increased temporary and permanent noise impacts because of construction and transportation and industrial land uses, visual resource impacts due to development of currently undeveloped areas, and consumption of energy and natural resources. Potential growth inducing impacts would be mitigated in part by compliance with the City's growth management ordinance.

5.3 Cumulative Impacts

5.3.1 Definition and Scope of Cumulative Analysis

In accordance with CEQA Guidelines §15130(a), this DEIR assesses the potential for cumulative impacts of the proposed project. A cumulative impact is defined as, "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (CEQA Guidelines §15355). Cumulatively considerable impacts as defined by CEQA mean that, "…the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of possible future projects." (CEQA Guidelines §15065(a)(3)). The CEQA Guidelines include specific direction regarding the cumulative impact analysis, including:

> *"Where a Lead Agency is examining a project with an incremental effect that is not 'cumulatively considerable,' a Lead Agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable." (§15130(a))*
>
> *"...An EIR shall not discuss impacts which do not result in part from the project evaluated in the EIR." (§15130(a)(1))*
>
> *"When the combined cumulative impact associated with the project's incremental effect and the effects of other projects is not significant, the EIR shall briefly indicate why the cumulative impact is not significant and is not discussed in further detail in the EIR. A Lead Agency shall identify facts and analysis supporting the Lead Agency's conclusion that the cumulative impact is less than significant." ((§15130(a)(2))*

"An EIR may determine that a project's contribution to a significant cumulative impact will be rendered less than cumulatively considerable and thus not significant. A project's contribution is less than cumulatively considerable if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact. The Lead Agency shall identify facts and analysis supporting its conclusion that the contribution will be rendered less than cumulatively considerable." (15130 (a)(3)).

5.3.2 Potential Cumulative Impacts

It is the determination of the City (CEQA Lead Agency) that the proposed ASR Program would not create significant cumulatively considerable impacts. The analysis herein includes the facts that provide the basis for this determination.

The potential cumulative impacts considered in this analysis include:

- Adverse effects to groundwater quality;
- Adverse changes to groundwater elevations (lowering the aquifer);
- Increased potential for surface subsidence; and
- Adverse effects to surface water flows.

As stated above, a project's contribution is less than cumulatively considerable if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact. The ASR program would be implemented consistent with the Western Placer County Groundwater Management Plan (WPCGMP), and the Water Forum Agreement (WFA), for which an EIR was certified in 1999. The WPCGMP and WFA represent regional plans for groundwater resource management. This analysis summarizes both of these program concepts as they relate to potential cumulative impacts associated with groundwater.

Western Placer County Groundwater Management Plan (WPCGMP)

As referenced throughout this DEIR, the proposed ASR Program would be implemented consistent with the direction of the WPCGMP. The WPCGMP is a joint effort by the City of Roseville, City of Lincoln, Placer County Water Agency (PCWA), and California American Water (CAW). Placer County and the California Department of Water Resources also actively participated in development of the WPCGMP.

The overarching goal of the WPCGMP is to, "...maintain the quality and ensure the long term availability of groundwater to meet backup, emergency, and peak demands without adversely affecting other groundwater uses within the WPCGMP area." To achieve the overarching goal, and to comply with the California Water Code, the WPCGMP identifies groundwater basin management objectives (BMOs) and plan components which would alleviate cumulative impacts. The BMO's and plan components are summarized below:

WPCGMP BMOs

The WPCGMP requires that BMO's be characterized by one or all of the following:

1. Specific objectives that can be scientifically measured;
2. A clearly defined monitoring program designed to collect data necessary to evaluate the BMO's performance;
3. A reporting method of monitored data to identify success or forewarn challenges with the management of the groundwater; and
4. Programs and/or actions available to remedy a problem, if one is determined to exist.

As stated in the WPCGMP, the BMO's were established in compliance with the California State Water Code §10753.7 (a)(1), which require that the BMO's be consistent with the water code as follows:

> *"(1) Prepare and implement a groundwater management plan that includes basin management objectives for the groundwater basin that is subject to the plan. The plan shall include components relating to the monitoring and management of groundwater levels within the groundwater basin, groundwater quality degradation, inelastic land surface subsidence, and changes in surface flow and surface water quality that directly affect groundwater levels or quality or are caused by groundwater pumping in the basin."*

The water code emphasizes specific and measurable BMO's, and the following BMO's were developed for the WPCGMP:

- Management of the groundwater basin shall not have a significant adverse effect on groundwater quality;
- Manage groundwater elevations to ensure an adequate groundwater supply for backup, emergency, and peak demands without adversely impacting adjacent areas;
- Participate in state and federal land surface subsidence monitoring programs;
- Protect against adverse impacts to surface water flows in creeks and rivers due to groundwater pumping; and
- Ensure groundwater recharge projects comply with state and federal regulations and protect beneficial uses of groundwater.

WPCGMP Components

Component Category 1: Stakeholder Involvement (Required)

- Involving the Public
- Involving other agencies within and adjacent to the WPCGMP Area
- Utilizing advisory committee
- Developing Relationship with State and Federal Agencies

Component Category 2: Monitoring Program (Required)

- Groundwater Elevation Monitoring
- Groundwater Quality Monitoring
- Land Surface Elevation (Subsidence) Monitoring
- Protocols for the Collection of Groundwater Data
- Groundwater Data Management System

Component Category 3: Groundwater Resource Protection

- Well Construction Policies
- Well Abandonment and Well Destruction Policies
- Wellhead Protection Measures
- Protection of Recharge Areas
- Control of the Migration and Remediation of Contaminated Groundwater
- Control of Saline Water Intrusion

Component Category 4: Groundwater Sustainability

- Conjunctive Management Activities
- Demand Reduction

Component Category 5: Planning Integration

- Existing Integrated Planning Effort
- Potential Future Integrated Planning Efforts

Water Forum Agreement (WFA) EIR (SCH No. 95082041)

The ASR Program is intended to meet the objectives of the regional conjunctive use program prescribed by the Water Form Agreement and the Regional Water Master Plan developed by the American River Basin Cooperating Agencies.[1] The focus of the Water Forum Agreement is meeting the water supply availability and reliability needs of Placer County and Sacramento County while protecting the environmental values of the lower American River. The ASR Project would enable the City to meet drought year water demands with groundwater, while mitigating any long-term impacts to the groundwater basin. This meets the goal of the Regional Water Master Plan which is to develop equitable, cost-effective water resource management strategies for enhancing water supply reliability and operation flexibility for water uses of Folsom Lake, the lower American River, and the connected groundwater basin. This cumulative analysis for groundwater injection and extraction considers the potential environmental effects of injecting surface water and extracting groundwater to maintain groundwater as a

1 ARBCUP is comprised of seven local water purveyors - Citrus Heights Water District, Fair Oaks Water District, Placer County Water Agency, San Juan Water District, Sacramento Suburban Water District, and the cities of Roseville and Sacramento

sustainable resource, and improve the City's water supply reliability. Specifically, this analysis also considers the provisions of the WFA which addresses supplying regional water demands generated in Placer County and Sacramento County. The WFA provides a framework for providing surface water and groundwater supplies to the region through 2030. It is likely that water supply will come from the following sources: existing surface water supplies from the American River, expanded use of groundwater, additional cooperative agreements between water purveyors, mandatory conservation measures in the future, and new surface water supplies from the Sacramento River.

An EIR was prepared for the WFA that addresses impacts and mitigation measures resulting from implementation of the water supply program outlined in the WFA. As a certified CEQA document, the WFA EIR constitutes a legally satisfactory analysis of all the issues addressed therein, including groundwater and water quality impacts. For the purpose of this analysis, the focus is on the potential groundwater impacts evaluated in the WFA EIR.

The WFA EIR listed the environmental impacts that could occur when implementing water diversions under the WFA and concluded that there was the possibility for environmental impacts in the following areas: groundwater resources, water supply, water quality, fisheries and aquatic habitat, flood control, hydropower supply, vegetation and wildlife, recreation, land use and growth inducement, aesthetics, cultural resources, and soils and geology. Impacts specific to groundwater listed below, were determined to be less than significant with no required mitigation measures.

WFA EIR Less Than Significant Impacts

- Groundwater Quality (Impact 6.2-1)
- Movement of Groundwater Contaminants (Impact 6.2-2)
- Land Subsidence (Impact 6.2-3)
- Reduced Efficiency of Wells (Impact 6.2-4)

5.4 Conclusion

Ultimately, the objectives of the BMO's, components in the WPCGMP, and mitigation measures identified in the WFA EIR, are designed to sufficiently provide a sustainable, long-term, source of water supply in the project area and surrounding region. Currently, no reasonably foreseeable projects in the groundwater basin, similar to the proposed ASR program are known. However, such projects would be implemented consistent with the WPCGMP with regional coordination called for under this plan which would ensure that cumulative impacts of the ASR Program would be less than cumulatively considerable.

CHAPTER 6.0
Alternatives Analysis

6.1 Introduction

The purpose of this chapter is to identify and describe project alternatives which could reduce or eliminate one or more of the potentially significant adverse impacts associated with the proposed project while still meeting most of the basic project objectives.

6.1.1 California Environmental Quality Act Requirements

An EIR must evaluate a reasonable range of alternatives to the proposed project that could reasonably attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project (CEQA Guidelines §15126.6). The EIR must also evaluate the comparative merits of the alternatives to the proposed project (CEQA Guidelines §15126.6(a)). An EIR need not evaluate the environmental effects of alternatives to the same level of detail as the proposed project, but must include enough information to allow meaningful evaluation, analysis, and comparison with the proposed project (CEQA Guidelines §15126.6(d)).

6.2 Alternatives Analyzed

The requirement that an EIR evaluate alternatives to the proposed project, or alternative locations for the proposed project, is broad; the primary intent of the alternatives analysis is to disclose other ways that the objectives of the proposed project could be met while reducing the magnitude of, or avoiding, any of the environmental impacts of the proposed project.

Alternatives that are included and evaluated in the EIR must be feasible alternatives. However, not all possible alternatives need to be analyzed. An EIR must "set forth only those alternatives necessary to permit a reasoned choice." The CEQA Guidelines provide a definition for a "range of reasonable alternatives" and, thus, limit the number and type of alternatives that need to be evaluated in an EIR. According to the CEQA Guidelines (§15126.6(b)):

> *"The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the lead agency determines could feasibly attain most of the basic objectives of the proposed project."*

Alternatives in an EIR must be potentially feasible. In the context of CEQA, "feasible" is defined as:

> *"...capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social and technological factors." (CEQA Guidelines §15364)*

The inclusion of an alternative in an EIR is not evidence that it is feasible as a matter of law, but rather reflects the judgment of lead agency staff that the alternative is *potentially* feasible. The final determination of feasibility will be made by the Roseville City Council as the lead agency (decision-making body) with the adoption of CEQA Findings at the time action is taken on the project. *(Mira Mar Mobile Community v. City of Oceanside (2004)* 119 Cal. App. 4th 477, 489, see also CEQA Guidelines §15091(a)(3) findings requirement, where alternatives can be rejected as infeasible); §15126 ([an EIR]) must consider a range of potentially feasible alternatives that will foster informed decision making and public participation"). The following factors may be taken into consideration in the assessment of the feasibility of alternatives: site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries, and the ability of the project proponent to attain site control (§15126(f)(1)). Lastly, an EIR is not required to analyze alternatives when the effects of the alternative "cannot be reasonably ascertained and whose implementation is remote and speculative (§15126.b(f)(3)).

The selection of alternatives in this EIR take into account the project objectives stated in Chapter 2, Project Description. The ASR Project objectives are to:

- Maximize the City's ability to fully utilize its surface water entitlements while improving the City's overall water supply reliability, operational flexibility, and use of existing City infrastructure.
- Manage the groundwater aquifer for its storage capabilities, particularly in light of the regulatory restrictions associated with surface storage, and as a sustainable resource to ensure groundwater availability in times of drought.
- Develop a cost-effective means for water supply storage. Meet regional conjunctive use program goals as outlined in the City's General Plan, Water Forum Purveyor Specific Agreement, Western Placer County Groundwater Management Plan and Integrated Regional Water Management Plan.
- Ensure no net impact to aquifer from potential use during dry and drier years.
- Obtain approval for ASR operations from Regional Water Quality Control Board.

Equally important to attaining the project objectives is the reduction of some or all significant impacts, particularly those that could not be mitigated to a less-than-significant level. The project-specific, and cumulative significant and unavoidable impacts of the proposed project after mitigation are:

- 4.3-1: Potentially significant Noise Impacts at Nearest Residences due to Drilling Noise Levels (During Construction only)
- 5.2.3: Potential to Induce Substantial Population Growth

The analysis also addresses the following adverse but less-than-significant impact:

- 4.2-2: Secondary MCLs

These impacts are discussed in detail in Chapters 4 and 5 of this EIR.

6.3 Alternatives Considered and Dismissed from Further Consideration

Consistent with CEQA, primary consideration was given to alternatives that would reduce significant impacts while still meeting most of the project objectives. The following alternatives were considered but rejected from further analysis: Procurement of Additional Surface Water, Relocation of Proposed Well Sites, and Separate Pipelines. Each of these alternatives is described in more detail below:

6.3.1 Procure Additional Surface Water Alternative

Under the *Procure Additional Surface Water Alternative*, the City would minimize groundwater as a supplemental source of water supply, and would prioritize and direct resources toward procurement of additional surface water over construction of groundwater wells. Available surface water supplies would not be injected year-around into existing and planned groundwater wells. The City's ability to meet water demands under conditions such as short supply due to drought conditions or peak demand times would be subject to the cost and availability of additional surface water supply.

Consistency with Project Objectives and Feasibility Considerations

The Procure Additional Surface Water Alternative meets the project objective of improving the City's water supply reliability only to the extent that surface water is available to purchase, and at a feasible cost. Under this alternative, surface water supply would be used to the maximum extent possible before utilizing groundwater resources. However, without the ASR Program, in the event groundwater is required to meet water demand, it would not be supplemented with stored, injected surface water. Rather, pure groundwater would be extracted as needed to meet water demand. This alternative is not consistent with the City's General Plan policy or regional conjunctive use program goals, both of which specifically support the use of ASR. It is also inconsistent with ASR Program objectives to manage the groundwater aquifer for its storage capabilities and as a sustainable resource to ensure groundwater availability in times of drought.

Because the EIR need only examine alternatives that could feasibly attain most of the project objectives, the Procure Additional Surface Water Alternative does not meet the criteria to warrant further consideration.

6.3.2 Well Site Relocation Alternative

The Well Site Relocation Alternative would involve relocating planned but yet unconstructed ASR wells that would otherwise result in temporary significant but unavoidable construction noise impacts.

As discussed in Section 4.3, significant unavoidable noise impacts were identified for the Woodcreek West, Del Webb Hayden Parkway and HP wells due to nearby noise sensitive land uses and nighttime noise generated by 24-hour drilling operations required to prevent collapse of the bore hole during well construction. Mitigation Measure 4.3-1 Use of Sound Attenuation During Well Drilling Operations can be employed to reduce drilling construction noise by approximately 17 dB. However, due to the proximity of nearby residences, even with implementation of Mitigation Measure 4.3-1, nighttime construction noise would exceed Noise Ordinance standards and consequently the impact would remain significant.

Relocation of undrilled wells to increase distance from noise sensitive land uses was considered as an alternative to further mitigate well drilling construction noise. To effectively reduce well drilling noise to less than significant, alternative sites would need to provide a separation of approximately 600 feet from sensitive noise receptors. Sites would also have to be located within reasonable distance from water distribution infrastructure and at locations strategic for effective ASR operations. Implementation of this alternative would require new pipelines to connect the alternative well sites with existing water distribution infrastructure.

Ability to Meet Project Objectives and Feasibility Considerations

The Well Site Relocation Alternative is similar in concept to the proposed project as it would continue to utilize available and/or surplus surface water from Folsom Lake, and store it underground to extract later when needed. This alternative also meets the additional water supply reliability objective as well as regional water planning and conjunctive use goals. Relocation of planned ASR well sites would reduce the ability to maximize use of existing infrastructure, which would increase construction costs and long term maintenance needs.

With the exception of some wells and top side improvements, the basic infrastructure necessary to begin limited ASR operations is in place. The well sites that remain to be constructed are strategically located to maximize ASR operations and use of existing infrastructure. Because the Well Relocation Alternative would represent a departure from planned ASR facilities and necessitate construction of additional connecting pipelines, full scale ASR operation could be delayed under this alternative reducing opportunity for enhanced groundwater reliability/banking. The additional connecting pipelines would also add to overall project costs and be inconsistent with the project objective to maximize use of existing available infrastructure.

6.3.3 Separate Pipelines Alternative

The Separate Pipelines Alternative would involve conveying filtered but not yet disinfected surface water directly from the Barton Road Water Treatment Plant via a different pipeline system to the ASR wells for injection. Since disinfection residual is required by Surface Water Treatment Rule, this pipeline system would not be used as a drinking water transmission line and would not be connected to the City's existing distribution system. Although the City's treated surface water complies with maximum contaminant level criteria for disinfection byproducts and fluoride, taking filtered water directly from the water treatment plant for injection to the ASR wells would eliminate these constituents from entering the groundwater aquifer. The main transmission pipeline would be approximately 12 inches in size and would follow the existing water transmission lines, where applicable, or be in the existing right of way, to avoid additional cost of land and easement procurement. The pipeline would extend from the WTP in Granite Bay to the City via Barton Road to Roseville Parkway to Washington Boulevard and then to Blue Oaks Boulevard. From Blue Oaks Boulevard, the main water line would split into smaller 6-inch diameter pipes to convey the water to different ASR wells for injection.

The cost to install a 6-inch pipeline is about $60 per foot while installing a 12-inch pipeline is $120 per foot. The pipeline routing described above would require a 12-inch water line from Barton Road WTP to Blue Oaks Boulevard, approximately 11 miles and several 6-inch water lines from Blue Oaks Boulevard to the ASR wells for injection. The total cost to construct the separate pipeline system would be about $15 to $20 million dollars. Pipeline maintenance would require ongoing expenses.

Without disinfection prior to injection, bacteria, viruses, protozoa, and other potential harmful organisms would re-grow in the conveying pipelines systems and possibly the groundwater aquifer, causing bio-fouling. Since the groundwater aquifer is a source of water supply for the greater Sacramento and Placer county region, the California Department of Public Health would not permit injection of filtered but not disinfected, surface water into this water supply.

There are relatively few infrastructure improvements required to begin implementation of the ASR Program. The basic necessary infrastructure is currently in place, including a treatment and distribution system that allows transmission of surface water from the supply source at Folsom Lake to existing and planned ASR Wells. Construction of a separate injection pipeline system to take filtered water for injection to the ASR well sites would considerably increase the start-up costs.

Injecting partially treated surface water into the groundwater would potentially contaminate portions of the aquifer with surface water contaminants and, therefore, would not be allowed by CDPH. Consequently, this alternative could not feasibly attain most of the project objectives, and does not meet the criteria to warrant further consideration.

6.4 Alternatives Considered In this EIR

Four alternatives to the proposed project are evaluated in this EIR. As stated above, the purpose of the alternatives analysis is to lessen or avoid significant environmental effects that have been identified in the EIR.

- Alternative 1: No Project Alternative
- Alternative 2: Upgrade Water Treatment Plant to Ultraviolet (UV) and Ozone with a Separate Water Main
- Alternative 3: Surface Storage Alternative
- Alternative 4: Onsite Groundwater Treatment at ASR Wells

Each of the alternatives is described in more detail below, followed by an assessment of the alternative's impacts relative to the proposed project. The focus of the analysis is the difference between the alternatives and the proposed project, with an emphasis on significant impacts. For each topical area, the analysis indicates which mitigation measures would not be required of the alternative, and whether or not significant and unavoidable impacts would be avoided. In some cases, the analysis identifies what additional mitigation measures, if any, would be needed under the alternative, and what significant and unavoidable impacts would be more severe. Unless otherwise indicated, the level of significance and required mitigation would be the same for the alternative as for the proposed project, and no further statement of the level of significance is made.

Table 6-1 provides a summary comparison of the severity of impacts for each alternative by topic.

TABLE 6-1. ALTERNATIVES COMPARISON

Level of Impact of Alternatives Compared to Proposed Project					
		Alternative 1	Alternative 2	Alternative 3	Alternative 4
Environmental Resource	Proposed Project	No Project	WTP Upgrade	Surface Storage	Onsite Well Head Treatment
Meets Project Objectives	Yes	No	Yes	Partially	Yes
Consistency with Plans and Policies	Yes	No	Partially	No	Partially
Groundwater Quality and Hydrology	Less than Significant	Similar impact	Reduced impact	Greater Impact	Similar impact
Surface Water Quality and Hydrology	Less than Significant	Similar impact	Similar impact	Greater impact	Similar Impact
Biological Resources	Less than Significant	Similar impact	Similar impact	Greater impact	Greater impact
Geology, Soils and Seismicity	Less than Significant	Similar impact	Similar impact	Similar impact	Similar impact
Air Quality	Less than Significant	Similar impact	Greater impact	Greater Impact	Greater impact
Climate Change	Less than Significant	Greater impact	Similar impact	Greater Impact	Greater impact
Hazardous Materials/Hazards	Less than Significant	Similar impact	Similar impact	Greater impact	Similar impact
Transportation/ Circulation	Less than Significant	Similar impact	Similar impact	Greater impact	Similar impact
Noise	Significant and Unavoidable	Similar impact	Similar impact	Greater Impact	Greater impact
Public Services and Utilities	Less than Significant	Similar impact	Greater impact	Greater impact	Greater impact
Cultural Resources	Less than Significant	Similar impact	Similar impact	Greater impact	Similar impact
Land Use	Less than Significant	Similar impact	Similar impact	Greater Impact	Greater impact
Visual/Aesthetic Resources	Less than Significant	Similar impact	Similar impact	Greater Impact	Greater Impact
Population, Employment, Housing	Less than Significant	Similar impact	Similar impact	Similar Impact	Similar impact
Growth Inducing	Significant & Unavoidable	Lesser Impact	Similar Impact	Similar Impact	Similar Impact

6.4.1 Alternative 1: No Project Alternative

Under CEQA, the No Project Alternative must consider the effects of foregoing the project. The purpose of analyzing the No Project Alternative is to allow decision makers to compare the impacts of the proposed project versus the environmental conditions that would reasonably be expected to occur in the foreseeable future if the project were not approved based on current plans, available infrastructure and community services. The No Project Alternative describes the environmental conditions that exist at the time the environmental analysis is commenced (CEQA Guidelines §15126.6(e)(2)).

Under the No Project Alternative, the City would not implement General Plan policy directing the City to pursue ASR. Groundwater wells would be constructed, but would not be designed for ASR capability. Available surface water supplies would not be injected year-around into existing and planned groundwater wells. Absent underground surface water storage, under the No Project Alternative, during conditions when treatment facilities operate at near capacity or when water is in short supply due to drought conditions, water demand would be met with pure groundwater, recycled water, conservation measures, and/or imported water.

Ability to Meet Project Objectives and Feasibility Considerations

Implementation of the No Project Alternative would not provide the benefits of enhanced water supply reliability for City customers. Unlike the proposed project, during dry years the No Project Alternative would not offer stored surface water as a supplemental source of water supply. Under the No Project Alternative, water demand during dry years or peak demand times would be met using existing sources, including groundwater. Therefore, the No Project Alternative would possibly decrease groundwater resources due to the need to use groundwater as a source of water supply during drought periods when the City's surface water contract is reduced by the USBR, or when distribution system needs are met. Implementation of the No Project Alternative would not meet the stated project objective to enhance the City's water supply reliability.

Environmental Impacts

Land Use and Agricultural Resources

The No Project Alternative would involve the same number and location of wells as the proposed project, although under the No Project Alternative, newly constructed wells would not be designed for ASR operations, but for groundwater extraction only. Because the number and location of wells would be identical to the proposed project, potential land use impacts would be similar to the proposed project.

Population, Employment and Housing

Growth Inducing Impacts – A project that removes obstacles to growth is generally considered to be growth inducing. Although not specifically intended to accommodate growth, the proposed project would supplement the City's water supply portfolio and improve water supply reliability, circumstances which could be considered to be growth-inducing. Conversely, the No Project Alternative would not increase water supply reliability and therefore would avoid conditions that could be considered potential growth-inducing impacts.

Consistency with Adopted City Policies

The Public Facilities Element of the General Plan includes a policy directing the City to "Develop and implement an aquifer storage and recovery program." Therefore, unlike the proposed project, the No Project Alternative would be inconsistent with General Plan policy.

Transportation and Circulation

The No Project Alternative would involve the same number and location of wells as the proposed project, although under the No Project Alternative, newly constructed wells would not be designed for ASR operations. Because the number and location of wells would be identical to the proposed project, potential transportation/circulation impacts would be similar to the proposed project.

Air Quality

Construction Emissions – The No Project Alternative would involve the same number and location of wells as the proposed project, therefore the same level of construction activity. With application of mitigation measures identified as part of the proposed project, such as minimizing idling time of diesel equipment and dust control measures, air quality impacts would be similar to the proposed project.

Operational Emissions – Operational emissions under the No Project Alternative would generally be equivalent to the proposed project as groundwater wells would still require operational monitoring and maintenance.

Climate Change – Water treatment and conveyance constitutes a significant portion of carbon emissions at the local and state level. Under the No Project Alternative, climate change impacts in terms of generating carbon emissions would be similar to the proposed project because construction activity and electricity demand for well operation would still occur.

Relative to adaptation to the potential impacts of climate change (such as increased chance of drought due to decreasing snowpack levels) the No Project Alternative would not meet the water conservation objective of the proposed project. Specifically, the No Project Alternative would not meet the project objective to manage the groundwater aquifer for its storage capabilities and manage groundwater as a sustainable resource. Further, the No Project Alternative increases the potential for depletion of groundwater supplies, as the aquifer would not be augmented with stored surface water. The proposed project would provide an element of adaptation to the potential effects of climate change by providing an additional source of available water supply in the event of drought. The No Project Alternative would not provide that benefit and therefore has comparatively greater adverse impacts in terms of climate change adaptation.

Noise

The No Project Alternative would involve the same number and location of wells as the proposed project, although under the No Project Alternative, newly constructed wells would not be designed for ASR operations. Like the proposed project, potential noise impacts would be potentially significant and unavoidable because the number and location of wells would be identical to the proposed project.

Construction Noise – As with the proposed project, mitigation measures would be implemented, however due to the need for continual drilling during well construction, the possibility of significant, but temporary, noise impacts would remain potentially significant.

Operational Noise – As with the proposed project, under the No Project Alternative, long-term operation of proposed wells and pump stations would comply with the City's Noise Ordinance, either because pump stations would be soundproofed to meet City standards, or by locating well sites to adequately distance pump stations from sensitive receptors.

Biological Resources

The No Project Alternative would involve the same number and location of wells as the proposed project. Like the proposed project, well construction under the No Project Alternative would require implementation of mitigation measures, in addition to state and federal regulatory agency permit processes as required. Consequently, biological resource impacts would be similar to the proposed project.

Cultural and Paleontological Resources

The No Project Alternative would involve the same number and location of wells as the proposed project and would require implementation of existing ordinances and construction standards, and mitigation measures. Potential impacts to cultural resources would be similar to the proposed project.

Geology, Soils and Seismicity

The No Project Alternative would involve the same number and location of wells as the proposed project. Like the proposed project, the nature of soil and geologic conditions would be a determining factor in siting well locations. Well drilling and construction would also require implementation of existing ordinances and construction standards, and applicable mitigation measures. Therefore, potential impacts with geology and soils would be similar to the Proposed Project.

Hazardous Materials and Public Safety

Construction – The No Project Alternative would involve the same number and location of wells as the proposed project, although under the No Project Alternative, newly constructed wells would not be designed for ASR operations. Well construction under the No Project Alternative would require equivalent equipment, vehicles, and fuel. Therefore, potential impacts associated with hazardous materials and public safety would be similar to the proposed project.

Operational – The No Project Alternative would involve the same number and location of wells as the proposed project, although under the No Project Alternative, newly constructed wells would not be designed for ASR operations. Like the proposed project, well operations under the No Project Alternative would require use of minor amounts of water treatment chemicals, however, as at all well sites, routine operational procedures would be in place, and would minimize health and safety risks. Like the proposed project, potential impacts associated with hazardous material and public safety would be similar to the proposed project.

Public Services

Like the proposed project, there is no component or feature of the No Project Alternative that would generate a demand for new or expanded public services. No mitigation measures would be required as there would be no impact to public services.

Public Utilities

The No Project Alternative would be comprised of the same existing and proposed wells as described in the proposed project, with the exception that, operationally, the wells would be limited to extraction only. Impacts of well operation and maintenance would be generally similar to the proposed project.

Hydrology and Water Quality

Groundwater Aquifer – Under the No Project Alternative, surplus surface water supplies would not be injected year-round into the groundwater aquifer. The No Project Alternative would increase the potential for depletion of groundwater because the City would not have the capability to augment the groundwater supply with surplus surface water. During drought conditions, only naturally occurring groundwater supplies would be available for extraction to meet demand, potentially lowering the groundwater levels. This would increase the uncertainty of available groundwater supplies compared to the Proposed Project.

Water Quality – The No Project Alternative would eliminate the opportunity for aquifer blending of surface and groundwater to improve the aesthetic characteristics of ASR extracted water. Blending would still be possible but would be limited to above-ground options (i.e., blending in tanks or at other available locations within the distribution system). Absent the ability to blend, consumer complaints regarding groundwater's aesthetic qualities would be expected during times when groundwater is needed to supplement surface and recycled water supplies.

Aesthetics and Visual Resources

The No Project Alternative would involve the same number and location of wells as the proposed project, although under the No Project Alternative, newly constructed wells would not be designed for ASR operations. As with the proposed project, well construction under the No Project Alternative would require implementation of existing ordinances and construction standards, and mitigation measures. Aesthetic and visual resource impacts would be equivalent to the proposed project.

Conclusions

In most cases, the impacts of the No Project Alternative would be the same as the proposed project. No impacts identified as potentially significant under the proposed project would be reduced or avoided under the No Project Alternative.

The proposed project would be environmentally superior because the No Project Alternative eliminates the potential for conjunctive use and increases the potential for groundwater depletion during times of drought or heavy demand.

The No Project Alternative would not meet the project objectives for increased water supply reliability, regional conjunctive use goals, or management of the groundwater aquifer for its storage capabilities and as a sustainable resource.

Mitigation That Would No Longer Be Required

Because the City would continue to construct new wells, the No Project Alternative would not reduce or eliminate the need for implementation of Mitigation Measure 4.3-1: Use of Sound Attenuation During Well Drilling Operations. Similarly, proposed project, air quality, cultural resource, and biological resources environmental commitments and mitigation measures would apply to new well construction under the No Project Alternative as with the Proposed Project. While these mitigation measures would still be needed, under the No Project Alternative there would be no increased groundwater reliability or opportunity for aquifer blending to improve groundwater's aesthetic qualities.

Significant and Unavoidable Impacts that Would No Longer Occur

None. Because the City would continue to construct new wells, the No Project Alternative would not eliminate significant unavoidable short term construction noise impacts at the proposed Woodcreek West, Del Webb, and HP well sites. This impact would be equivalent to the proposed project.

6.4.2 Alternative 2: Upgrade Water Treatment Plant to Ultraviolet (UV) and Ozone with a Separate Water Main

The purpose of this Alternative is to address the DBP's and fluoride that are contained in treated drinking water and do not naturally occur in the groundwater aquifer. It should be noted that under the Proposed Project, source water would meet the primary drinking water standards for injection, although it would introduce these constituents into the groundwater aquifer. Therefore the objective of this Alternative is to eliminate these constituents from the injection source supply.

Technologies to control disinfection byproducts (DBPs) include alternative disinfection products/technologies, or removing DBP precursors, total organic carbons (TOCs). Typically, the TOC levels in the City's WTP raw water is low, ranging between 1.0 milligrams per liter (mg/L) – 1.5 mg/L, and treated water is less than 1.0 mg/L. Because the reduction of TOC in the treated water is minimal compared to the influent TOC concentrations, it is not an effective treatment process and the incremental cost would be difficult to justify considering the minimal difference in TOC levels. Because of TOCs present in the raw water, other disinfectants such as chloramines and chlorine dioxides would still produce DBPs, with potentially greater adverse health effects. The majority of the DBPs in treated water are formed when chlorine is added for disinfection. Other disinfectants, such as UV and ozone, can be used without the creation of DBPs. However, UV and ozone do not carry disinfection residuals as required by federal and state surface water treatment rules. Therefore, water treated with UV and ozone may be suitable for injection, but would require a separate pipeline to convey the water directly from the water treatment plant to the well injection sites.

This alternative would consist of the addition of UV reactors or ozone injectors as a separate disinfection train to the water treatment plant. The existing chlorine disinfection would be used to provide water through the existing distribution system for potable consumption, while UV/ozone treated water would be used for injection water only. Similar to the existing water treatment process, raw water from Folsom Lake would undergo coagulation, flocculation, sedimentation, and filtration unit process prior to reaching the disinfection process. Filtered water would be split for disinfection treatment with UV or ozone and then pumped into a separate pipeline system for delivery to the ASR well sites. This process would minimize the creation of THMs, which are a DBP.

Environmental Impacts

Land Use and Agricultural Resources

The WTP Upgrade with a Separate Pipeline Alternative would involve the same number and location of wells as the proposed project, and additional infrastructure to treat and convey the injection water to the well sites for aquifer storage and recovery. The additional pipeline system would be constructed primarily within existing roadway right-of-way, but could increase the potential for land use impacts compared to the proposed project.

Population, Employment and Housing

Growth Inducing Impacts – The WTP Upgrade with a Separate Pipeline Alternative would be similar to the proposed project in that stored water would have the potential to increase water supply reliability, circumstances that could be considered as potentially growth inducing impacts. This alternative would therefore not avoid the potentially significant growth-inducing impacts of the proposed project.

Consistency with Adopted City Policies

The Public Facilities Element of the General Plan includes a policy directing the City to "Develop and implement an aquifer storage and recovery program." Like the proposed project, the WTP Upgrade with a Separate Pipeline Alternative would still entail modified water treatment with ASR, and would be consistent with General Plan policy.

Transportation and Circulation

Under this Alternative, the number and location of wells would be identical to the proposed project, but under this alternative, the potential for transportation/circulation impacts would be slightly increased due to the need for construction of additional treatment facilities and pipelines within roadways.

Air Quality

Construction Emissions – The WTP Upgrade Alternative would require increased construction activity compared to the proposed project. Although construction would be conducted using air quality mitigation measures identified as part of the proposed project, such as minimizing idling time of diesel equipment and dust control measures, the increased activity compared to the proposed project would increase the potential for significant air quality impacts compared to the proposed project.

Operational Emissions – Compared to the proposed project, construction emissions under the WTP Upgrade Alternative would be greater as the alternative includes construction of additional treatment facilities at the water treatment plant, and installation of a pipeline system. Operational emissions would increase due to additional water treatment processing, but would otherwise generally equivalent to the proposed project, as groundwater wells would require equivalent operational monitoring and maintenance. Primarily, it would be expected that operational air quality impacts would increase relative to the proposed project.

Climate Change

Water treatment and conveyance constitutes a significant portion of carbon emissions at the local and state level. Under the WTP Upgrade Alternative, climate change impacts in terms of generating carbon emissions would be similar to the proposed project because construction activity, and electricity demand for well operation, would still occur.

Relative to adaptation to the potential impacts of climate change, such as increased chance of drought due to decreasing snowpack levels, the WTP Upgrade Alternative would be similar to the proposed project, as it would manage the groundwater aquifer for its storage capabilities and utilize groundwater as a sustainable resource.

Noise

The WTP Upgrade Alternative would involve the same number and location of wells as the proposed project. Potential noise impacts would essentially be equivalent because the number and location of wells would be identical to the proposed project.

Construction Noise – Compared to the proposed project, the WTP Upgrade Alternative would require additional construction and associated noise. Also, as with the proposed project, mitigation measures would be implemented. However, due to the need for continual drilling during well construction, the possibility for significant noise impacts under this alternative, like the proposed project, would be similarly significant and unavoidable.

Operational Noise – As with the proposed project, under the WTP Upgrade Alternative, long-term operation of proposed wells and pump stations would comply with the City's Noise Ordinance, either because pump stations would be soundproofed to meet City standards, or by locating well sites to adequately distance pump stations from sensitive receptors. Noise impacts would be similar to the proposed project.

Biological Resources

The WTP Upgrade with a Separate Pipeline Alternative would involve the construction of new treatment facilities at the water treatment plant, and a separate pipeline system under existing roads. Because the additional infrastructure would be constructed in the existing water treatment plant or within existing right-of-way, it is anticipated that the potential for impacts to biological resources would be less than significant.

This alternative would also require the same number and location of wells as the proposed project. Like the proposed project, well construction under the WTP Upgrade with a Separate Pipeline Alternative would require implementation of mitigation measures, in addition to state and federal regulatory agency permit processes as required. Consequently, biological resource impacts would be similar to the proposed project.

Cultural and Paleontological Resources

The WTP Upgrade with a Separate Pipeline Alternative would involve the same number and location of wells as the proposed project, in addition to the added facilities at the WTP and pipeline installation. Like the proposed project, construction under the WTP Upgrade Alternative would require implementation of existing ordinances and construction standards, and mitigation measures to protect and prevent impacts to cultural and paleontological resources. Therefore, the potential for impacts to cultural resources would be similar to the proposed project.

Geology, Soils and Seismicity

The WTP Upgrade and Pipeline Alternative would involve the same number and location of wells as the proposed project. Like the proposed project, the nature of soil and geologic conditions would be a determining factor in siting well locations. Well drilling and construction, and pipeline installation, would require implementation of existing ordinances and construction standards, and applicable mitigation measures. Potential impacts with geology and soils would be similar to the proposed project.

Hazardous Materials and Public Safety

Construction – The WTP Upgrade with a Separate Pipeline Alternative would involve expanding the water treatment plant to include an additional separate disinfection treatment train after the water has been filtered and construction of a dedicated pipeline for transporting the water into the wells. Construction of the additional facilities would require a significant amount of equipment, vehicles, and fuel beyond what would be required for the proposed project. As with the proposed project, any potentially hazardous material would be stored and used in compliance with existing construction and industry standards.

The WTP Upgrade and Separate Pipeline Alternative would require considerably more construction and infrastructure than the proposed project. Like the proposed project, construction and storage of potentially hazardous material would be conducted in compliance with all applicable regulatory standards, and the potential for hazard and safety impacts would be similar.

Operational – The WTP Upgrade with a Separate Pipeline Alternative would involve additional effort in the existing operation of the water treatment plant for maintenance of the UV/ozone equipment. ASR well operations would be the same as the proposed project.

Compared to the proposed project, well operations under the WTP Upgrade Alternative would require use of minor amounts of water treatment chemicals, however, as at all well sites, routine operational procedures would be in place, and would minimize health and safety risks. Potential impacts associated with hazardous material and public safety would be similar to the proposed project.

Public Services

Like the proposed project, there is no component or feature of the WTP Upgrade with a Separate Pipeline Alternative that would generate a demand for new or expanded public services. Like the proposed project, this alternative would not generate additional demands for public services.

Public Utilities

Because of the process and infrastructure required, the WTP Upgrade with a Separate Pipeline Alternative would increase resource utilization on the water utility operations. The additional disinfection treatment train and the new separate pipeline would require new equipment and facilities. In addition to the $15 million to $20 million cost of a separate pipeline, the costs associated with the new facilities would include equipment upgrades, maintenance, additional chemical procurement (for ozone), and increased operational costs, for power, and staff hours. Compared to the proposed project, this alternative would have a greater impact on cost for services and demand for services, required by the water utility.

Hydrology and Water Quality

The WTP Upgrade with a Separate Pipeline Alternative would eliminate the injection of fluoride and DBPs into the groundwater aquifer system. With a separate disinfection train and a pipeline system, filtered water could be disinfected without the use of chlorine and fluoride injection could be bypassed via the separate pipeline. This alternative would provide injection water capable of meeting both federal and state Surface Water Treatment requirements for treating surface water to drinking water standards. The separate pipeline would also prevent introduction of added fluoride and DBPs into the groundwater aquifer when the treated surface water is injected. This alternative would therefore reduce the already less than significant impact to groundwater quality compared to the proposed project.

Aesthetics and Visual Resources

The WTP Upgrade Alternative would involve the same number and location of wells as the proposed project. As with the proposed project, well construction under the WTP Upgrade Alternative would require implementation of existing ordinances and construction standards, and mitigation measures. Aesthetic/visual resource impacts would be similar to the proposed project.

Conclusions

In most cases, the impacts of the WTP Upgrade with a Separate Pipeline Alternative would be the same as the proposed project. No impacts identified as potentially significant under the proposed project would be reduced or avoided under the WTP Upgrade.

The proposed project would be environmentally superior because the WTP Upgrade with a Separate Pipeline Alternative would require construction of a separate pipeline system to deliver water to the well sites, with the associated construction impacts and cost. The separate pipeline would also prevent introduction of added fluoride and DBPs into the groundwater aquifer when the treated surface water is injected. While the proposed project meets the primary standards for maximum contaminant levels; this alternative would further reduce the already less than significant potential impacts to groundwater quality.

Mitigation That Would No Longer Be Required

Because the City would continue to construct new wells, the WTP Upgrade with a Separate Pipeline Alternative would not eliminate significant unavoidable short-term construction noise impacts associated with well drilling, or eliminate the need for implementation of Mitigation Measure 4.3-1: Use of Sound Attenuation During Well Drilling Operations. Similarly, proposed air quality, cultural resource, biological resources, environmental commitments and mitigation measures would continue to apply to new well construction under the WTP Upgrade Alternative.

Significant and Unavoidable Impacts that Would No Longer Occur

None, as this alternative would still generate noise from well drilling and has the potential for growth-inducing impacts due to the enhanced storage capacity.

6.4.3 Alternative 3: Surface Storage Alternative

A surface water storage alternative would entail construction of a water basin or reservoir of adequate size to store excess raw water from the City's entitled surface water allocation. The existing and proposed ASR wells would accommodate approximately 13,786 acre-feet of injected water for a single year. This excess water is based on 20 percent current water demand reduction due to conservation as well as unused water before buildout. A basin or reservoir for surface storage of this amount of water would require an area of approximately 3,500 acres, which, in order to preclude the need for a structural dam, would not exceed a depth of 4 feet. Based on future water demand and water conservation, a consecutive four years of over 12,500 acre-feet per year of water would be available for injection. A surface storage to capture this water that has been allocated, but not utilized, would be around 20 to 25 square miles, the entire area of the City.

This alternative would require availability of a suitable site and procuring land to accommodate the storage basin as well as design and construction of infrastructure to convey and treat the water at the City's Barton Road WTP. Ideally the storage basin would be located near the City to minimize transmission infrastructure needs and related costs. It is assumed for the purpose of this analysis that the basin would be located in a rural area most likely on agricultural land with limited improvements. On an ongoing basis, the storage basin would be regulated by the State, and would require compliance with water quality regulatory permitting requirements applicable to surface water storage.

Ability to Meet Project Objectives and Feasibility Considerations

The Surface Storage Alternative would meet the objective of providing additional storage to maximize the City's ability to fully utilize its surface water entitlements thereby improving the City's overall water supply reliability. However this alternative would not meet the objectives to maximize use of existing City infrastructure or manage the groundwater aquifer for its storage capabilities and as a sustainable resource. It also would not meet regional conjunctive use program goals as outlined in the City's General Plan, Water Forum Purveyor Specific Agreement, Western Placer County Groundwater Management Plan and Integrated Regional Water Management Plan.

There are relatively few infrastructure improvements required to begin implementation of the ASR Program. The basic necessary infrastructure is in place today including a treatment and distribution system that allows transmission of surface water from the supply source at Folsom Lake to existing and planned ASR Wells with injecting capability. Consequently the start-up cost under the proposed ASR program is nominal. Comparatively, the start-up cost for the surface storage alternative would be significantly higher, as costs would include the purchase, design and construction of the storage basin as well as transmission and treatment infrastructure to connect the surface storage basin or reservoir with the City's existing supply source and distribution system. As there is not an identified site for this alternative, projected costs can only be conceptual estimates. For comparative purposes, for land acquisition alone, in 2004 the City paid $11,190,000 to purchase 1,767 acres of rural agricultural land for stormwater retention. Other costs would include infrastructure, ongoing operational, maintenance and regulatory compliance costs would be required to manage a surface water impoundment. Due to the high cost, this alternative would likely result in significant rate impacts, and the feasibility of this alternative is questionable.

Environmental Impacts

Land Use and Agricultural Resources

Within the City, there is limited availability of 3,500 acres of contiguous, undeveloped acres properly zoned for water storage. Figure 6-2 identifies the relative size of the area required for this alternative, and the amount of acreage owned by the City. Implementation of the Surface Storage Alternative would require property acquisition, and converting zoning and land use to accommodate water storage. Given the land area required to implement this Alternative, it would significantly increase the potential for land use-related impacts, such as conversion of agricultural or other land uses, for water storage.

Population, Employment and Housing

Growth Inducing Impacts. A project that removes an obstacle to growth is generally considered to be growth-inducing. Proposed project objectives are to: manage existing water supply resources and improve water supply reliability, rather than to simply add volume to the water supply. Like the proposed project, under this alternative, stored surface water would not be a primary source of water supply, but rather to bolster reliability and a back-up source to be used when necessary to meet peak demand or during drought conditions. Nevertheless, an argument can be made that improved reliability removes an obstacle to growth, causing a significant growth-inducing impact. Consequently, impacts would be similar to the proposed project.

Consistency with Adopted City Policies

General Plan policy is to increase water supply reliability specifically through ASR. The Surface Storage Alternative would not be consistent with General Plan policy in terms of utilizing ASR for water storage and extraction.

Transportation and Circulation

The Surface Storage Alternative would require extensive earth-moving, with corresponding construction-related traffic. Also, the alternative would require construction of pipelines to connect to existing water delivery and treatment infrastructure. Pipeline installation within roadway right-of-way could require temporary delays to traffic circulation, but would be conducted using standard procedures for construction within roadways, and no permanent impacts would be expected to occur. Consequently, potential transportation/circulation impacts would result in greater short-term construction impacts compared to the proposed project.

Air Quality

Construction Emissions – Due to the size of the storage reservoir under the Surface Storage Alternative, construction-related air pollution would increase significantly compared to the proposed project. Construction of an adequately sized surface impoundment would require use of heavy equipment for extensive soil grading and importation of construction materials and labor. The duration of constructing surface storage would be longer, compared to the proposed project. Comparatively, construction and furnishing of an ASR well typically takes a little over a year and would generate significantly less construction equipment combustion emissions. Given the amount of earthwork required for the Surface Storage Alternative, construction emissions would be significantly greater than the proposed project.

Climate Change – As stated above, the Surface Storage Alternative would require extensive excavation, grading, and similar earth-moving activity, requiring heavy-duty earth-moving equipment. The duration of the construction period would be extensive due to the scale of the project, and therefore construction emissions would exceed that expected from the proposed project.

Noise

The Surface Storage Alternative would require extensive excavation, grading, and earth-moving activity, requiring heavy-duty equipment operating over a wide area. Depending on the specific location of the surface water storage area, nearby residents or other noise sensitive receptors could experience daily construction noise, the significance of which would depend on the distance between construction activities and receptors. Because the construction period would be much longer than the proposed project, the duration of the noise impacts would also be prolonged compared to the proposed project. Furthermore, the Surface Water Alternative would not eliminate the need for well drilling since there would still be a need to construct planned wells to ensure access to emergency backup groundwater supplies. Therefore this alternative would not eliminate the proposed project's significant unavoidable noise impact resulting from 24-hour well drilling, and could result in additional significant construction noise impacts. Consequently, noise impacts would be greater under this alternative compared to the proposed project.

Biological Resources

The Surface Storage Alternative would require a basin or reservoir of approximately 3,500 undeveloped acres. Within the City, there is limited availability of contiguous, undeveloped acres properly zoned for water storage. Figure 6-2 Surface Storage Alternative identifies the relative size of the area required for this alternative compared to the existing City. Depending on the site-specific location, surface storage could result in significant biological impacts while no such impacts were identified for the proposed project. Biological impacts would be expected from conversion of existing habitats to a surface water storage facility. Because of the required land area, it is likely surface storage would displace a significant amount of grassland with a high probability that some amount of seasonal wetlands, or annual grassland habitat would be impacted. Grasslands provide important foraging, habitat and wetlands, and vernal pools support a variety of invertebrate populations including federally listed branchiopods and endemic flora. Consequently, compared to the proposed project, under this alternative, the potential for biological impacts would be significantly greater.

Cultural and Paleontological Resources

Depending on the site-specific location, surface storage could result in significant impacts to cultural and paleontological resources, while no such impacts were identified for the proposed project. Required measures to prevent such impacts would be employed, in accordance with the City's Construction Standards and Mitigating Policies, which require proper survey and handling of historically significant resources. However, due to the relative area required for the Surface Storage Alternative, the potential for impacts would be greater compared to the proposed project.

Geology, Soils and Seismicity

In addition to the construction and operation of a surface storage basin, the Surface Storage Alternative would involve the same number and location of wells as the proposed project. Like the proposed project, the nature of soil and geologic conditions would be a determining factor in design and construction of a storage area, as well as siting well locations. Well drilling, construction, and pipeline installation would require implementation of existing ordinances and construction standards and applicable mitigation measures. Potential impacts with geology and soils would be similar to the proposed project.

Hazardous Materials and Public Safety

The Surface Water Alternative would not eliminate the need for well drilling since there would still be a need to construct planned wells to ensure access to emergency backup groundwater supplies. These wells would be operated similar to the proposed project requiring standard use of minor amounts of water treatment chemicals, with routine operational procedures in place that minimize health and safety risks. Due to the scope and scale of the surface storage alternative, this alternative could increase the potential for conflict with hazardous materials during basin construction. Consequently, the potential for hazardous material and public safety impacts would be slightly greater under this alternative compared to the proposed project.

Public Services and Utilities

Surface water storage would be subject to water quality permitting by state regulatory agencies. The associated water quality enforcement, monitoring and reporting would require staff oversight beyond that required by the proposed project. The Surface Water Alternative would also incur additional costs to utilities due to the required planning, construction, maintenance, and operation of infrastructure to pump surface water to the City's WTP prior to distribution. Maintenance and monitoring of the surface storage and additional connecting infrastructure would create a greater demand for expanded public utility services compared to the proposed project.

Hydrology and Water Quality

Because no surface water would be injected, the Surface Storage Alternative would not involve potential impacts to groundwater quality. The surface storage area associated with this alternative would aid the underlying shallow groundwater aquifer by slowly recharging the aquifer via infiltration, which would be considered beneficial. However the recharge rate would be far less than what can be accomplished using injection. Under this alternative, municipal wells would still be necessary because groundwater would continue to serve as the City's emergency backup supply. Because the City extracts groundwater from the lower aquifer, which is confined from the upper aquifer, this alternative would not be a true surface/groundwater conjunctive use strategy since infiltration at the surface storage site would not significantly improve the City's groundwater supply reliability. In addition, water stored in a surface facility would require treatment prior to customer delivery.

Aesthetics and Visual Resources

Surface water storage could potentially be considered beneficial in terms of aesthetics. Although specific sites have not been identified, due to the required size, the surface storage alternative would result in a significant change to the current visual landscape. From a CEQA perspective, the visual change could be considered a potentially significant impact. Because no visual impacts were identified for the proposed project, visual impacts would be considered greater under this alternative.

Conclusions

As discussed above, the Surface Storage Alternative would have substantially greater or similar impacts compared to the Proposed Project for most issue areas. The intent of the Surface Storage Alternative is to reduce potential impacts associated with secondary drinking water standards (taste, odor and aesthetics) by minimizing the need to pump and distribute groundwater. However, even with surface water storage, under certain conditions, groundwater would still be pumped to supplement surface water supplies. On these occasions, absent ASR operations, the groundwater would not be blended with surface water. Therefore, the potential for effects of taste, odor, and aesthetics (secondary drinking water standards compliance) would not be entirely resolved by the Surface Storage Alternative.

Acquisition and construction of an adequately sized surface impoundment would be extremely costly and require extensive earth moving activities (e.g., excavation and grading); therefore, the construction period would be much longer than the proposed project, and the duration of construction-related impacts of traffic, noise, and air quality would also be prolonged. Due to the size of the undeveloped area required, the Surface Storage Alternative would also increase the potential for impacts to biological and paleontological/cultural resources. Because of the significant area required for the Surface Storage Alternative, the magnitude of potential impacts to traffic, biological resources, and cultural resources would also be increased compared to the proposed project.

Because this alternative requires significant land area, and construction time, it would result in greater temporary construction air quality and transportation/circulation impacts. The required land area would also result in greater potential impacts to biological and cultural resources.

The acquisition of surface storage area and associated infrastructure, and treatment needs would also add to overall project costs and be inconsistent with the project objective to maximize use of existing available infrastructure.

Mitigation That Would No Longer Be Required

The Surface Water Storage Alternative would not eliminate the need for implementation of Mitigation Measures required for the Proposed Project.

Significant and Unavoidable Impacts that Would No Longer Occur

The Surface Water Storage Alternative would not avoid or mitigate significant impacts of construction noise or potential growth-inducement and may result in new significant unavoidable impacts to air quality.

6.4.4 Alternative 4: Onsite Groundwater Treatment at ASR Wells

The purpose of this alternative is to improve the aesthetic qualities of groundwater prior to customer delivery. This would be accomplished with onsite treatment at well sites. Figure 6-3 provides an example of how an existing well site could be modified to incorporate onsite treatment. As shown, the onsite treatment equipment would require approximately 24,500 square feet (0.56 acres) for treatment of extracted water, including processing, waste concentration, piping, and materials storage. Treatment equipment would add to system maintenance requirements and create the need for additional routine inspection, delivery, and security visits. The treatment process would generate a concentrated brine solution which would require temporarily onsite storage before being hauled away to an approved disposal facility.

Ability to Meet Project Objectives and Feasibility Considerations

Similar to the proposed project, implementation of the onsite groundwater treatment at ASR well sites would meet the project objectives by ensuring additional water supply reliability for City customers as well as providing regional conjunctive use goals with groundwater protection. The City investigated the cost for a reverse osmosis (RO) system in 2008, and based on engineering estimates, the capital cost to design and construct the treatment system would be $37,000,000 and the annual operation and maintenance cost for such a system would be near $4,000,000 per year per well. This equates to about $6,000,000 annualized cost per well for an estimated life span of the equipment of 20 years.

Environmental Impacts

Land Use and Agricultural Resources

The onsite treatment of extracted groundwater at ASR wells to achieve water quality similar to existing surface supplies, would involve construction of an RO membrane system and a treatment waste system. Construction of the these systems would require extensive construction equipment and labor compared to the proposed project. The majority of the existing and planned wells are located in residential neighborhoods where noise and traffic would impact adjacent residents.

Structures and equipment required to accommodate onsite treatment would consist of enclosed buildings, approximately 9,550 square feet. The additional land area required to accommodate these facilities would require use of additional land adjacent to the existing well sites. Depending on well locations, this would require using land not currently zoned for utility infrastructure, including park acreage, or open space wetland preserve areas. Wetland preserve areas are restricted by the U.S. Army Corps of Engineers/Federal Clean Water Act and Federal Endangered Species Act, which would increase the potential for land use impacts compared to the proposed project.

Population, Employment and Housing

Growth Inducing Impacts. A project that removes an obstacle to growth is generally considered to be growth-inducing. Proposed project objectives are to: manage existing water supply resources and improve water supply reliability, rather than to simply add volume to the water supply. Like the proposed project, under this alternative, stored surface water would not be a primary source of water supply, but rather intended to bolster reliability and a back-up source to be used when necessary to meet peak demand or during drought conditions. Consequently, impacts would be similar to the proposed project.

Consistency with Adopted City Policies

The Public Facilities Element of the General Plan includes policies and implementation measures directing the City to develop and implement an ASR Program. Like the proposed project, the onsite treatment alternative would be consistent with the City's General Plan policies and implementation measures.

Transportation and Circulation

The Onsite Treatment Alternative would involve the same number of wells as the proposed project. Construction and operation of the onsite water treatment facilities would result in increased construction transportation and circulation impacts compared to the proposed project. Construction would be conducted using standard traffic handling procedures and no permanent impacts would be expected to occur. Onsite water treatment waste systems would also require increased City staff vehicle trips to conduct required maintenance operations. Consequently, potential transportation/circulation impacts would result in a slightly greater impact compared to the Proposed Project.

Air Quality

This alternative would involve construction of an RO membrane system and a treatment waste system. The RO process would require high energy because extensive pressure is required to separate the water from the dissolved materials by forcing water through semi-permeable membrane. In a typical RO treatment process, high capacity pumps feed the water to drive the RO process. The energy needed to evaporate the water and concentrate the waste (dissolved materials) from an RO system is also high. Environmental impacts from this alternative would include increased energy consumption compared to the proposed project, and hazardous material impacts associated with brine/waste disposal.

Construction Emissions – Construction of the treatment facilities would necessitate a longer duration for construction, and consequently increased emissions from construction equipment, dust from earth moving, etc. Compared to the proposed project, implementation of this alternative would increase the potential for significant air quality impacts.

Operational Emissions – The treatment system for extracted water, the RO process, would require higher energy demand than the proposed project. In a typical RO treatment process, high capacity pumps feed the water to drive the reverse osmosis process. The energy needed to evaporate the water and concentrate the waste (dissolved materials) from an RO system is also high. Environmental impacts from this alternative would include increased energy consumption compared to the proposed project, and hazardous material impacts associated with brine/waste disposal. Due to increased energy demands, implementation of this alternative would increase the potential for significant air quality impacts.

Climate Change

. In addition to carbon emissions resulting from an extended construction timeframe, the environmental impacts from this alternative would generate increased carbon emissions associated with energy consumption. Comparative to the proposed project, the RO process requires high energy because in a typical RO treatment process, high capacity pumps feed the water to drive the RO process. The energy needed to evaporate the water and concentrate the waste (dissolved materials) from an RO system is also high. Due to increased energy demands, implementation of this alternative would increase the potential for increased generation of greenhouse gases compared to the proposed project.

Noise

The Onsite Treatment Alternative would involve the same well drilling activity and consequent noise impacts, as the proposed project. Locating onsite treatment systems at each well site would require additional construction compared to the proposed project. This would create traffic and construction equipment noise that would otherwise not occur, and would last for the duration of project construction. Because of the additional treatment facilities associated with this alternative, it is anticipated that the potential for operational noise impacts would also be greater compared to the proposed project.

Biological Resources

The Onsite Water Treatment Alternative would require a larger footprint at each well site, therefore increase the potential for biological resource impacts, including loss of federally protected wetlands and other waters of the United States and/or loss or degradation of habitat for wetland/listed species, and loss of Annual Grassland Habitat. However, like the proposed project, construction of this alternative would require implementation of mitigation measures, in addition to any applicable state and federal regulatory agency permit processes. Consequently, biological resource impacts would be similar to the proposed project.

Cultural and Paleontological Resources

Similar to the proposed project, the Onsite Treatment Alternative would require implementation of existing ordinances, construction standards, and mitigation measures as identified in the Initial Study (Appendix A) and Project Description Environmental Commitments section. With implementation of these measures, potential impacts to cultural resources would be expected to be similar to the proposed project.

Geology, Soils and Seismicity

Like the proposed project, the nature of soil and geologic conditions would be a determining factor in location, design and construction of wells. Well drilling and construction would require implementation of existing ordinances and construction standards, and applicable mitigation measures. Potential impacts with geology and soils would be similar to the proposed project.

Hazardous Materials and Public Safety

An RO treatment process would generate a concentrated brine solution which would require temporarily onsite storage before being hauled away to an approved disposal facility. Proper operational procedures would ensure this would be a less than significant impact, similar to the proposed project.

Public Services and Utilities

In addition to high energy demands and related costs that would be passed on to rate payers, the RO process would also require dedication of staff time for operation and oversight of the onsite treatment at each applicable well site. The proposed project would be environmentally superior in this regard.

Hydrology and Water Quality

The Onsite Groundwater Treatment at ASR Wells Alternative was conceived as a result of customer concerns raised during the 2007/08 ASR test project, and in comments submitted in response to the NOP primarily related to groundwater quality issues of taste, sodium content, and hardness.

Currently groundwater extracted from the local aquifer meets all potable water standards and only requires disinfection prior to customer distribution, as required by the CDPH. The Onsite Groundwater Treatment Alternative would entail installation of additional treatment facilities at ASR wells to treat extracted groundwater to be equivalent to that of surface water in terms of appearance, mineral content, and taste. This would be accomplished through the addition of a RO membrane filtration system capable of removing dissolved minerals and ions, such as sodium, calcium, magnesium, chloride, etc., from the extracted groundwater prior to delivery to water customers. There is no benefit to environmental hydrology and environmental water quality with this alternative. However, this alternative would improve the aesthetic qualities of local groundwater.

Aesthetics and Visual Resources

The treatment system necessary for this alternative would require construction of new permanent structures adjacent to well sites. In many cases, wells are located in parks and open space areas. The addition of the structures could constitute an adverse aesthetic impact compared to the Proposed Project.

Mitigation That Would No Longer Be Required

None. The Onsite Water Treatment Alternative would require the same mitigation measures as the proposed project, plus additional mitigation to address potential construction and land use related impacts that would not occur with the proposed project.

Significant and Unavoidable Impacts That Would No Longer Occur

The Onsite Water Treatment Alternative would not avoid or mitigate significant impacts of construction noise or potential growth-inducement. The alternative would potentially cause additional impacts related to energy usage, waste disposal, traffic, noise, public services and utilities, and air quality.

Conclusions

As discussed above, the onsite groundwater treatment at ASR wells would create additional land use, energy demand, waste disposal, traffic, noise, public services and utilities, and air quality impacts compared to the proposed project.

The extracted groundwater currently meets potable water quality standards. Consequently the high costs of adding, operating and maintaining the required treatment facilities is difficult to justify. It is not uncommon for groundwater to have aesthetic qualities that are different from surface water. Given that the groundwater extracted from City wells is of similar quality to other municipalities served solely by groundwater and meets all health protective drinking water standards and regulations; the need to justify the high capital and operational costs significantly decreases the feasibility of this alternative compared to the proposed project.

6.5 Environmentally Superior Alternative

Section 15126.6(d)(2) of the CEQA Guidelines requires that an EIR identify the environmentally superior alternative, other than the No Project Alternative, from the range of reasonable alternatives. The environmentally superior alternative would be that which results in the fewest significant environmental impacts as compared to the proposed project.

Although it would be significantly more costly compared to the proposed ASR Project, Alternative 2, the WTP Upgrade with a Separate Pipeline, is the environmentally superior alternative. Compared to the Surface Storage Alternative and Onsite Treatment Alternative, the WTP Plant upgrade with a Separate Pipeline would require significantly less land area, and consequently fewer associated impacts (e.g., land use, transportation, biologic and cultural resource impacts). Although the Proposed Project injection source water (i.e., treated surface water) meets RWQCB standards for injection, the WTP Upgrade/Pipeline Alternative includes the benefits of reducing (but not eliminating) the need for groundwater pumping. It also eliminates the need to inject treated surface water containing DBP's and fluoride into the groundwater aquifer where these constituents don't naturally occur.

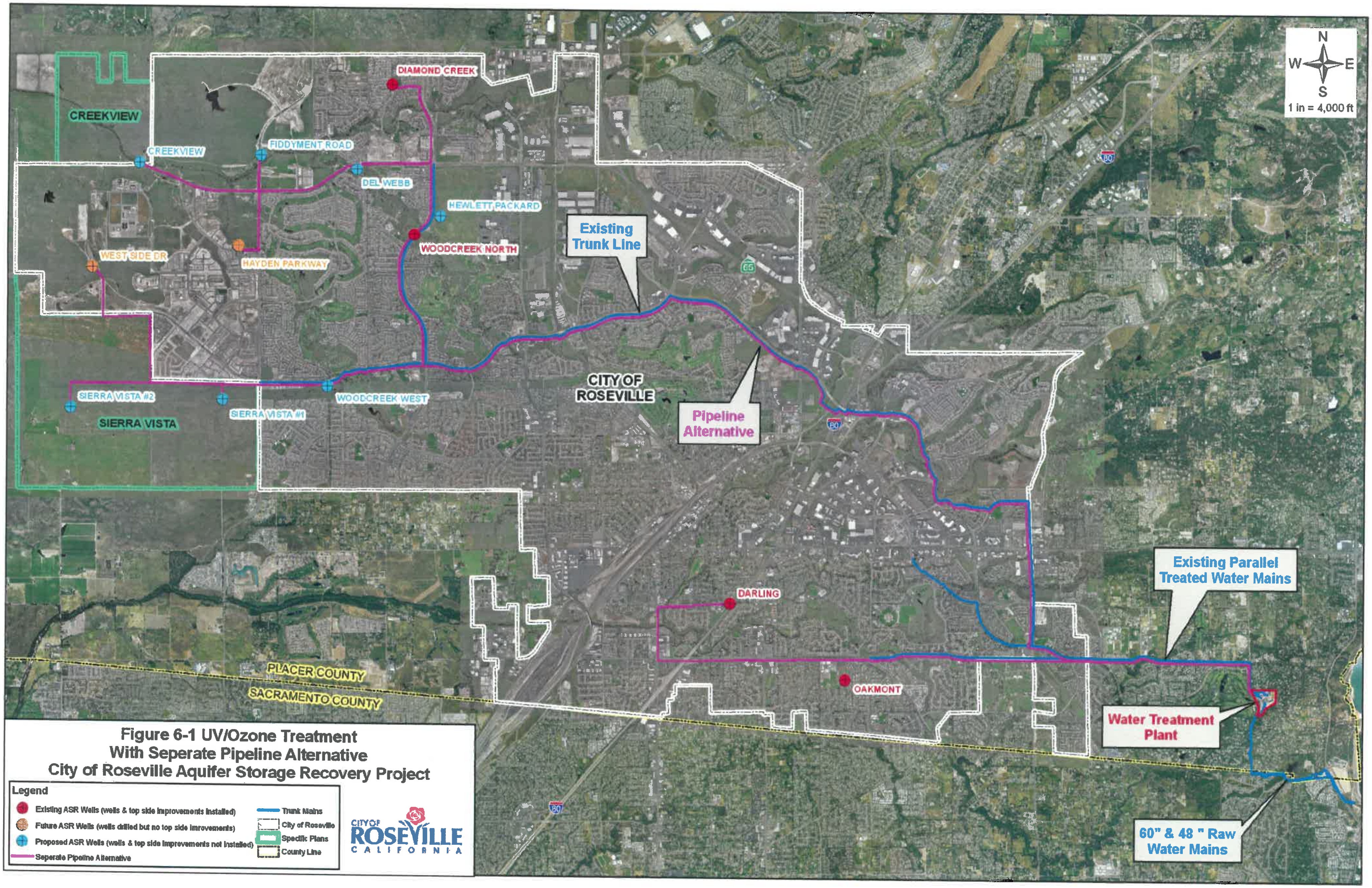

Figure 6-1 UV/Ozone Treatment
With Seperate Pipeline Alternative
City of Roseville Aquifer Storage Recovery Project

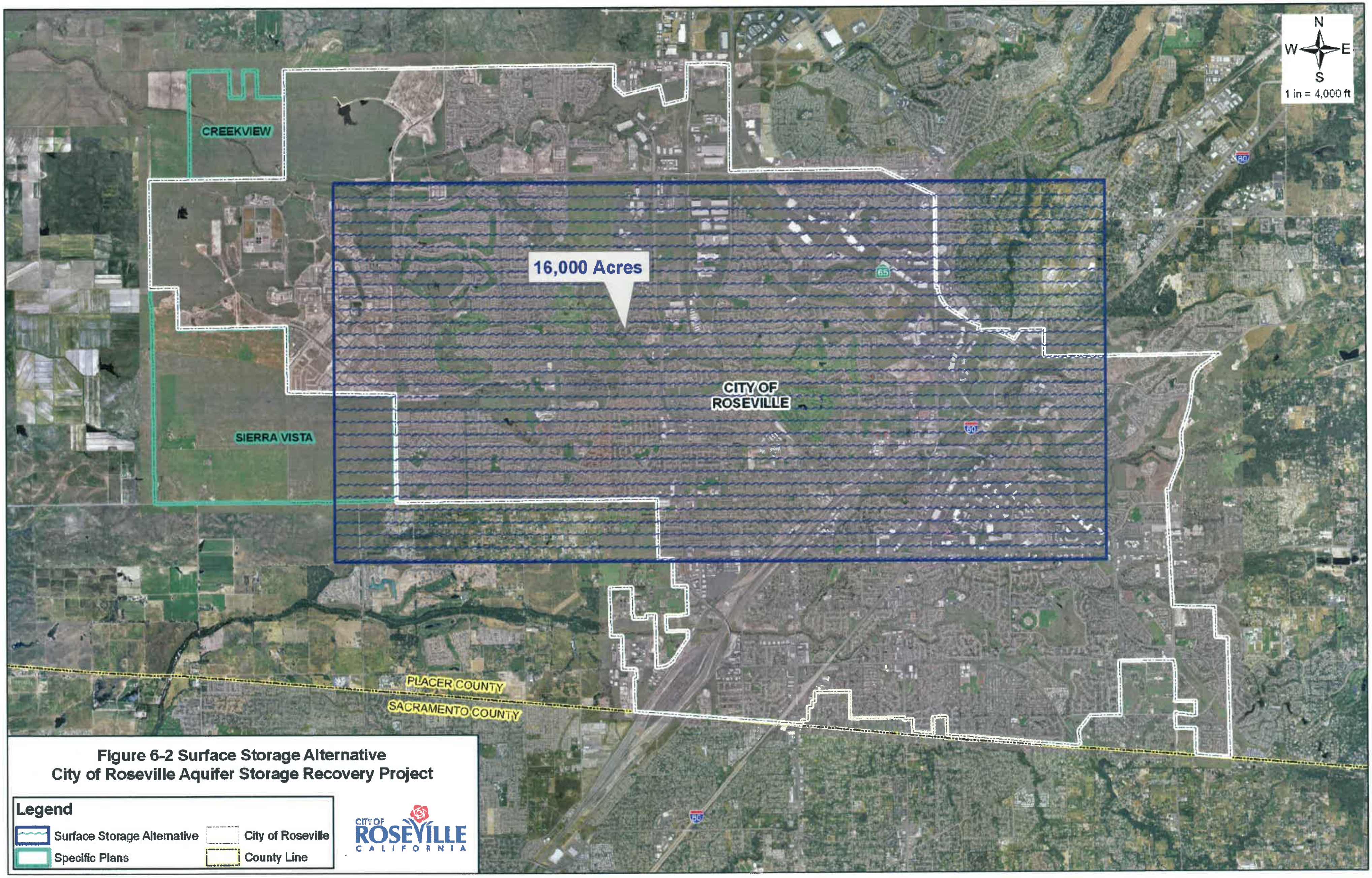

Figure 6-2 Surface Storage Alternative
City of Roseville Aquifer Storage Recovery Project

APPENDIX A: NOTICE OF PREPARATION AND INITIAL STUDY

CITY OF ROSEVILLE CALIFORNIA
Environmental Utilities
Administration
2005 Hilltop Circle
Roseville, California 95747

NOTICE OF PREPARATION AND SCOPING MEETING

TO:	State Clearinghouse Responsible Agencies, Trustee Agencies and Interested Parties
DATE:	June 30, 2009
SUBJECT:	**Notice of Preparation of a Draft Focused Environmental Impact Report and Scoping Meeting**
PROJECT:	**City of Roseville Aquifer Storage and Recovery Project**
LEAD AGENCY:	City of Roseville Environmental Utilities Department 2005 Hilltop Circle Roseville, CA 95747
CONTACT:	Terri Shirhall, Administrative Analyst (916)774-5536), tshirhall@roseville.ca.us

The City of Roseville is the CEQA Lead Agency and will prepare a Focused Environmental Impact Report (EIR) for the project identified above. We request review and comments from your agency as to the scope and content of the environmental information that is germane to your agency's statutory responsibilities in connection with the proposed project. The comments received during the Notice of Preparation Comment Period will be utilized to define the scope and content of the EIR. Your comments can be submitted in writing and/or you can attend one of two Scoping Meetings to be held at the following times and locations:

July 15 4:00-6:00 p.m.
City of Roseville Corporation Yard
Meeting Rooms 2 and 3
2005 Hilltop Circle
Roseville, CA 95678

July 29 3:00-5:00 p.m.
Timber Creek Lodge, Partial Ballroom
7050 Del Webb Boulevard
Roseville CA 95747

The City of Roseville is proposing to implement a citywide Aquifer Storage and Recovery (ASR) program to maintain groundwater as a sustainable resource, improve the City's water supply reliability, and meet regional conjunctive use program goals. ASR is a process where surface water supply is injected by specially designed groundwater wells into the groundwater aquifer for storage and then later recovered for municipal use.

A description of the proposed project and its probable environmental effects are contained in the Initial Study (either attached or available online at: http://www.roseville.ca.us/gov/community_development). The Initial Study identifies potentially significant impacts to Water Quality, Noise, and potentially significant indirect impacts to population growth.

Due to time limits mandated by State law, your response should be submitted to the City of Roseville Environmental Utilities Department no later than **August 3, 2009.** Please send comments to Terri Shirhall, Administrative Analyst, Environmental Utilities Department, at the address indicated above. Please also include the name of a contact person for your agency.

NOTICE OF PREPARATION: INITIAL STUDY
for the
City of Roseville Aquifer Storage and Recovery Project Environmental Impact Report

This Notice of Preparation (NOP) has been prepared by the City of Roseville (CEQA Lead Agency) to comply with the California Environmental Quality Act (CEQA Guidelines §15082) and notify interested parties that an environmental impact report (EIR) will be prepared to evaluate potential environmental impacts associated with the City of Roseville Aquifer Storage Recovery (ASR) Project.

SECTION 1: PROJECT DESCRIPTION

1. PROJECT BACKGROUND

Project Objectives
The City of Roseville is proposing to implement a citywide Aquifer Storage and Recovery (ASR) Project to maintain groundwater as a sustainable resource, improve the City's water supply reliability, and meet regional conjunctive use program goals. ASR is a process where treated surface water supply is injected by specially designed groundwater wells into the groundwater aquifer for storage and then later recovered for municipal use.

Over the past several decades, there has been increasing demand for water supplies in Roseville. At the same time, Roseville and the surrounding region, have also been affected by:

- Extended drought and wet periods;
- Increased push to dedicate surface water for environmental purposes;
- Declining groundwater levels; and
- Ongoing and potential impacts to surface water quality and groundwater quality.

To address these challenges, consistent with General Plan Policy, Roseville is proposing an Aquifer Storage and Recovery (ASR) Project to meet water supply reliability needs.

ASR Operations
An ASR Project would entail injecting available surface water supplies year-around up to the excess treatment capacity of the City's water treatment plant. Most injection would happen during fall, winter, and spring months when water is plentiful in Folsom Lake and system demands are lowest due to precipitation. Summer injection would occur when water availability to the City exceeds customer demands. Extraction would then be used to meet customer demands when treatment facilities near capacity or when water is in short supply due to drought conditions.

The proposed project would use the existing surface water source from Folsom Lake as the injected water. Raw water from Folsom Lake will be treated at the City's Barton Road Water Treatment Plant in Granite Bay. Utilizing conventional water treatment methods including flocculation, sedimentation, filtration, and disinfection, treated water will flow through the City's existing water distribution grid to injection well sites. These wells are (and will be) designed and constructed with ASR capabilities to both inject and extract water. The recovered water would then be piped into the existing water distribution system. The receiving groundwater is identified to be North American Sub basin (basin number: 5-21.64), as defined in Department of Water Resources' Bulletin 118. Typically the geologic formation for municipal drinking water yield is from the Mehrten formation. The storage zone for the ASR operation will also be mainly the Mehrten formation.

The proposed project boundary is within the City of Roseville city limits.

The City has land use authority to ensure there are no other ASR wells or other municipal wells within the project boundary. For water that travels beyond the City boundary, the City is/will continue to coordinate with the appropriate regulatory agencies regarding water quality issues that may affect other groundwater users.

The History of ASR in Roseville

The City of Roseville's ASR program is currently a demonstration-level project conducted in partnership with the California Department of Water Resources (DWR) and the Central Valley Regional Water Quality Control Board (RWQCB).

In 2003, the City of Roseville conducted a pilot project to test ASR at the well site located at Leonard Duke Davis Park, in the northwest area of Roseville. Following the testing completed in the summer of 2004, city staff worked cooperatively with other Sacramento area water purveyors to assemble information that would assist the RWQCB as they developed a regulatory framework specifically designed for ASR projects.

In August 2005, the RWQCB approved a waiver for a two-year program based on the proposed regulatory framework.

In 2006, the City of Roseville injected more than 250 million gallons (767 acre feet) of treated drinking water into the aquifer located under the area occupied in and around Leonard Duke Davis Park. Beginning on July 17, 2007 this water was extracted from the aquifer and delivered to customers in the well's service area surrounding the well. This continued through February 2008, when the required volume of water was extracted and pumping ceased. Approximately 697 million gallons, (2,140 acre feet) of water was extracted during this phase.

Existing and Future ASR Wells

As shown in Table 1, below, the City has constructed four wells, all of which are equipped for both extraction and injection. Seven more wells have been planned as components of previously approved Specific Plan projects, and approved along with certification of those Specific Plan EIRs. The location of existing and planned ASR wells is shown in **Figure 1(Project Location Map)**.

Table 1: ASR Program Existing and Future City Well Sites

Well No.	Well Name & Plan Area	Constructed	CEQA Status for Well Construction	Top Side Infrastructure	Note
Well 4	Darling*	1958	Completed	Completed	
Well 5	Oakmont*	1977	Completed	Completed	

Table 1: ASR Program Existing and Future City Well Sites					
Well No.	**Well Name & Plan Area**	**Constructed**	**CEQA Status for Well Construction**	**Top Side Infrastructure**	**Note**
Well 6	Diamond Creek	2003	Completed	Completed	
Well 7	Woodcreek North	2006	Completed	Completed	
Well 8	Hayden Parkway (Fiddyment Ranch)	Drilled in 2006.	Completed as part of West Roseville Specific Plan	Not completed. (to be evaluated in the ASR Project EIR)	
Well 9	West Side Dr #1 (W-77)	Drilled in 2006.	Completed as part of West Roseville Specific Plan.	Not completed. (to be evaluated in the ASR Project EIR)	
Well 10	Not named yet (West Side Dr #2, W-76)	Yet to be drilled (Monitoring well drilled.)	Completed as part of West Roseville Specific Plan.	Not completed. (to be evaluated in the ASR Project EIR)	
Well 11	Woodcreek West	Yet to be drilled.	No.	Not completed. (to be evaluated in the ASR Project EIR)	Site selection pending
Well 12	Del Webb	Yet to be drilled.	No.	Not completed. (to be evaluated in the ASR Project EIR)	Site selection pending
Well 13	Hewlett Packard (HP)	Yet to be drilled.	No.	Not completed. (to be evaluated in the ASR Project EIR)	Injection well only
Well 14	Fiddyment Road (F-66)	Yet to be drilled.	Completed as part of West Roseville Specific Plan.	Not completed. (to be evaluated in the ASR Project EIR)	

*Have been retrofitted for injection (ASR) capability.

During drilling phase of the well, 24-hour construction is necessary, over an approximate two-week period. During the top side infrastructure phase, typical construction related dust, noise, and traffic will be experienced during the installation of the above ground equipment.

Irrigation Wells

In addition, the City is planning to drill shallow irrigation wells at regional park facilities (Mahany Park and Maidu Park) in order to conserve surface water from Folsom Lake. These irrigation wells will be shallow in depth and will not be part of the potable water system or ASR operations. The purpose of the wells is to reduce potable water demand. The locations of the regional parks are shown in Figure 1.

2. REQUIRED PERMITS AND APPROVALS

The ASR Program would require permits from other agencies. The project would be constructed and implemented in accordance with local, state, and federal standards, and with applicable mitigation measures identified in ASR EIR and this Initial Study. The applicable standards and mitigation measures include required permits. The permit requirements and approvals and the responsible agencies are shown in Table 2. Some or all of the listed approvals may be necessary depending on the status and operation of the individual wells.

Table 2: Responsible Agencies and Required Permits and Approvals

Regulatory Agency	***Type of Permit or Approval***	***Reason for Permit or Approval***
Roseville City Council	Project and CEQA Approval	City Council is the approving authority for EIR certification and the ASR Program approval
Roseville Public Works Department/Environmental Utilities Department	Improvement Plans, Grading and/or Encroachment Permit	Compliance with City Design & Construction Standards, Mitigating Policies and Standards
Roseville Planning and Redevelopment Department	Tree Permit (if applicable)	Compliance with City Tree Protection Ordinance
Regional Water Quality Control Board – Central Valley	Waste Discharge Permit	Required for groundwater injection operations
California Department of Public Health	Domestic Water Supply Permit	Required for all municipal water supply facilities

The EIR for the ASR Project will cover the approvals and entitlements listed above and analyze construction and operation of the ASR Project at a project level (CEQA Guidelines section 15161). Future ASR Project improvements would be evaluated for consistency with the ASR EIR assumptions and impacts to confirm that project level CEQA compliance was achieved with disclosures provided in the EIR. Alternatively future ASR improvements may quality for a "Partial Exemption" for projects consistent with a community plan, general plan or zoning in accordance with CEQA Guidelines Section 15183.

3. ALTERNATIVES

As required by CEQA, the EIR will evaluate alternatives to the proposed project. As stated in section 15126.6(c) of the CEQA Guidelines, the primary intent of the alternatives evaluation in an EIR is that "the range of potential alternatives to the proposed project shall include those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects." Although the effects of the proposed project have yet to be identified, issues of concern include potential impacts to water quality and groundwater depletion. Therefore, it is anticipated that, at a minimum, the alternatives will address: 1) a no project, which would be reliance on groundwater absent the storage and recovery program; and 2) an above-ground storage alternative.

4. SUMMARY OF PROBABLE ENVIRONMENTAL IMPACTS

This Initial Study has been prepared to identify anticipated environmental impacts for the ASR Project. At present, the City has not yet determined the potential significance of the various environmental impacts that would result from the proposed citywide ASR Project. It is anticipated, however, based on the attached Initial Study analysis that the following issue areas will be analyzed in the Draft EIR:

- Hydrology and Water Quality
- Noise (Short-term Construction)
- Indirect Growth Inducement

It is anticipated that the following impact areas could either be mitigated to less than significant, constitute less-than-significant impacts, or are not impacts of the proposed project and therefore are not proposed as part of the EIR scope of analysis.

- Biological Resources
- Air Quality
- Land Use and Planning
- Transportation and Circulation
- Cultural Resources
- Hazardous Materials and Public Safety
- Aesthetics
- Geology, Soils, and Seismicity
- Population, Employment, and Housing
- Mineral Resources
- Public Services
- Utilities and Service Systems
- Agriculture
- Recreation

5. Scoping Meetings

Two scoping meetings are scheduled for the proposed project EIR. The meetings will be held on the following dates and locations:

July 15 4:00-6:00 p.m.
City of Roseville Corporation Yard
Meeting Rooms 2 and 3
2005 Hilltop Circle
Roseville, CA 95678

July 29 3:00-5:00 p.m.
Timber Creek Lodge, Partial Ballroom
7050 Del Webb Boulevard
Roseville CA 95747

6. NOP Review & Comment Submittal

Written comments concerning the scope of the EIR will be accepted by the City of Roseville through Friday, **August 3, at 5:00 p.m.** Comments should be directed to:

City of Roseville, Environmental Utilities Department
Attn: Terri Shirhall, Administrative Analyst
2005 Hilltop Circle, Roseville, CA 95747.
(916)774-5536
tshirhall@roseville.ca.us

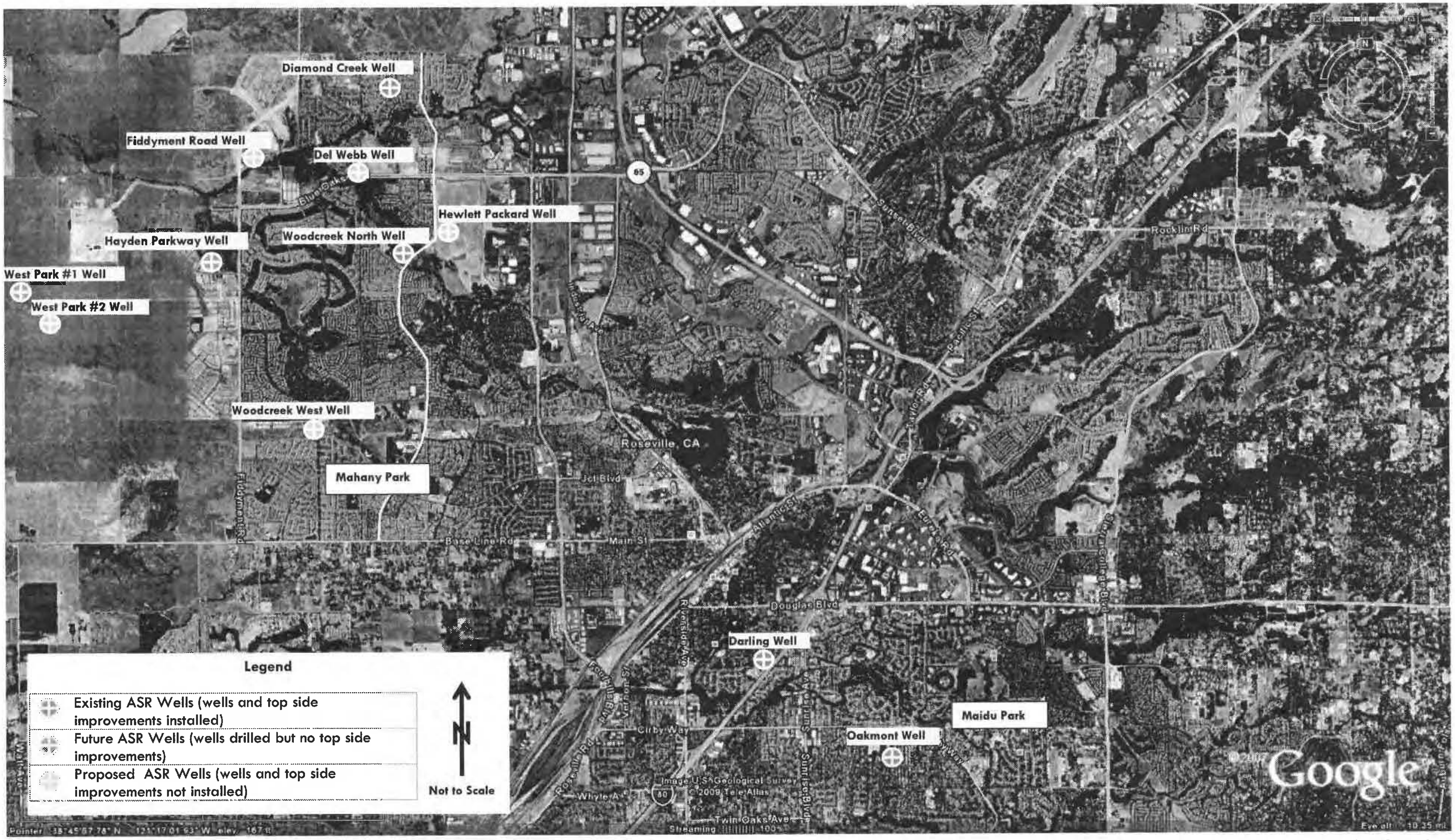

Figure 1 – Project Location

SECTION 2: INITIAL STUDY CHECKLIST

The CEQA Guidelines recommend that lead agencies use an Initial Study Checklist to determine potential impacts of the proposed project to the physical environment. The Initial Study Checklist provides a list of questions concerning a comprehensive array of environmental issue areas potentially affected by this project. This section of the Initial Study incorporates a portion of Appendix "G" Environmental Checklist Form, contained in the CEQA Guidelines. The Appendix "G" Environmental Checklist Form has been modified to include a reference to Public Resources Code Section 21083.3 and CEQA Guidelines Section 15183 in order to identify impact areas that do not require further analysis than that which was provided in a previously certified EIR. Impact questions and responses are included in both tabular and narrative formats for each of the 17 environmental topic areas.

There are five (5) possible answers to the Environmental Impacts Checklist on the following pages. Each possible answer is explained herein:

1) A "Potentially Significant Impact" is appropriate if there is enough relevant information and reasonable inferences from the information that a fair argument can be made to support a conclusion that a substantial, or potentially substantial, adverse change may occur to any of the physical conditions within the area affected by the project. When one or more "Potentially Significant Impact" entries are made, an EIR is required.

2) A "Potentially Significant Unless Mitigation Incorporated" answer is appropriate where the applicant has agreed to incorporate a mitigation measure to reduce an impact from "Potentially Significant" to a "Less than Significant." For instance, impacts to flood waters could be reduced from a "potentially significant impact" to a "less than significant impact" by relocating a building to an area outside of the floodway. The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less-than-significant level.

3) A "Less Than Significant Impact" answer is appropriate if there is evidence that one or more environmental impacts may occur, but the impacts are determined to be less than significant, or that the application of development policies and standards to the project will reduce the impact(s) to a less than significant level. For instance, the application of the City's Improvement Standards reduces potential erosion impacts to a less than significant impact.

4) A "No Impact" answer is appropriate where it can be clearly seen that the impact at hand does not have the potential to adversely affect the environment. For instance, a project in the center of an urbanized area will clearly not have an adverse affect on agricultural resources or operations.

5) A "Exempt per 15183/21083.3" answer is appropriate where the project meets the criteria for a project pursuant to CEQA Guidelines Section 15183 and CEQA Section 21083.3, therefore not requiring any further environmental review. The CEQA Guidelines Section 15183 (a) states:

   "(a) CEQA mandates that projects which are consistent with the development density established by existing zoning, community plan, or general plan policies for which an EIR was certified shall not require additional environmental review, except as might be necessary to examine whether there are project-specific significant effects which are peculiar to the project

or its site. This streamlines the review of such projects and reduces the need to prepare repetitive environmental studies."

"(j) This section does not affect any requirement to analyze potentially significant offsite or cumulative impacts if those impacts were not adequately discussed in the prior EIR. If a significant offsite or cumulative impact was adequately discussed in the prior EIR, then this section may be used as a basis for excluding further analysis of that offsite or cumulative impact.

All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project level, indirect as well as direct, and construction as well as operational impacts except as provided for under CEQA Guidelines Section 15183 and CEQA Section 21083.3.

A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources cited in the parentheses following each response. A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards.

Previous CEQA Documents and Project Studies/Reports

CEQA provides for the use of prior environmental documents in specific situations. The following narrative is provided to summarize the analysis undertaken as it relates to CEQA Public Resources Code (PRC) §21093 and §21094, which direct lead agencies to tier from EIRs whenever feasible. CEQA §21083.3 and §15183 specifically address the process and applicability of tiering. In this case it has been determined that PRC §21083.3 and its attendant CEQA Guidelines §15183 are applicable to the project. These sections direct lead agencies to utilize prior environmental impact reports in order to streamline the processing of permits and avoid redundancy in environmental documents. This narrative does not address specific impacts of ASR Project, but rather is intended to be read in conjunction with the other portions of the Initial Study to inform the reader of the process and analysis utilized by the City in its determination of the appropriate environmental document for the project.

PRC §21083.3 limits CEQA review of certain projects to environmental effects that are "peculiar" to the project and which were not addressed as significant effects in a prior EIR, or which new information shows will be more significant than described in the prior EIR. The ASR Project is a qualified project pursuant to §21083.3(a) which provides in pertinent part:

> (b) If a development project is consistent with the general plan of a local agency and an environmental impact report was certified with respect to that general plan, the application of this division to the approval of that development project shall be limited to effects on the environment which are peculiar to the parcel or to the project and which were not addressed as significant effects in the prior environmental impact report, or which substantial new information shows will be more significant than described in the prior environmental impact report.

The ASR Project is comprised, in part, by a number of well sites identified as capable of supporting ASR This Initial Study tiers from earlier specific plan EIRs that addressed groundwater well construction and operation. The earlier CEQA documents addressed the construction and operation of the groundwater wells that are now proposed as part of the ASR Project. The current CEQA documentation addresses the operation of the following wells for ASR (i.e., for injection), which was not a component of the previous CEQA analyses:

- West Roseville Specific Plan, February 2004. SCH No.2002082057
- North Roseville Specific Plan, July 1997. SCH No.96112014
- Hewlett-Packard Master Plan Draft Environmental Impact Report, February 1996. SCH No.95112022
- Del Webb Specific Plan Environmental Impact Report, September 1993. SCH No.93042005
- City of Roseville Diamond Creek Well Project, Initial Study/Mitigated Negative Declaration. February 2002.
- City of Roseville Aquifer Storage and Recovery Demonstration Test Phase 2, Initial Study Negative Declaration. June 2005.

In 2004, the City prepared a technical update to its General Plan, which incorporated the land use designation of the subject property and integrated the concepts contained in the Specific Plan as well as other specific plans in the City. The EIR for the original General Plan was adopted in 1992 (SCH #92072064) (the "General Plan EIR"). An EIR for the technical update was adopted on January 21, 2004 (SCH#2002082057). Accordingly, the project is a qualified project within the meaning of §21083.3, both under subsection (a) and (b). Further analysis was required however, prior to making a determination of the appropriate environmental document for the processing of the project.

CEQA Guidelines §15183 provides guidance on the criteria to be used in making a determination as to whether §21083.3 will apply. Specifically, Guideline Section 15183(b) provides as follows:

> *(b) In approving a project meeting the requirements of this section, a public agency shall limit its examination of environmental effects to those that the agency determines, in an initial study or other analysis:*
>
> *(1) Are peculiar to the project or the parcel on which the project would be located, and*
>
> *(2) Were not analyzed as significant effects in a prior EIR on the zoning action, general plan, or community plan, with which the project is consistent,*
>
> *(3) Are potentially significant off-site impacts and cumulative impacts which were not discussed in the prior EIR prepared for the general plan, community plan or zoning action, or*
>
> *(4) Are previously identified significant effects which, as a result of substantial new information which was not known at the time the EIR was certified, are determined to have a more severe adverse impact than discussed in the prior EIR.*

The balance of this section of the Initial Study is devoted to discussing the basis upon which this partial exemption provided by Section 21083.3 is utilized for the ASR Project. Most importantly, it summarizes the findings of the City relating to the prior EIRs and how the criteria set forth in Guidelines Section 15183 have been met.

General Plan

The City's 2020 General Plan was adopted on February 4, 2004 by Resolution #04-39. The current General Plan contains in large part the same goals, policies, and implementation measures as the previous 2010 General Plan (adopted on November 18, 1992, by Resolution #92-321), for which a formal General Plan EIR was prepared. However, the current General Plan has been updated to reflect the current level of development in the City and to reflect the 3,100-acre West Roseville Specific Plan annexation that was approved in 2004. Changes between the 2010 General Plan and the current 2020 General Plan were analyzed as part of the West Roseville Specific Plan Environmental Impact Report (WRSP EIR) (SCH #2002082057), and most recently the Cirby Way/Roseville Road Improvement Project (CIP Update) EIR (SCH # 20042052) and Downtown Roseville Specific Plan (SCH#2007102090).

Each element of the General Plan (GP) references and provides policies relating to specific plans. The specific plans are viewed as the primary mechanism for implementing the goals and policies of the GP. The plans are consistent with, and incorporated by reference into the GP. The specific plans establish detailed policies and implementation programs for portions of the City, consistent with the goals and policies established in the GP.

The City Council adopted a Statement of Overriding Considerations with certification of the GP EIR, identifying the following impacts as significant and unavoidable:

- Flood hazard
- Vehicular air emissions (ozone)
- Construction air emissions (ozone)
- Vehicle noise
- Railroad noise
- Noise from fixed sources
- Conversion of open space outside of infill area
- Jobs/housing imbalance
- Affordable housing
- Increased traffic/degraded LOS
- Loss of annual grasslands
- Loss of oak trees and oak woodlands
- Loss of riparian woodlands
- Loss of vernal pools
- Loss of intermittent drainages and other seasonal wetland habitat
- Habitat fragmentation and loss of wildlife habitat
- Risk of hazardous materials-related emergencies due to rail operations
- Cumulative air quality, land use, jobs/housing, traffic, biological, cultural, risk of upset, open space, public services and utilities, and water impacts
- Growth inducement

West Roseville Specific Plan

The West Roseville Specific Plan is referenced and utilized in the evaluation of this project as it represents the most significant change in land use and allocation of new land use to the City following the adoption of the 1992 General Plan. The project added approximately 3,100 acres to the City's corporate limits, and included a mixed-use land use plan of commercial, business professional, industrial, park, open space, and school land uses, and included 8,430 new residential dwelling units. As mentioned above, processing of this plan also resulted in an update to the City's 2010 General Plan.

In accordance with the California Environmental Quality Act (CEQA), it was determined that the West Roseville Specific Plan had the potential to have a significant adverse impact upon the environment, and the WRSP EIR (SCH #2002082057) was prepared for the project. A Notice of Completion was filed with the State of California Office of Planning and Research. The Final Environmental Impact Report (FEIR) was certified by the City Council on February 4, 2004. A copy of the WRSP EIR is available for review within the Planning Department at 311 Vernon Street, Roseville, CA.

The City Council adopted a Statement of Overriding Considerations when they certified the WRSP EIR. The EIR identified the following impacts associated with development of the WRSP area as significant and unavoidable:

- Potential incompatibility of internal land uses
- Conversion of agricultural land to developed uses
- Inducement of substantial population growth
- Increased traffic on City of Roseville roadways
- Increased traffic on State Highways
- Increased traffic on Placer County roadways
- Increased emissions of fugitive dust and PM10 from grading and trenching activities (short term)
- Increased emissions of ozone precursors during construction (short-term)
- Increased emissions of air pollutants during operation
- Loss of oak trees of greater than 6 inches dbh (short-term)
- Removal of historically significant properties and/or loss of historic integrity of such resources
- Increased demand for solid waste services at the landfill
- Increased demand for solid waste services at the MRF
- Construction debris demand for solid waste services
- Alteration of the visual character of the site and vicinity
- New sources of light and glare

For buildout of the WRSP project area, the WRSP EIR also identified the following cumulative impacts as significant and unavoidable:

- Agricultural land conversion
- Increased traffic on City of Roseville roadways with Kaiser Medical Center
- Air quality emissions from construction

- Air quality emissions from operation
- On-site noise levels that exceed City standards
- Off-site noise levels that exceed City standards
- Loss of historic resources
- Increased demand for water
- Increased demand for recycled water distribution system
- Increased generation of solid waste
- Increased stormwater runoff in the Curry Creek Watershed
- Change in visual character

Subsequent Environmental Impact Report and Roseville 2020 Transportation System Capital Improvements Program Update

In May 2007 the Roseville City Council certified the Subsequent Environmental Impact Report And Roseville 2020 Transportation System Capital Improvements Program Update, which updated the City's Roadway Capitol Improvement Program (CIP) and General Plan to reflect changing conditions and ensure an adequate transportation system, consistent with the City's General Plan. The EIR identified the following impacts associated with the project as significant and unavoidable:

Existing Plus Project Conditions

- Increased traffic on City of Roseville roadways
- Increased traffic on state highways
- Increased traffic on Placer County roadways
- Increased traffic on Sacramento County roadways
- Growth-inducing impacts

2020 Plus Project Conditions

- Increased traffic on City of Roseville's roadways
- Increased traffic on state highways
- Increased traffic on Placer County roadways
- Growth-inducing impacts

2025 Cumulative Plus Project Conditions

- Increased traffic on City of Roseville roadways
- Increased traffic on state highways
- Increased air emissions
- Loss of biological resources
- Growth-inducing impacts

Downtown Specific Plan

The Downtown Specific Plan (DSP) EIR is referenced and utilized in the evaluation of this project as it represents the most significant change in land use and allocation of new land use to the City following the adoption of the West Roseville Specific Plan. The project encompassed a 176 acre infill area surrounded by built-out neighborhoods and the Union Pacific Rail Yard. The project established a mix of land uses to facilitate infill development, mixed land use, pedestrian and transit use, and revitalization of the Downtown. The Plan also established new policies for pedestrian and alternative transportation, vehicle traffic and parking. As mentioned above, processing of this plan also resulted in an update to the City's 2020 General Plan.

In accordance with the California Environmental Quality Act (CEQA), it was determined that the DSP had the potential to have a significant adverse impact upon the environment, and the DSP EIR (SCH #2007102090) was prepared for the project. A Notice of Completion was filed with the State of California Office of Planning and Research. The Final Environmental Impact Report (FEIR) was certified by the City Council on April 1, 2009. A copy of the DSP EIR is available for review within the Planning Department at 311 Vernon Street, Roseville, CA.

The City Council adopted a Statement of Overriding Considerations when they certified the DSP EIR. The EIR identified the following impacts associated with downtown redevelopment as significant and unavoidable:

- Level of Service Degradation at four area intersections
- Air quality emissions from construction
- Air quality emissions from operation
- Exposure of sensitive receptors to rail yard emissions of toxic air contaminants
- Exposure of sensitive receptors to railway and land-use noise that exceeds City standards
- Exposure of sensitive receptors to excessive roadway traffic noise levels
- Loss of historic resources

Project Studies/Reports

The following documents that relate specifically to the ASR Project have been prepared and are available for review at the City of Roseville Environmental Utilities Department, (located at 2005 Hilltop Circle, Roseville, California, 95747):

1. City of Roseville Aquifer Storage and Recovery Demonstration Test Phase 2, MWH, June 2005
2. City of Roseville, Aquifer Storage and Recovery (ASR) Program, Phase II Demonstration Testing at the Diamond Creek Well, Final Report, February 2009.
3. City of Roseville, Pilot Scale Cycle Testing at Diamond Creek Well, Final Report, December 2004.
4. Western Placer County Groundwater Management Plan, MWH, August 2007
5. Diamond Creek Well Project, Initial Study Negative Declaration, MWH, February 2002

City Of Roseville Mitigating Ordinances, Guidelines And Standards

CEQA Guidelines Section 15183(f) provides guidance as to what effects will be considered "peculiar" to a project and states in part as follows:

> *(f) An effect of a project on the environment shall not be considered peculiar to the project or the parcel for the purposes of this section if uniformly applied development policies or standards have been previously adopted by the city or county with a finding that the development policies or standards will substantially mitigate the environmental effect*

when applied to future projects, unless substantial new information shows that the policies or standards will not substantially mitigate the environmental effect.

The standards and policies adopted by the City Council which are uniformly applied to mitigate environmental impacts include:

- The City's Zoning Ordinance,
- Noise Regulation (RMC Ch.9.24)
- Flood Damage Prevention Ordinance (RMC Ch.9.80)
- Traffic Mitigation Fee (RMC Ch.4.44)
- Drainage Fees (Dry Creek [RMC Ch.4.49] Pleasant Grove Creek [RMC Ch.4.48])
- Urban Stormwater Quality Management and Discharge Control Ordinance (RMC Ch.14.20)
- Stormwater Quality Design Manual (Resolution 07-432)
- City of Roseville Design/Construction Standards (Resolution 17-137)
- Tree Preservation Ordinance (RMC Ch.19.66)
- Subdivision Ordinance (RMC Ch.18)
- Community Design Guidelines (Resolution 95-347)
- Specific Plan Design Guidelines include standards and policies that are uniformly applied to development projects throughout the City.
- Development Guidelines Del Webb Specific Plan (Resolution 96-330)
- Landscape Design Guidelines for North Central Roseville Specific Plan (Resolution 90-170)
- North Roseville Specific Plan and Design Guidelines (Resolution 00-432)
- Northeast Roseville Specific Plan (Olympus Pointe) Signage Guidelines (Resolution 89-42)
- North Roseville Area Design Guidelines (Resolution 92-226)
- Northeast Roseville Specific Plan Landscape Design Guidelines (Resolution 87-31)
- Southeast Roseville Specific Plan Landscape Design Guidelines (Resolution 88-51)
- Stoneridge Specific Plan and Design Guidelines (Resolution 95-83)
- Highland Reserve North Specific Plan and Design Guidelines (Resolution 97-128)
- West Roseville Specific Plan and Design Guidelines (Resolution 04-40)

In March 2003, the City of Roseville adopted Findings of Fact confirming that certain environmental impacts for the following issue areas are mitigated by the uniform application of the above ordinances, guidelines, and standards (Resolution 03-169):

- Flooding
- Urban Form/Aesthetics
- Tree Impacts
- Hazards/Hazardous Materials
- Water Quality
- Drainage
- Traffic

The City's mitigating ordinances, guidelines and standards are referenced, where applicable, in this Initial Study Checklist. Because the City of Roseville has adopted CEQA Findings that these Mitigating Policies and Standards substantially mitigate environmental impacts, no additional project-specific mitigation is required for the specified impact areas.

I. Aesthetics

Would the project:

Environmental Issue	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Exempt per 15183/ 21083.3
a) Have a substantial adverse effect on a scenic vista?				X	
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?				X	
c) Substantially degrade the existing visual character or quality of the site and its surroundings?				X	
d) Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?			X		

Discussion:

a–c) The proposed well sites (both ASR and irrigation) are located within the City of Roseville (Figure 1). None of the proposed locations are considered scenic, nor are they located within a scenic vista. Furthermore, well sites are relatively small, approximately 50 feet by 100 feet, and generally unobtrusive. The most visible aspect of the well sites would be, in some instances, topside improvements constructed to enclose pump station facilities. Typically the dimensions of pump station buildings would be approximately 30 feet wide by 40 feet long and 16 feet high. Potentially, some type of fencing could also be used, in lieu of a structure. Regardless of the building material, it will be designed to meet applicable design guidelines and standards. Any urban form/aesthetic impacts would be mitigated by the uniform application of the City of Roseville Resolution 03-169, City of Roseville Mitigating Ordinances, Guidelines, and Standards (referenced in Section III, above). Given the absence of scenic resources, small size of wells, and application of the City's design and building requirements, the proposed ASR program would not create significant aesthetic impacts, and no mitigation is required.

d) Nighttime lighting will be required for limited periods during construction, lasting approximately 14 days when 24-hour drilling operations are required, and focused on the drilling operations. This impact is considered short-term and less than significant. Subsequent lighting needs will be provided by street lighting, or will only be utilized to the extent needed for nighttime safety and security on the site(s). Pump station buildings would be equipped with outdoor lights with on/off switches. The lights would be used infrequently, only when nighttime maintenance is required. Upon completion of well drilling operations, there would be no equipment or materials used on the sites during operation that would cause glare during the day or night. For these reasons, the effects of the project on light and glare would be less than significant.

Conclusion: The potential for aesthetic impacts would be less than significant with implementation of the City of Roseville Mitigating Ordinances, Guidelines, and Standards and will not be analyzed further in the ASR Project EIR.

II. Agricultural Resources

Would the project:

Environmental Issue	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Exempt per 15183/ 21083.3
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use?				X	
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X	
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to nonagricultural use?				X	

Discussion:

a-c) The proposed ASR program and irrigation wells would be implemented within existing and planned (entitled) urban development areas, regional parks, and on parcels with appropriate land use and zoning designation for pubic/quasi-public uses. Well sites would not be located within areas designated as Prime Farmland, Unique Farmland, Farmland of Statewide Importance, or areas under Williamson Act contracts.

Conclusion: No impacts would occur to agricultural resources.

III. Air Quality

Would the project:

Environmental Issue	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Exempt per 15183/ 21083.3
a) Conflict with or obstruct implementation of the applicable air quality plan?		X			
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?		X			
c) Result in a cumulatively considerable net increase of any criteria for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors), including greenhouse gas emissions?			X		
d) Expose sensitive receptors to substantial pollutant concentrations?				X	
e) Create objectionable odors affecting a substantial number of people?				X	

Discussion:

Regulatory Background

California Clean Air Act Requirements

The City of Roseville, along with the south Placer County area, is located in the Sacramento Valley Air Basin (SVAB). Under the California Clean Air Act, Placer County has been designated a “serious non-attainment” area for ozone and a "non-attainment" area for PM10 (particulate matter less than 10 microns in diameter). The Placer County Air Pollution Control District (PCAPCD) is responsible for administration of state and federal air quality standards. In 1991, the PCAPCD adopted its first Air Quality Attainment Plan (AQAP). The AQAP is required by the California Clean Air Act (CCAA), and is designed to bring Placer County into compliance with state ozone standards, which are generally more stringent than current federal ambient standards.

Federal Clean Air Act Requirements

Under the Federal Clean Air Act, Placer County is designated as a severe non-attainment area for ozone, and is an attainment area for the federal PM10 standards, and other criteria pollutants. The City of Roseville, along with the south Placer County area, is located in the Sacramento Air Quality Maintenance Area (SAQMA). The Sacramento Area Council of Governments (SACOG), in conjunction with SVAB air quality management districts, and the California Air Resources Board, developed the SVAB portion of the State Implementation Plan (SIP). The SIP is required to demonstrate compliance with the Federal Clean Air Act Amendments. The U.S. EPA approved the SIP in 1996, and the SAQMA has since been operating under the SIP control measures, pending U.S. EPA approval of the SVAB's 2009 SIP submittal.

Placer County Air Pollution Control District

The City of Roseville is within the jurisdiction of the Placer County Air Pollution Control District (PCAPCD). The PCAPCD enforces emission standards for stationary source emissions through its permit authority, and indirect or area source emissions (e.g., fireplaces, landscape maintenance equipment) through planning and review. The APCD is also responsible for administering components of the Federal Clean Air Act, and California Clean Air Act. To that end, the PCACD has prepared an Air Quality Attainment Plan documenting strategies to reduce local emissions to meet Federal Clean Air Act standards. The plan focuses on ozone precursor pollutants reactive organic gases (ROG) and nitrogen oxides (NOx).

The PCAPCD does not have adopted significance thresholds, but historically has used the following standards for thresholds of significance for purposes of CEQA review. The PCAPCD also applies a cumulative significance threshold, of 10 lbs/day of ROG and/or NOx, to operational emissions.

PCAPCD CEQA Thresholds of Significance				
Pollutant	**ROG**	**NOx**	**PM10**	**CO**
lbs/day	82	82	82	550

<u>Project Impacts</u>

a,b,c) **Construction Emissions**

Based on the air quality analysis prepared for the Diamond Creek Well, individual well project emissions would be well below levels that would constitute a significant impact.[1] Construction emissions would be generated by construction equipment, worker vehicle exhaust, and fugitive dust from earth moving activities. The table below identifies construction emission estimates as analyzed for the Diamond Creek Well Project. Future ASR and irrigation well sites would generate similar construction emission impacts, which would be below the threshold of significance levels identified by the Placer APCD.

Pollutant	**Preliminary/Staging**	**Well Construction**	**Pump Building and Piping**	**Restoration**
	Emissions in lbs/day			
CO	8	19	17	10
ROG	4	5	10	4
NOx	18	60	41	36
PM_{10}	14	3	11	13

Source: Diamond Creek Well Project, Air Quality Analysis. MWH, December 2001

Operational Emissions

Operational emissions would include operation of the well pumps, and periodic vehicle trips for monitoring and maintenance. Once constructed, well site equipment, including pumps, automatic valves, lighting and chlorination facility are powered by electricity. Vehicle trips for operation

[1] City of Roseville Diamond Creek Well Project, Air Quality Analysis. MWH, December 2001

and maintenance occur on an approximate weekly basis. As the wells do not directly generate emissions, the cumulative operational emissions of the well sites would not exceed the PCAPCD cumulative thresholds of significance, therefore operational emissions would be less than significant and will not be evaluated further in the EIR.

c) Construction activities would generate unavoidable, temporary increases in the nonattainment pollutants, but would not exceed PCAPCD significance thresholds, and would not be considered cumulatively considerable given the construction emissions would be temporary, and the atmospheric lifetime of the regulated pollutants is a matter of days and weeks. Operational emissions would not exceed the PCAPCD cumulative thresholds of significance, therefore cumulative air quality impacts would be less than significant.

Although project and cumulative air quality impacts are determined to be less than significant, implementation of all feasible control measures would serve to reduce emissions to the extent possible. As such, the following air quality mitigation measures are recommended.

AQ-1: Air Quality Mitigation Measures

1. Clean earth moving construction equipment with water, or sweep clean, once per day, or as necessary (e.g., when moving onsite), consistent with NPDES BMP's, local ordinances and municipal codes. Water shall be applied to control dust as needed to prevent dust impacts offsite. Operational water truck(s), shall be onsite, as required, to control fugitive dust. Construction vehicles leaving the site shall be cleaned, as needed, to prevent dust, silt, mud, and dirt from being released or tracked off-site.

2. Spread soil binders on unpaved roads and employee/equipment parking areas. Soil binders shall be non-toxic in accordance with state and local regulations. Apply approved chemical soil stabilizers, or vegetated mats, etc. according to manufacturer's specifications, to all-inactive construction areas (previously graded areas which remain inactive for 96 hours).

3. Minimize diesel idling time to a maximum of 10 minutes.

4. Utilize existing power sources (e.g., power poles) or clean fuel generators rather than temporary diesel power generators, if feasible.

d) Air emissions would only be generated during construction and not in amounts that exceed APCD thresholds. There would only be limited operational emissions and no operational emissions would be generated at the well sites and consequently there would be no impact to sensitive receptors.

e) Chlorination activities necessary for ASR well operation would produce minor chemical odors that will be limited to within pump station buildings. Pump station buildings will not be accessible to the public, therefore, no impacts from odors would be expected to result from the project. Irrigation wells would not require chlorination and consequently no chemical odors would be associated with these wells. Related odor impacts would be less than significant.

Greenhouse Gas Emissions and Global Climate Change

There are no established thresholds for measuring the significance of a project's cumulative contribution to global climate change, but an evaluation of potential impacts is still necessary under CEQA. This analysis addresses the impact to the degree possible given the available information.

The State Legislature signed AB 32 in 2006, which acknowledged global climate change as an environmental impact and charged the California Air Resources Board (CARB) with developing regulations to address global climate change. CARB is mandated to provide preliminary actions to reduce greenhouse gas emissions.

Global climate change is a change in the average weather of the earth, which can be measured by wind patterns, storms, precipitation, and temperature. It is exacerbated by greenhouse gases, which trap heat in the atmosphere (thus the "greenhouse" effect). Greenhouse gases include carbon dioxide, methane, and nitrous oxide, and are emitted by natural processes and human activities. The accumulation of greenhouse gases in the atmosphere regulates the earth's temperature, and is natural and desirable as without it the Earth's surface would be significantly cooler, and generally uninhabitable by current standards. The effects of Global Climate change at levels exceeding the natural and desirable level includes increased drought and associated increase in wildfires, increased flooding events, and increased vector-borne disease[2].

GHG's associated with the proposed project include those generated during construction, and the electricity demand for well operation. Relative to global contributions, the GHG contribution from the proposed municipal ASR wells would be negligible. Also, because ASR is implemented locally, it is a sustainable approach compared to transporting water resources within California, which requires expending substantial energy resources, and comprises a significant portion of the state GHG inventory. Increased potential for drought has been identified as an impact of Global Climate Change. City conservation programs, such as ASR, directly address this potential issue as a method of increasing sustainable local water supply.

In spite of the small size and sustainable nature of the proposed project, it is recognized that some GHGs will be generated as a result of construction and operations. The City of Roseville is implementing projects however, that offset contributions to greenhouse gas emissions by incorporating features that reduce vehicle emissions, and maximize energy-efficiency. The City has the following existing programs in place that reduce and minimize greenhouse gas emissions:

- City Adopted National Action Plan for Energy Efficiency (2008)
- Solar Electric (PV) Incentive Program
- Joined California Climate Registry (2006)
- Asphalt Recycling
- City adopted "Smart Choices for Roseville's Future: Implementation Strategies to Achieve Blueprint Project Objectives (2005)
- Roseville Electric goal to reduce energy requirements by 5% by 2012
- Recycling drop-offs throughout City
- Alternatively Fueled City Vehicles
- Summer Youth Bus Pass program
- Electric Vehicle Charging Stations

[2] http://www.epa.gov/climatechange/

- Residential Energy Efficiency Programs
- City has installed solar electric generation (PV) on several City facilities
- Energy Efficiency Programs for Low Income Residents
- City's Civic Center and Roseville Electric buildings with clean, renewable power by purchasing 100% of their energy use from Green Roseville
- Commercial Energy Efficiency Programs
- 20% renewable power resources in Roseville Electric's power portfolio
- Shade Tree Program
- Bicycle Incentive Programs
- City Traffic Signal Head Retrofit from traditional incandescent to LED
- ITS (Intelligent Transportation System) for traffic management
- City facilities retrofitted with a HVAC efficiency management program
- Alternatives to paper at the Library
- Tree Mitigation Ordinance
- Parking Lot Shade Tree Ordinance

Given the carbon reduction associated with the above City programs, and conservation-oriented nature and small scale of the proposed project, the greenhouse gas emissions generated by the proposed project would be considered less than significant.

Conclusion: The project is located in an area that is not meeting federal and state air quality health standards. The project would generate emissions during construction, and to a more limited extent, operational emissions. None of the identified project emissions would exceed significance thresholds, and consequently air quality issues will not be evaluated further in the EIR.

IV. Biological Resources

Would the project:

Environmental Issue	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Exempt per 15183/ 21083.3
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?		X			
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies or regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?		X			
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?		X			
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?			X		
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?			X		
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?				X	

Discussion:

a-d) Because wells would be constructed in a number of locations, the project could potentially disturb habitat for special-status species, including riparian or wetland habitat, and associated plant and animal species. Based on these factors, the proposed project would result in potentially significant impacts to special-status species. Where well sites are proposed on undeveloped property, or may otherwise disturb nesting raptors, wetland or riparian habitat, the following mitigation measures require compliance with local, state, and federal regulations, and would reduce this potential impact to a less than significant level.

Bio-1: Survey for Wetlands: During preliminary engineering for well sites located on undeveloped property, a survey for wetlands shall be conducted by a qualified biologist in accordance with the following:

1. A wetland delineation shall be prepared in accordance with the requirements of the Federal Clean Water Act and U.S.Army Corps of Engineers.
2. If no wetlands are documented during the survey, no further mitigation or agency consultation is required.
3. If wetlands are present, the City shall, as feasible, avoid impacts to the resource.
4. If avoidance measures do not eliminate the impacts to wetlands, the City shall obtain required approvals from the U.S. Army Corps of Engineers per Section 404 of the Federal Clean Water Act.

Bio-2: Survey for Riparian Habitat and Special Status Species: During preliminary engineering for well sites located on undeveloped property, or an area that may otherwise disturb riparian habitat or a special status plant species, a survey for special status plant species shall be conducted by a qualified biologist in accordance with the following:

1. If no riparian habitat or special status species are documented during the survey, no further mitigation or agency consultation is required.
2. If riparian habitat or special status species are identified on the project site, the City shall, as feasible, avoid impacts to the resource.
3. If feasible avoidance measures do not eliminate the impact to special status species, the City shall consult with and obtain approvals from the applicable regulatory agency, and determine appropriate measures for further protection or mitigation of the impact.

Bio-3: Construct Outside the Nesting Season or Conduct Preconstruction raptor nesting surveys: to avoid disturbance of raptor breeding and nesting activity, including nesting of sensitive raptors, project activities will be avoided during the typical raptor breeding season of March through August, to the extent feasible. If construction must take place during the typical nesting season, preconstruction surveys will be conducted by a qualified biologist no more than 30 days prior to initiation of proposed development activities. Surveys will be conducted to determine if active nesting is occurring on or directly adjacent to the study area. Survey results will then be submitted to the CDFG. If active nests are found on or immediately adjacent to the site, consultation will be initiated with CDFG to determine appropriate avoidance measures. If no nesting is found to occur, necessary tree removal and other project activities could then proceed. Implementation of preconstruction raptor surveys and appropriate avoidance measures will reduce impacts to a less-than-significant level.

b) Riparian habitat occurs along Dry Creek,Pleasant Grove Creek, and tributaries in the project area. Riparian habitat is recognized in the General Plan as an important resource, and is within the jurisdiction of the California Department of Fish and Game, which regulates protection through the Streambed Alteration Agreement (CDFG Section 1600) process.

The City of Roseville Tree Protection Ordinance, which is a component of the City's adopted Mitigating Policies and Standards, would help reduce potential impacts to riparian habitat because oak trees are a common species in riparian areas. Compliance with the CDFG Section 1600 process, and the City's Tree Protection Ordinance, as cited in discussion (a) above, would reduce potential impacts to less than significant.

e) Implementation of the project would include uniform application of the City of Roseville Resolution 03-169, City of Roseville Mitigating Ordinances, Guidelines, and Standards (referenced in Section III, above). Specifically, the Roseville Municipal Code, Title 19, Zoning, contains a section on tree preservation (Article IV). The code protects native oak trees that have a diameter of six inches or more at breast height (dbh). A permit is required for any activity which would harm, destroy, kill, or remove a protected tree within a protected zone. The proposed project would comply with Article IV of the Roseville Municipal Code. If the removal of trees is required, an In-Lieu Mitigation fee would be paid or replacement of trees in kind would occur. Therefore, the proposed project would not conflict with Roseville tree preservation policies and the impact would be less than significant.

f) There are no habitat conservation plans or natural community conservation plans within the City of Roseville. No well sites are proposed within local open space preserve areas.

Conclusion: With implementation of the above described ordinances and standards, permit processes and mitigation measures, biological resource impacts from the ASR project would be reduced to less than significant will not be further analyzed in the ASR Project EIR.

V. Cultural Resources

Would the project:

Environmental Issue	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Exempt per 15183/ 21083.3
a) Cause a substantial adverse change in the significance of a historic resource as defined in Section 15064.5?			X		
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?			X		
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?			X		
d) Disturb any human remains, including those interred outside of formal cemeteries?			X		

Discussion:

(a-d) The City of Roseville has adopted Construction Standards, that are uniformly applied to projects constructed in the City, and so would be applicable to construction of the proposed project. The Construction Standards identify procedures to be applied if an archaeological resource is discovered during construction. Section 21-2(E) of the Construction Standards requires the following:

Cultural Resources – the Contractor shall stop construction if cultural resources are discovered during excavation operations. It is possible that previous activities have obscured surface evidence of cultural resources.

If signs of an archeological site, such as any unusual amounts of stone, bone or shell are uncovered during grading or other construction activities, work shall be halted within 100 feet of the find and the Roseville Community Development Department shall be notified immediately. A qualified archaeologist shall be consulted for an on-site evaluation. Additional mitigation may be required by the archaeologist.

Compliance with City's adopted standards would prevent and/or minimize potential impacts to cultural resources to a less than significant level.

Conclusion: The potential for cultural resource impacts would be less than significant with implementation of the City's Construction Standards, and will not be analyzed further in the ASR Project EIR.

VI. Geology and Soils

Would the project:

Environmental Issue	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Exempt per 15183/ 21083.3
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:			X		
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to Division of Mines and Geology Special Publication 42.)			X		
ii) Strong seismic groundshaking?			X		
iii) Seismic-related ground failure, including liquefaction?			X		
iv) Landslides?				X	
b) Result in substantial soil erosion or the loss of topsoil?			X		
c) Be located in a geological unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?			X		
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?			X		
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?				X	

Discussion:

a) The proposed project consists of locating wells for regional park irrigation and the City's ASR project. The project will not expose people or structures to potential substantial adverse effects involving seismic shaking, ground failure, or landslides. This impact is less than significant.

i–ii) The California Department of Mines and Geology classifies the South Placer area as a low-severity earthquake zone. No active faults are known to exist within Placer County. The project area is considered to have low seismic risk with respect to faulting, groundshaking, seismically related ground failure, and liquefaction. All components of the project will be constructed in compliance with the Uniform Building Code (UBC) and California Building Bode (CBC) for seismic safety, therefore, these impacts are considered less than significant.

iv) Landslides due to slope instability do not typically occur in Roseville. Engineering and design criteria for the project would preclude locating a well site on on soils that are expansive or would result in landslides. This impact is less than significant.

b) Construction of the project will involve excavation, grading, and surface soil disturbance in the construction areas. The City has established protocols for construction projects to minimize soil erosion or loss of topsoil. Erosion and sedimentation impacts would be mitigated by the uniform application of the City of Roseville Design/Construction Standards (Resolution 07-137) included in the City of Roseville Mitigating Ordinances, Guidelines, and Standards (referenced in Section III, above). No improvements are proposed that would require extensive excavations or hillside cut and fills. Any exposed soils from the construction phase of the proposed project would be covered by landscaping and semi-impervious and/or impervious surfaces, which would minimize soil erosion. The proposed project would adhere to the City of Roseville's requirements for a site-specific geotechnical report and erosion and sedimentation control plan for any grading activities needed. Therefore, the impacts associated with the proposed project would be less than significant. Operation of the project would not involve discharge of water onto land surface, therefore no erosion impacts associated with operation of the project would occur. These impacts would be less than significant.

c–d) The City of Roseville area does not typically experience subsidence. According to the Western Placer County Groundwater Management Plan (WPCGMP), based on DWR and National Geodetic Survey historic data, land surface subsidence in the Western Placer County area has been minimal, with no known significant impacts to existing infrastructure. The WPCGMP concludes that, given the historic trends, the potential for future land surface subsidence from groundwater extraction appears remote. Nevertheless, the City of Roseville, as a participant in the WPCGMP, is a participant in State and Federal Land Surface Subsidence monitoring efforts and programs. Also, the City's Design/Construction Standards and Improvement Standards include requirements to prevent impacts related to soils, including on-or off-site landslides, lateral spreading, subsidence, liquefaction, collapse, or expansive soils. The City of Roseville Municipal Code also includes a section pertaining to well construction. RMC§14.11.010 requires that…"minimum requirements are contained in this chapter for construction, reconstruction, use of water wells, cathodic protection wells, monitoring wells, and soil boring activities undertaken to investigate the environmental condition or water-bearing capacities of a property. The unlikelihood of subsidence, in addition to the City's Construction Standards and well construction requirements would ensure that impacts related to unstable soil would be less than significant.

e) The proposed project would not require wastewater disposal systems, there would be no impact relative to wastewater.

Conclusion: With implementation of the above described ordinances and standards, geology and soils impacts from the ASR project would be reduced to less than significant, and will not be further analyzed in the ASR Project EIR.

VII. Hazards and Hazardous Materials

Would the project:

Environmental Issue	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Exempt per 15183/ 21083.3
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?			X		
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?			X		
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?			X		
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?		X			
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?				X	
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing in the project area?				X	
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				X	
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?				X	

Discussion:

a-c) Construction

Equipment and vehicles used during the construction phase of the proposed project would use minimal amounts of hazardous materials such as diesel fuel, gasoline, oil, and grease. Best Management Practices (BMPs), as required by City of Roseville Design/Construction Standards (Resolution 17-137) would be implemented for construction activities to minimize impacts to the environment and public health. Transportation, storage and disposal of hazardous materials would also be carried out in compliance with federal, state, and local regulations. Consequently, related impacts would be less than significant.

Operation

The proposed ASR program would utilize minor amounts of water treatment chemicals, at varying locations, and using methods that would minimize health and safety risks. Chlorination for the ARS program will be accomplished by bulk delivery or manual mixing of a solution of hypochlorite in a 400 gallon storage tank using tap water and dry chemicals to produce the desired 10-15 percent solution strength. The solution storage tank material is composed of high-density polyethylene, suitable for the intended use of the solution stored and located within the well buildings. The solution will be conveyed automatically via chemical monitoring pumps and related piping and appurtenances; no special containment or handling procedures are required. Therefore, no hazards or hazardous conditions would be created by the project.

d) The proposed project would locate groundwater wells in areas with no known hazardous materials releases. However, due to the degree of ground disturbance associated with the project, the potential exists for discovery of the presence of hazardous substances. The following mitigation measure would ensure that appropriate protocol is followed prior to initiating soil disturbing activities:

Hazard-1: Prior to initiating ground-disturbing activities, the City shall evaluate areas where drilling would occur to evaluate the potential for historical or existing hazardous materials. This evaluation shall include visual inspections of the site for evidence of hazardous materials releases (i.e., dumping) or evidence of nearby land uses, which may indicate the use of hazardous materials or hazardous waste generation (i.e., aboveground storage tanks, placarding). If such evidence is observed, the City shall retain a qualified consultant to evaluate the potential for hazardous materials releases at the site prior to initiating construction to determine whether these releases may constitute a potential recognized environmental condition. If such a condition is determined to exist, the City shall prepare and implement a remediation plan prepared in accordance with the applicable regulatory agency (i.e., Department of Toxic Substances Control or Regional Water Quality Control Board) prior to proceeding with construction.

e, f) The proposed project would not be within an airport land use plan, and would not result in a safety hazard to the surrounding airports (Sacramento International Airport, Rio Linda Airport, and McClellan Air For Base). There would be no impact.

g) The proposed project would not interfere with emergency response or evacuation plans. During construction, emergency routes would remain open and emergency response plans would not be affected. There would be no impact.

h) The proposed project would not create a use that would expose people or structures to hazards related to wildland fires. There would be no impact.

Conclusion: With implementation of the above described ordinances and standards and implementation of mitigation measure Hazard-1, hazards and hazardous materials impacts from the ASR project would be reduced to less than significant will not be further analyzed in the ASR Project EIR.

VIII. Hydrology and Water Quality

Would the project:

Environmental Issue	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Exempt per 15183/ 21083.3
a) Violate any water quality standards or waste discharge requirements?	X				
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?			X		
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?				X	
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?			X		
e) Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted water?			X		
f) Otherwise substantially degrade water quality?	X				
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?				X	
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?				X	
i) Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam?				X	
j) Inundation by seiche, tsunami, or mudflow?				X	

Discussion:

a,f) The proposed project will include substantial testing for compliance with standards established by the Regional Water Quality Control Board and California Department of Public Health. The program will include measures to ensure that mixing of groundwater aquifers is avoided, and that water pumped from ASR wells can be treated to achieve drinking water standards. The Central Valley RWQCB has identified the following general issues of concern with regard to regulating ASR projects: 1) potential aquifer water quality degradation; and 2) contamination from chlorine disinfection byproducts. It is the City's intent that the project comply with the permit requirements of the applicable local, state, and federal permitting agencies and associated regulations promulgated to protect and control water quality. However, the potential exists that the ASR program could result in water quality degradation, Therefore, this impact is considered potentially significant and will be further evaluated in the ASR Project EIR.

b) By design, the objective of the ASR Program is to enhance, rather than deplete, groundwater resources by injecting more water than is withdrawn. The program would include ongoing use of groundwater monitoring wells and computer modeling to address potential depletion of groundwater supplies or interference with groundwater recharge and the potential lowering of the local groundwater table. A groundwater model for the City of Roseville's ASR program is currently under development and will be used to predict groundwater levels during future ASR operations. Therefore, until modeling results are known this impact is considered potentially significant and will be further evaluated in the ASR Project EIR.

c) The proposed project would constitute a negligible increase in impervious surface area, and therefore would not substantially alter existing drainage patterns. This very minimal increase would not substantially increase the amount of runoff. Therefore, the impact would be less than significant.

d,e) The proposed project would be comprised of ASR well sites with small footprints that would only very slightly increase impervious surfaces; therefore, there would be a very minimal increase in the amount of increased runoff. The project would not introduce any new sources of pollutants. No erosion, siltation, flooding, or polluted runoff is anticipated because the project would be constructed in compliance with the NPDES permit; the City's Urban Stormwater Quality Management and Discharge Control Ordinance; and implementation of BMPs as required via adopted ordinances and standards. Because the proposed improvements would not substantially increase the amount of runoff and would not introduce new pollutants, the impact would be less than significant.

g) Housing is not an element of the proposed project. Therefore, no impact would occur.

h) The proposed project would not place any structures within a 100-year floodplain. Should a future well be proposed within an area designated as an area of special flood hazard, the project would be constructed in compliance with the requirements of the City of Roseville Flood Damage Prevention Ordinance (RMC Ch.9.80), which specifically addresses utility infrastructure. Therefore, potential project impacts would be less than significant.

i) No people or structures would be exposed to a significant risk of loss, injury, or death as a result of construction of the proposed project. No levees or dams are located in the project vicinity. No impacts would occur.

j) The nature and general location of the proposed project precludes the potential for inundation by seiche, tsunami, or mudflow.

Conclusion: An EIR will be prepared, and will evaluate the potential for adverse impacts to water quality.

IX. Land Use and Planning

Would the project:

Environmental Issue	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Exempt per 15183/ 21083.3
a) Physically divide an established community?				X	
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?					X
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?				X	

Discussion:

a) The proposed project will utilize individual small City-owned parcels, dedicated to the City for location of municipal wells, or portions of large City owned properties such as regional park sites, and will not require linear elements that could create the potential for division of a community. Therefore, the proposed project would not divide any established communities and no impact would occur.

b) The following land use plans, policies and regulations adopted by agencies with jurisdiction over the project for the purpose of avoiding or mitigating environmental effects are applicable to the ASR Project.

City of Roseville General Plan Water System Policies. As stated in the project description, the purpose of the ASR program is to improve water supply reliability. Development of an ASR program is identified for this purpose in General Plan Water System Policy 11. Furthermore, General Plan Water System Implementation Measure 2, Water System Master Plans, calls for updating the Groundwater Management Plan as needed to further the City's desire to increase water supply reliability through aquifer storage and recovery. Consequently the proposed ASR Project is consistent with applicable City of Roseville General Plan Water System policy and implementation measures.

City of Roseville General Plan Land Use Designations. Where proposed ASR well sites are known and project level CEQA review has already been completed, the project would not conflict with applicable land use plans or zoning. With long-term implementation of the proposed ASR program, the potential exists for future well sites which are addressed in this initial study to be proposed at locations yet to be determined. In that event, the policy impact would be less than significant with implementation of all applicable City of Roseville Mitigating Ordinances and Standards referenced in Section III, including the Noise Ordinance, General Plan Noise Element, Construction and Improvement Standards, Design/Construction Standards, and the Community and Specific Plan Design Guidelines. As such the project would result in less-than-significant impacts to City of Roseville land use plans, policies and regulations, and no additional mitigation is required.

City of Roseville Noise Policy. As discussed in the project description, ASR well construction requires 24 hour drilling which creates the potential for conflict with City noise policy. The City's noise policy is contained in the Noise Element of the General Plan. General Plan noise policy is mostly intended for use as a planning tool with a focus on transportation and fixed noise sources. City policy for construction noise is outlined in General Plan Noise Element Policy 10. According to this policy, construction related noise is to be regulated consistent with the City's Noise Ordinance. Noise Ordinance Section 9.24.160 allows the City Manager or his designee to issue a Noise Ordinance "Exception" if strict compliance would be unreasonable due to the circumstances of the requested exception (such as the need for 24 hour drilling). Therefore the City's noise policy includes an exception process for short-term construction noise and related policy impacts would be considered less than significant.

It should be noted that while the ASR Project would be consistent with City of Roseville Noise policy, the project would is still anticipated to result in a substantial temporary increase in ambient noise levels as a result of the need for 24 hour drilling. As such short-term construction related noise impacts will be further evaluated in the ASR Project EIR.

c) There are no habitat conservation or natural community conservation plans in the project area. Therefore, there would be no impact.

Conclusion: The ASR Project would be implemented consistent with the identified land use plans, policies and regulations adopted by agencies with jurisdiction over the project for the purpose of avoiding or mitigating conflicting land uses. Potential land use impacts associated with the ASR project would be reduced to less than significant will not be further analyzed in the ASR Project EIR.

X. Mineral Resources

Would the project:

Environmental Issue	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Exempt per 15183/ 21083.3
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?			X		
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?			X		

Discussion:

a, b) The proposed project does not propose to excavate for mineral resources nor does it have the potential to result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state. There are no locally important mineral resource recovery sites delineated on the general plan, related specific plans, or other land use plans prepared for the City of Roseville. Therefore, impacts to mineral resources would be less than significant.

Conclusion: Because of the nature of the project, and the absence of important mineral resources, potential impacts to mineral resources would be less than significant, and will not be evaluated in the ASR Project EIR.

XI. Noise

Would the project result in:

Environmental Issue	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Exempt per 15183/ 21083.3
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	X				
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?			X		
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?			X		
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	X				
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				X	
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?				X	

Discussion:

a,d) <u>Construction Noise</u>

Of the eleven proposed ASR wells, six have been drilled, and five have yet to be drilled. Each of the five ASR wells to be drilled has been evaluated in a previously certified Specific Plan EIR, as discussed in Section 1 (Introduction), and identified in the table below. All of the previous CEQA analyses required mitigation measures to reduce construction noise impacts. The significance determinations varied, with construction noise impacts either identified as significant and unavoidable (and encompassed in a Statement of Overriding Considerations where it was determined to be an impact of which the benefit overrides the adverse impacts) or, less than significant because mitigation was required to comply with the City's Noise Ordinance. In the case of the two remaining wells in the West Roseville Specific Plan, well drilling is subject to a Development Agreement requirement that the wells be drilled prior to adjacent residential construction and concurrent with construction of adjacent roadways.

Well Location	Constructed	Previously Certified EIR	Top Side Infrastructure	Noise Impact Evaluation
Hayden Parkway (Fiddyment Ranch)	Drilled in 2006.	West Roseville Specific Plan (WRSP) EIR	Not completed.	Top side improvements only. No significant impact.
West Side Dr #1 (W-77)	Drilled in 2006.	WRSP EIR	Not completed.	Top side improvements only. No significant impact.
West Side Dr #2, (W-76)	Yet to be drilled (Monitoring well drilled.)	WRSP EIR	Not completed.	Required mitigation measures and compliance with City standards to mitigate construction noise impacts to less than significant. Well will be drilled prior to presence of adjacent residential construction. (Development Agreement requirement)
Fiddyment Road (F-66)	Yet to be drilled.	WRSP EIR	Not completed.	Required mitigation measures and compliance with City standards to mitigate construction noise impacts to less than significant. Well will be drilled prior to presence of adjacent residential construction. (Development Agreement requirement)
Woodcreek West	Yet to be drilled.	North Roseville Specific Plan EIR	Not completed.	Requires feasible mitigation measures for construction noise and impact determination identified as significant and unavoidable.
Del Webb	Yet to be drilled.	Del Webb Specific Plan EIR	Not completed.	Requires feasible mitigation measures for construction noise and impact determination identified as significant and unavoidable
Hewlett Packard (HP)	Yet to be drilled.	Hewlett Packard Master Plan EIR	Not completed.	Required mitigation measures and compliance with City standards to mitigate construction noise impacts to less than significant.

Drilling operations for ASR Wells occurs over a 4 to 6 week period, during which there would be approximately 14 days of intermittent continuous 24-hour drilling operations. This is necessary in order to avoid caving of the borehole and possible loss of the well prior to completion. Noise levels at 50 feet away from the drilling location are estimated at 55-65 dBA. [3] The City of Roseville General Plan and Noise Ordinance specify noise standards of maximum 70 dB during daytime and 65 dB nighttime. The Noise Ordinance includes an exception process for short-term construction activities that can not comply with Noise Ordinance standards. Adherence to this process would allow the project to comply with the Noise Ordinance. Nevertheless, regardless of

[3] City of Roseville Diamond Creek Well Project, Initial Study/Mitigated Negative Declaration February 2002.

the ability to comply with the Noise Ordinance, project construction is expected to cause a substantial temporary increase in ambient noise levels in the project vicinity above levels existing without the project. Therefore construction noise will be further evaluated in the ASR Project EIR.

c) Operational (Permanent) Noise and Vibration

Long term operation of the proposed wells and pump stations will comply with the City's Noise Ordinance, either because pump station buildings will be soundproofed to meet the City's exterior noise level standards, or by adequately distancing pump stations from sensitive receptors to minimize noise. Operational noise impacts would be less than significant. Based on information obtained from construction of existing wells; post drilling, construction activities, testing and operation of the wells would not cause substantial groundborne vibration or noise, and related impacts are considered less than significant.

e, f) The proposed project is not located within or in the vicinity of an airport land use plan or private airstrip; therefore, there would be no impact.

Conclusion: During construction, well drilling and construction would result in temporary noise and vibration. Therefore, construction noise impacts of the propose project are considered potentially significant and will be further evaluated in the EIR.

XII. Population and Housing

Would the project:

Environmental Issue	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Exempt per 15183/ 21083.3
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	X				
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				X	
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				X	

Discussion:

a) A project that removes an obstacle to growth is generally considered to be growth inducing. The proposed ASR Project is a method of providing long-term storage of an existing surface water supply source. The need for the ASR Program was identified to meet the objectives of the regional conjunctive use program prescribed by the Water Form Agreement and the Regional Water Master Plan developed by the American River Basin Cooperating Agencies.[4] The focus of the Water Forum Agreement is on meeting the water supply availability and reliability needs of Placer County and Sacramento County while protecting the environmental values of the lower American River. The ASR Project would enable the City to meet drought year water demands with groundwater, while mitigating any long-term impacts to the groundwater basin. This meets the goal of the Regional Water Master Plan which is to develop equitable, cost-effective water resource management strategies for enhancing water supply reliability and operation flexibility for water uses of Folsom Lake, the lower American River, and the connected groundwater basin.

Implementation of an ASR Program also complies with General Plan policy to increase water supply reliability. In and of itself, the ASR program would not induce population growth, as the ASR water would be used for emergency back-up rather than as a primary source of water supply. However, because the project would supplement the City's existing back-up water supply, the potential exists that the project could indirectly remove a barrier to future development. Therefore, the potential for growth inducement associated with the proposed project is considered potentially significant and will be analyzed in the EIR.

b,c) The proposed project does not include residential development and would not displace existing housing or people. The project would not necessitate the construction of replacement housing elsewhere. No impact would occur.

[4] ARBCUP is comprised of seven local water purveyors - Citrus Heights Water District, Fair Oaks Water District, Placer County Water Agency, San Juan Water District, Sacramento Suburban Water District, and the cities of Roseville and Sacramento

Conclusion: The potential for growth inducement associated with the proposed project is considered potentially significant and will be analyzed in the EIR.

XIII. Public Services

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:

Environmental Issue	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Exempt per 15183/ 21083.3
a) Fire protection?				X	
b) Police protection?				X	
c) Schools?				X	
d) Parks?				X	
e) Other public facilities?				X	

Discussion:

a–e) The project would not add new residents or change land uses, therefore would not generate a demand for new fire protection, police protection, schools, parks, or related services. No additional public services would be required.

Conclusion: The proposed project would have no impacts associated with the City's ability to provide public services. Consequently, this issue will not be evaluated in the ASR Project EIR.

XIV. Recreation

Would the project:

Environmental Issue	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Exempt per 15183/ 21083.3
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that physical deterioration of the facility would occur or be accelerated?				X	
b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				X	

Discussion:

a,b) The proposed project would not add new residents or create new land uses that would impact existing recreation. Regional park irrigation wells would be sited so that they do not displace existing recreational facilities. The proposed project would not increase the use of existing parks or recreation facilities, nor would these facilities need to be expanded. Therefore, the project would have no impact on recreation.

Conclusion: The proposed project would have no impacts associated with recreational facilities or services. Consequently, this issue will not be evaluated in the ASR Project EIR.

XV. Transportation/Traffic

Would the project:

Environmental Issue	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Exempt per 15183/ 21083.3
a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume-to-capacity ratio on roads, or congestion at intersections)?			X		
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads and highways?				X	
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that result in substantial safety risks?				X	
d) Substantially increase hazards due to design features (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?				X	
e) Result in inadequate emergency access?				X	
f) Result in inadequate parking capacity?				X	
g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?				X	

Discussion:

a,b,g) Implementation of the proposed ASR program would involve a very limited number of vehicle trips, in a range of locations. The number of trips per well site is estimated on average at one round trip daily, which would not constitute a significant increase in vehicle trips, or impact level of service standards.

c) The proposed project would not affect air traffic patterns because the project would not involve aircraft operations. There would be no impact.

d,e,f) Potential traffic impacts relative to incompatible land uses, parking capacity, or emergency access are mitigated by uniform application of the City of Roseville Resolution 03-169 described in Section III, City of Roseville Mitigating Ordinances, Guidelines, and Standards. No impacts to traffic are foreseeable as a result of the proposed ASR program.

Conclusion: The proposed project would have essentially little or no impact associated with traffic or transportation services. Consequently, this issue will not be evaluated in the ASR Project EIR.

XVI. Utilities and Service Systems

Would the project:

Environmental Issue	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Exempt per 15183/ 21083.3
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				X	
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				X	
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				X	
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?				X	
e) Result in a determination by the wastewater treatment provider which serves the project that it has adequate capacity to serve the project's projected demand in addition of the provider's existing commitments?				X	
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?			X		
g) Comply with federal, state, and local statutes and regulations related to solid waste?			X		

Discussion:

a) The project would not generate wastewater, and therefore would not create a demand for treatment. No impact would occur.

b) The project entails utilizing existing and planned municipal wells for ASR, and irrigation wells. Potential new significant environmental effects associated with the wells are identified throughout this Initial Study Checklist. The proposed project would not require construction of additional water treatment facilities. No impact would occur.

c) The proposed project would be comprised of ASR well sites with small footprints that would only very slightly increase impervious surfaces; therefore, there would be a very minimal increase in the amount of increased runoff. The project would not introduce any new sources of pollutants. No erosion, siltation, flooding, or polluted runoff is anticipated because the project would be constructed in compliance with the NPDES permit; the City's Urban Stormwater Quality

Management and Discharge Control Ordinance; and implementation of BMPs. Because the proposed improvements would not substantially increase the amount of runoff and would not introduce new pollutants, the impact would be less than significant.

d,e) The project would not generate a demand for water and/or wastewater. The facilities would provide backup water supply for the City of Roseville, and would not consume additional water supplies. There would be no impacts related to water/wastewater demand.

f, g) Some solid waste would be generated during the construction phase. The solid waste would be disposed of at the Western Regional Sanitary Landfill (in accordance with the City of Roseville General Plan 2010, November 1992), which complies with all federal, state, and local regulations. The solid waste generated during construction would be minimal (primarily earthwork). The ongoing amount of solid waste anticipated to be generated would be negligible and not substantially reduce the lifespan of the Western Regional Sanitary Landfill. No operational phase solid waste is anticipated; therefore, the impacts would be less than significant.

Conclusion: The project would not require new or expanded water/wastewater/stormwater treatment facilities. Impacts to utilities would be less than significant, and will not be further evaluated in the ASR Project EIR.

XVII. Mandatory Findings of Significance

Environmental Issue	Potentially Significant	Potentially Significant Unless Mitigation Incorporated	Less Than Significant	No Impact	Exempt per 15183/ 21083.3
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?		X			
b) Does the project have impacts which are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects).	X				
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	X				

Discussion:

a) The Biological Resources section of this initial study contains an evaluation of the project's potential affect upon the environment, including vegetation, fish and wildlife, and rare, threatened, endangered or special-status plant and animal species. That analysis concludes that project implementation would result in a potentially significant impact upon biological resources. However, Initial Study mitigation measures Bio 1, 2 and 3 would be implemented to reduce the potential effect on these resources to a less-than-significant level.

The Cultural Resources section of this initial study contains an evaluation of the project's potential affects on historic and pre-historic cultural resources. That analysis concludes that with implementation of applicable City of Roseville ordinance and standards cultural resource impacts would be less than significant.

Based upon these analyses, the proposed project will not: degrade the quality of the environment; substantially reduce the habitat of fish or wildlife species; cause a fish or wildlife population to drop below self-sustaining levels; threaten to eliminate a plant or animal community; reduce the number or restrict the range of a rare or endangered plant or animal; or eliminate important examples of major periods of California's history or prehistory.

b) The Proposed Project is not expected to result in any new cumulative impacts not already disclosed in the previously prepared environmental documents cited in this Initial Study. These impacts have been adequately analyzed in the first tier EIRs.

The proposed Citywide ASR Project is intended to increase water supply reliability and provide supplemental water storage during periods of drought. The ASR Project entails using existing and planned municipal groundwater wells for this purpose. Although locating and drilling the wells has been evaluated in previously certified EIRs, which include associated mitigation, the previous CEQA analyses does not consider use of the wells for ASR application. Therefore, in this context the proposed project may result in cumulative impacts to water quality, groundwater resources and possibly other issues. The ASR EIR will evaluate cumulative effects and identify appropriate mitigation measures to the extent that these issues may not have been previously disclosed in accordance with CEQA.

c) With the exception of short-term construction noise associated with the need for 24-hour drilling of ASR wells, with incorporation of mitigation measures, the ASR project would not result in impacts that will cause substantial adverse effects on human beings, either directly or indirectly. Impacts on the human environment related to hazards will be reduced to a less-than-significant level through implementation of Initial Study mitigation measure Haz-1. Construction noise impacts on the human environment and feasible mitigation will be further evaluated in the ASR Project EIR.

APPENDIX B: NOP COMMENTS

Aquifer Storage & Recovery Program
EIR Scoping Meeting—July 29, 2009 3:00pm

Comments:

How can water that eats a ring in the Toilet enamel be Fit to drink? What is To become of the plumming under homes when the Toxic water eats it away?

Aquifer Storage & Recovery Program
EIR Scoping Meeting—July 29, 2009 3:00pm

Comments: sfgraham@comcast.net

1. Have studies been done in the area that had these wells (Darling & Oakmont) for years regarding user's health and the water quality there?
2. Where will construction be in Sun City?
3. If we have a water shortage, how about building a new dam? Stimulus! (?)
4. Concerned about water quality & odor
5. Pilot Program - I did not like it - odor + skin rash + dishes not getting clean
6. Hi sodium

Aquifer Storage & Recovery Program

EIR Scoping Meeting—July 29, 2009 3:00pm

Comments:

Why not treat the reclaimed water with reverse ~~[illegible]~~ osmosis to make it potable?

The water into the aquifer is very high quality but the water out is of much lower quality with a ~~[illegible]~~ lot of impurities.

Aquifer Storage & Recovery Program

EIR Scoping Meeting—July 29, 2009 3:00pm

Comments:

Blend the well water before distribution

Aquifer Storage & Recovery Program

EIR Scoping Meeting—July 29, 2009 3:00pm

Comments:

Consider the health consequences for seniors with the changes in the mineral content of water from the aquifer and document that we are not endangered by this water

Marsha Rhodes
771-7054

Aquifer Storage & Recovery Program

EIR Scoping Meeting—July 29, 2009 3:00pm

Comments:

- what material is in the aquifer?
- Why don't we use other storage systems (above ground) instead of aquifer
- Why not store water instead of releasing/overflow of Folsom in wet years?
- When aquifer (well) water was supplied to Sun City as a test use of the aquifer there were many negative consequences - will these be addressed i.e. skin itch + rash, too much salt in H_2O.
- How often will aquifer water be tested before distribution?
- Why should Sun City residents have to install water systems to keep our soft water quality.
- My major concern is the sodium content (unhealthy for my husband and I) in well water

Sun City families should not be considered a standard family in size or make-up in your studies regarding consumption

Aquifer Storage & Recovery Program
EIR Scoping Meeting—July 29, 2009 3:00pm

Comments: GIVE IT TO WEST PARK — OR SHUT THEM DOWN!

TASTE WAS TERRIBLE!

STAINS SINKS & TOILETS —

IS NOT HEALTHY!

Aquifer Storage & Recovery Program
EIR Scoping Meeting—July 29, 2009 3:00pm

Comments:

Sun City residents are not to be considered as "Disposable". Health concerns are wrong. Over the ground storage is better. The plan is unfair to West Roseville. We pay enough taxes to be treated fairly.

Aquifer Storage & Recovery Program

EIR Scoping Meeting—July 29, 2009 3:00pm

Comments:

Sir, if you take blood pressure medicine I am sure you would not drink this water.

If put on this water again we need to be notified, so I can notify ~~+~~ my Doctor + see about bottled water or a home purification system

Aquifer Storage & Recovery Program

EIR Scoping Meeting—July 29, 2009 3:00pm

Comments:

The first option should be above ground storage. Underground storage should be absolutely the last choice

Aquifer Storage & Recovery Program

EIR Scoping Meeting—July 29, 2009 3:00pm

Comments:

MEETING WAS <u>NOT</u> REAL INFORMATIVE. EXPLANATIONS AS TO WHY THE PROGRAM WAS NECESSARY WERE LACKING. WE WANT SURFACE WATER STORAGE.

[illegible]

Aquifer Storage & Recovery Program

EIR Scoping Meeting—July 15, 2009 4:00pm AND JULY 29, 2009 3:00PM

Comments:

While the ASR water that was extracted and then piped into West Roseville homes in the Phase II trial met state and federal health requirements, it was a much lower quality water than directly treated and piped Folsom Lake surface water - for drinking and indoor household use purposes. For example, upon aquifer storage for as little as several months, injected-treated-surface water (ASR water) acquired the undesirable characteristics of very high TDS, higher turbidity (poorer cold storage clarity), fine sediments which settle in toilet tanks and cause plumbing valves to leak, and elevated levels of about a dozen chemical species due to diffusion and ion-exchange within the aquifer. There is no reason to believe and no technical evidence to suggest that the huge mass of aquifer solids will not serve as an infinite source of these undesirable componets and characteristics - no matter how many times treated surface waters might be injected into and removed from any of the current wells in the future. Therefore, the Roseville City Council should not provide funding for more ASR injection/extraction wells or the topside upgrade of any existing drilled wells until serious consideration and planning is undertaken for the following action items:

1. Maximize the use of some ASR water specifically for the irrigation of Roseville's parks and various other city landscape and street vegetation, as opposed to indoor household use. This would require some city-wide, strategically located ASR wells dedicated for this purpose. Treated surface water is spared irrespective of how the subsequent ASR water is used later.
2. Blend ASR extracted water (which is merely screened down-hole during recovery and then re-chlorinated and re-fluoridated at extraction) with treated surface water in a ratio of 1 to 4, for example,to dilute the lower quality characteristics of ASR water before sending it into households. If necessary, this could be facilitated via storage/blending tanks. Other cities have sent well water to short-term storage tanks for sediment settling and subsequent blending with treated surface water just prior to delivery in their piped distribution systems.

Environmental scientistshave long known that sometimes the simplest and best "solution to pollution is dilution." That old coined phrase is certainly applicable to the low quality Roseville ASR water. Diluting ASR water with much higher quality treated surface water would minimize its lower quality properties, but would still achieve the primary goal of drawing less surface water during a summer drought period. The Roseville Utilities Department is estimating a 17% need for well or ASR water over the long-term future. If this is accurate, it makesno difference how this is achieved - using ASR water exclusively for a shorter period of time or blending it with treated surface water for a longer period of time.

Bob Taylor July 28, 2009
[redacted] Stonework Court
Roseville, CA 95747

JOHN P. & JOANNE E. SANCHEZ
[redacted] WASHOE COURT
ROSEVILLE, CA 95747-8259

29 JULY 2009

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ENVIRONMENTAL UTILITIES
CITY OF ROSEVILLE

TERRI SHIRHALL, ADMINISTRATIVE ANALYST
CITY OF ROSEVILLE ENVIRONMENTAL UTILITIES
2005 HILLTOP CIRCLE, ROSEVILLE CA 95747

AQUIFER STORAGE & RECOVERY EIR SCOPING MEETING 29 JULY 09

IN REFERENCE TO THE SUBJECT MEETING HELD AT THE SUN CITY ROSEVILLE TIMBER CREEK LODGE, IT WAS WELL DONE AND VERY INFORMATIVE. WHILE THERE WERE MANY QUESTIONS AND COMMENTS FROM THE RESIDENTS IN ATTENDANCE THE MAJORITY HAD TWO MAJOR CONCERNS. 1. **WILL THE QUALITY OF THE WATER TO BE EXTRACTED FROM THE AQUIFER STORAGE WELLS BE EQUAL TO OR BETTER THAN THE WATER THAT WAS PUMPED IN?**

2. WHAT MEASURES CAN OR SHOULD BE TAKEN TO NEUTRALIZE OR MITIGATE THE NATURAL MINERALS CONTAMINATION THAT WILL TAKE PLACE WITHIN THE AQUIFER STORAGE AREA ITSELF?

THESE TWO CONCERNS IF ADDRESSED PROPERLY IN THE EIR PROCESS, WOULD PUT TO REST MANY OF THE RESIDENTS FEARS OVER USE OF THE WELL WATER SHOULD THE NEED ARISE.

JOHN P. SANCHEZ
Johnjo509@comcast.net
916-771-3489

Linda S. Adams
Secretary for Environmental Protection

California Regional Water Quality Control Board
Central Valley Region
Karl E. Longley, ScD, P.E., Chair

11020 Sun Center Drive #200, Rancho Cordova, California 95670-6114
Phone (916) 464-3291 • FAX (916) 464-4645
http://www.waterboards.ca.gov/centralvalley

Arnold Schwarzenegger
Governor

3 August 2009

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ENVIRONMENTAL UTILITIES CITY OF ROSEVILLE

Terri Shirhall
City of Roseville
Environmental Utilities Department
2005 Hilltop Circle
Roseville, CA 95747

sent via email
hard copy to follow

NOTICE OF PREPERATION (NOP) OF A DRAFT ENVIRONMENTAL IMPACT REPORT (EIR)

The City of Roseville is proposing to implement a city-wide Aquifer Storage and Recovery (ASR) program and states as its objectives "maintain groundwater as a sustainable resource, improve the City's water supply reliability, and meet regional conjunctive use program goals."

Central Valley Regional Water Board staff has the following comments.

1. The NOP mentions both increased demand for water supplies and increased water supply reliability. Improved reliability implies that there should be no increase or no impact in the City's water demand beyond that already allocated. If this is not the anticipated outcome then the EIR needs to describe other appropriate impacts including but not limited to, a possible planned expansion of the City's Waste Water Treatment Plant and the subsequent impacts to the surface water discharge water quality.

2. The NOP indicates that there is a less than significant impact to deplete groundwater. The ASR project accommodates extensive groundwater extraction. The controls on groundwater overdraft must then be accomplished in some mitigation strategy, such as a City action, rule, policy or another method.

3. The ASR project causes surface water that is treated to drinking water water-quality standards to be injected for storage, into a subsurface aquifer. The aquifer is a water of the State and Waste Discharge Requirements (WDRs or a permit) are required. Thus, in accordance with California Water Code Section 13260, the City is required to submit a Report of Waste Discharge (RWD) at least 150 days prior to operating the ASR project.

4. Potential groundwater water quality impacts arise from injecting water that is of a different character than the natural groundwater quality. Thus the City needs to complete an antidegradation analysis that demonstrates the ASR project proposal complies with the Antidegradation Policy (State Water Board Resolution 68-16) and the Antidegradation Implementation Policy contained in the Basin Plan. The Antidegradation Implementation Policy is available on page IV-15.01 at: http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/sacsjr.pdf

In part it states:

> *The antidegradation directives of Section 13000 of the Water Code and State Water Board Resolution No. 68-16 ("Statement of Policy With Respect to Maintaining High Quality Waters in California") require that high quality waters of the State shall be maintained "consistent with the maximum benefit to the people of the State."*
>
> *The Regional Water Board applies these directives when issuing a permit, or in an equivalent process, regarding any discharge of waste which may affect the quality of surface or ground waters in the region.*
>
> *Implementation of this policy to prevent or minimize surface and ground water degradation is a high priority for the Board. In nearly all cases, preventing pollution before it happens is much more cost-effective than cleaning up.*

The antidegradation analysis is best completed within the CEQA process: Before high project costs are incurred and allowing the feasibility of alternatives to set appropriate mitigation measures.

Please contact Mary Serra at (916) 464-4732 or via an email to mserra@waterboards.ca.gov, if you have questions.

Mary Serra

MARY SERRA, P.E., Chief
Waste Discharge to Land Unit

MIWOK MAIDU United Auburn Indian Community of the Auburn Rancheria

JESSICA TAVARES CHAIRPERSON | JOHN SUEHEAD VICE CHAIR | DAVID KEYSER SECRETARY | DOLLY SUEHEAD TREASURER | GENE WHITEHOUSE COUNCIL MEMBER

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ENVIRONMENTAL UTILITIES
CITY OF ROSEVILLE

July 15, 2009

City of Roseville
Environmental Utilities Administration
Terri Shirhall, Administrative Analyst
2005 Hilltop Circle
Roseville, CA 95747

Subject: Notice of Preparation: Initial Study for the City of Roseville Aquifer Storage and Recovery Project Environmental Impact Report

Dear Ms. Shirhall,

Thank you for requesting information regarding the above referenced project. The United Auburn Indian Community (UAIC) is comprised of Miwok and Maidu people whose traditional homelands include portions of Placer and Nevada counties, as well as some surrounding areas. The Tribe is concerned about development within ancestral territory that has potential to impact sites and landscapes that may be of cultural or religious significance. We appreciate the opportunity to comment on the proposed project.

In the event of an inadvertent discovery of prehistoric cultural resources or human burials, the UAIC would like to be contacted immediately to provide input on the appropriate course of action. Should excavations for site testing or data recovery become necessary, we would like to be informed in order to provide on-site tribal monitors. We also request copies of future environmental documents for the proposed project so that we have an opportunity to comment on potential impacts and proposed mitigation measures related to cultural resources.

If you have any questions, please contact Shelley McGinnis, Analytical Environmental Services, at (916) 447-3479.

Sincerely,

Greg Baker
Tribal Administrator

CC: Shelley McGinnis AES

STATE OF CALIFORNIA Arnold Schwarzenegger, Governor

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
(916) 657-5390 - Fax

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ENVIRONMENTAL UTILITIES
CITY OF ROSEVILLE

July 14, 2009

Terri Shirhall
City of Roseville
2005 Hilltopo Circle
Roseville, CA 95747

RE: SCH#2009072018 City of Roseville Aquifer Storage and Recovery Project; Placer County.

Dear Ms. Shirhall:

The Native American Heritage Commission (NAHC) has reviewed the Notice of Preparation (NOP) referenced above. The California Environmental Quality Act (CEQA) states that any project that causes a substantial adverse change in the significance of an historical resource, which includes archeological resources, is a significant effect requiring the preparation of an EIR (CEQA Guidelines 15064(b)). To comply with this provision the lead agency is required to assess whether the project will have an adverse impact on historical resources within the area of project effect (APE), and if so to mitigate that effect. To adequately assess and mitigate project-related impacts to archaeological resources, the NAHC recommends the following actions:

✓ Contact the appropriate regional archaeological Information Center for a record search. The record search will determine:
  - If a part or all of the area of project effect (APE) has been previously surveyed for cultural resources.
  - If any known cultural resources have already been recorded on or adjacent to the APE.
  - If the probability is low, moderate, or high that cultural resources are located in the APE.
  - If a survey is required to determine whether previously unrecorded cultural resources are present.

✓ If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
  - The final report containing site forms, site significance, and mitigation measurers should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure.
  - The final written report should be submitted within 3 months after work has been completed to the appropriate regional archaeological Information Center.

✓ Contact the Native American Heritage Commission for:
  - A Sacred Lands File Check. <u>USGS 7.5 minute quadrangle name, township, range and section required.</u>
  - A list of appropriate Native American contacts for consultation concerning the project site and to assist in the mitigation measures. <u>Native American Contacts List attached.</u>

✓ Lack of surface evidence of archeological resources does not preclude their subsurface existence.
  - Lead agencies should include in their mitigation plan provisions for the identification and evaluation of accidentally discovered archeological resources, per California Environmental Quality Act (CEQA) §15064.5(f). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American, with knowledge in cultural resources, should monitor all ground-disturbing activities.
  - Lead agencies should include in their mitigation plan provisions for the disposition of recovered artifacts, in consultation with culturally affiliated Native Americans.
  - Lead agencies should include provisions for discovery of Native American human remains in their mitigation plan. Health and Safety Code §7050.5, CEQA §15064.5(e), and Public Resources Code §5097.98 mandates the process to be followed in the event of an accidental discovery of any human remains in a location other than a dedicated cemetery.

Sincerely,

Katy Sanchez

Katy Sanchez
Program Analyst
(916) 653-4040

CC: State Clearinghouse

Native American Contact
Placer County
July 14, 2009

Rose Enos
15310 Bancroft Road — Maidu
Auburn, CA 95603 — Washoe
(530) 878-2378

April Wallace Moore
19630 Placer Hills Road — Nisenan - So Maidu
Colfax, CA 95713 — Konkow
530-637-4279 — Washoe

United Auburn Indian Community of the Auburn Rancheria
Jessica Tavares, Chairperson
10720 Indian Hill Road — Maidu
Auburn, CA 95603 — Miwok
530-883-2390
530-883-2380 - Fax

Todd Valley Miwok-Maidu Cultural Foundation
Christopher Suehead, Cultural Representative
PO Box 1490 — Miwok
Foresthill, CA 95631 — Maidu
tvmmcf@foothill.net

United Auburn Indian Community of the Auburn
Tribal Preservation Committee
10720 Indian Hill Road — Maidu
Auburn, CA 95603 — Miwok
530-883-2390
530-883-2380 - Fax

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed SCH# 2009072016 City of Roseville Aquifer Storage and Recovery Project; PlacerCounty.

SGA Sacramento Groundwater Authority
Managing Groundwater Resources in Northern Sacramento County

5620 Birdcage Street, Suite 180
Citrus Heights, CA 95610

Tel: (916) 967-7692
Fax: (916) 967-7322
www.sgah2o.org

August 3, 2009

Ms. Terri Shirhall
Administrative Analyst
City of Roseville
Environmental Utilities Department
2005 Hilltop Circle
Roseville, CA 95747

Re: Review of Notice of Preparation of a Draft Focused Environmental Impact Report and Scoping Meeting for the City of Roseville Aquifer Storage and Recovery project

Dear Ms. Shirhall:

The Sacramento Groundwater Authority (SGA) appreciates the opportunity to review and comment on the City of Roseville's proposed preparation of a Focused Environmental Impact Report (EIR). SGA is a joint powers authority formed in 1998 to collectively manage the groundwater basin underlying Sacramento County north of the American River. The groundwater underlying SGA supplies more than half of the public water supply to some 500,000 customers within the SGA area. The SGA area lies adjacent to Roseville on the south.

SGA is aware that because of operational and physical constraints in the region, aquifer storage and recovery (ASR) is a conjunctive use option that should be encouraged as a necessary tool to maximize the recharge to groundwater basins. This has become even more important with potential hydrologic variability resulting from climate change and the decreasing reliability of State and Federal water deliveries even in normal water years due to factors such as legal decisions.

Specific to the Roseville Notice of Preparation (NOP), SGA has the following comments:

1. Water Quality. SGA has been tracking groundwater contamination issues in the underlying groundwater basin since 2004. While we are not aware of any specific contamination concerns in the proposed Roseville well locations, we encourage Roseville to participate in the Sacramento Regional Contamination Issues Committee in order to stay informed on possible contaminants in the region to help ensure the protection of public health.

2. Subsidence. While subsidence has not been a significant concern in the greater Sacramento region, the extensive clay formations described during the July 15, 2009 Public Scoping Meeting could be prone to subsidence through the dewatering of clay layers. We encourage Roseville to continue to participate in State and Federal land surface subsidence monitoring efforts to ensure that land surface subsidence does not become a problem during future operation of a wellfield.

Thank you for the opportunity to comment. Please feel free to contact me at (916) 967-7692 if you have any questions regarding our comments.

Sincerely,

John K. Woodling
Executive Director

Placer County
AIR POLLUTION CONTROL DISTRICT

3091 County Center Drive, Suite 240 Auburn, CA 95603 • (530) 745-2330 • Fax (530) 745-2373
www.placer.ca.gov/apcd
Thomas J. Christofk, Air Pollution Control Officer

August 3, 2009

City of Roseville
Environmental Utilities Department
2005 Hilltop Circle
Roseville, CA 95474

Sent via email at tshirhall@roseville.ca.us on August 3, 2009.

Hard copy mailed on August 3, 2009.

Subject: City of Roseville Aquifer Storage and Recovery Project

Dear Terri Shirhall,

Thank you for providing the above referenced document to the Placer County Air Pollution Control District (District) for review and comment. As you are aware, this project is located within the Sacramento Valley Air Basin (SVAB) portion of Placer County, which is classified as a severe non-attainment area for federal health based ambient air quality standards of ozone and particulate matter (PM10) standards.

Based on the project description, the projects related short-term construction emissions will result primarily from diesel-powered construction equipment, grading, construction, and construction employee trips. Preliminary analysis indicates that the short-term construction emissions will exceed the District's significant thresholds; therefore mitigation measures must be implemented.

The District has identified the following, recommended mitigation measures that should be implemented by the project to ensure that the project's short-term construction emissions, and contribution to cumulative air quality impacts will be reduced to a less than significant impact. The applicant also can propose other measures that achieve the same emissions reductions.

Recommending Mitigation Measures and Notes to Improvement Plans

ap1 1a. Prior to approval of Grading/Improvement Plans, the applicant shall submit a Construction Emission / Dust Control Plan to the Placer County APCD. This plan must address the minimum Administrative Requirements found in section 300 and 400 of APCD Rule 228, Fugitive Dust. The applicant shall not break ground prior to receiving APCD approval of the Construction Emission / Dust Control Plan.

1b. Include the following standard note on the Improvement/Grading Plan: The prime contractor shall submit to the District a comprehensive inventory (i.e. make, model, year, emission rating) of all the heavy-duty off-road equipment (50 horsepower of greater) that will be used an aggregate of 40 or more hours for the construction project. The inventory shall be updated, beginning 30 days after any initial work on site has begun, and shall be submitted on a monthly basis throughout the duration of the project, except that an inventory shall not be required for any 30-day period in which no construction activity occurs. At least three business days prior to the use of subject heavy-duty off-road equipment, the project representative shall provide the District with the anticipated construction timeline including start date, and name and phone number of the property owner, project manager, and on-site foreman.

1c. Prior to approval of Grading/Improvement Plans, the applicant shall provide a plan to the Placer County APCD for approval by the District demonstrating that the heavy-duty (> 50 horsepower) off-road vehicles to be used in the construction project, including owned, leased and subcontractor vehicles, will achieve a project wide fleet-average 20 percent NOx reduction and 45 percent particulate reduction compared to the most recent CARB fleet average. Acceptable options for reducing emissions may include use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, and/or other options as they become available.

ap2 Include the following standard note on the Improvement/Grading Plan: Construction equipment exhaust emissions shall not exceed District Rule 202 Visible Emission limitations. Operators of vehicles and equipment found to exceed opacity limits are to be immediately notified by APCD to cease operations and the equipment must be repaired within 72 hours. Additional information regarding Rule 202 can be found at: http://www.placer.ca.gov/Departments/Air/Rules.aspx **(APCD - Rule 202)**

ap4 Include the following standard note on the Improvement/Grading Plan: The contractor shall suspend all grading operations when fugitive dust exceeds Placer County APCD Rule 228 (Fugitive Dust) limitations. The prime contractor shall be responsible for having an individual who is CARB-certified to perform Visible Emissions Evaluations (VEE). This individual shall evaluate compliance with Rule 228 on a weekly basis. It is to be noted that fugitive dust is not to exceed 40% opacity and not go beyond property boundary at any time. If lime or other drying agents are utilized to dry out wet grading areas they shall be controlled as to not to exceed Placer County APCD Rule 228 Fugitive Dust limitations. **(APCD – Rule 228)**

ap5 Prior to approval of Grading/Improvement Plans, an enforcement plan shall be established, and submitted to the APCD for review, in order to weekly evaluate project-related on-and-off- road heavy-duty vehicle engine emission opacities, using standards as defined in California Code of Regulations, Title 13, Sections 2180 - 2194. An Environmental Coordinator, hired by the prime contractor or property owner, and who is CARB-certified to perform Visible Emissions Evaluations (VEE), shall routinely evaluate project related off-road and heavy duty on-road equipment emissions for compliance with this requirement. Operators of vehicles and equipment found to exceed opacity limits will be notified by APCD and the equipment must be repaired within 72 hours. **(APCD – Rule 202 / California Code of Regulations, Title 13, Sections 2180 - 2194)**

ap6 Include the following standard note on the Improvement/Grading Plan: During construction, no open burning of removed vegetation shall be allowed. All removed vegetative material shall be either chipped on site or taken to an appropriate disposal site. **(APCD - Rule 318)**

ap7 Include the following standard note on the Improvement/Grading Plan: The prime contractor shall be responsible for keeping adjacent public thoroughfares clean of silt, dirt, mud, and debris, and shall "wet broom" the streets if silt, dirt, mud or debris is carried over to adjacent public thoroughfares. Dry mechanical sweeping is prohibited. **(APCD – Rule 228 / section 401.5)**

ap8 Include the following standard note on the Improvement/Grading Plan: During construction, traffic speeds on all unpaved surfaces shall be limited to 15 miles per hour or less. **(APCD – Rule 228 / section 401.2)**

ap9 Include the following standard note on the Improvement/Grading Plan: The prime contractor shall suspend all grading operations when wind speeds (including instantaneous gusts) exceed 25 miles per hour and dust is impacting adjacent properties. **(APCD Rule 228 / section 402)** ap10 Include the following standard note on the Improvement/Grading Plan: The contractor shall apply water to control dust, as required by Rule 228, Fugitive Dust, to prevent dust impacts offsite. Operational water truck(s), shall be onsite, at all times, to control fugitive dust. Construction vehicles leaving the site shall be cleaned to prevent dust, silt, mud, and dirt from being released or tracked off-site. **(APCD Rule 228 / section 401.1, 401.4)**

ap11 Include the following standard note on the Improvement/Grading Plan: During construction, the contractor shall minimize idling time to a maximum of 5 minutes for all diesel powered equipment. **(APCD - Placer County Code / section 10.14.040 Idling)**

ap12 Include the following standard note on the Improvement/Grading Plan: The contractor shall use CARB ultra low diesel fuel for all diesel–powered equipment. In addition, low sulfur fuel shall be utilized for all stationary equipment. **(APCD – California Standards for Motor Vehicle Diesel Fuel, title 13, article 4.8, chapter 9, California Code of Regulations).**

ap13 Include the following standard note on the Improvement/Grading Plan: The contractor shall utilize existing power sources (e.g., power poles) or clean fuel generators rather than temporary diesel power generators.

ap14 Include the following standard note on the Improvement/Grading Plan: All on-site stationary equipment which is classified as 50 hp or greater shall either obtain a state issued portable equipment permit or a Placer County APCD issued portable equipment permit. **(APCD - California Portable Equipment Registration Program, Section 2452).**

Sincerely,

Angel Rinker

Angel Rinker
Placer County Air Pollution Control District
Associate Planner
arinker@placer.ca.gov
(530) 745-2333

Placer County
AIR POLLUTION CONTROL DISTRICT

3091 County Center Drive, Suite 240 Auburn, CA 95603 • (530) 745-2330 • Fax (530) 745-2373

www.placer.ca.gov/apcd Thomas J. Christofk, Air Pollution Control Officer

August 5, 2009

City of Roseville
Environmental Utilities Department
2005 Hilltop Circle
Roseville, CA 95474

Sent via email at tshirhall@roseville.ca.us on August 3, 2009.

Subject: Revised comments for the City of Roseville Aquifer Storage and Recovery Project

Dear Terri Shirhall,

Per our communication, I have revised the recommended mitigation measures to account for the minimal grading (less than one acre) proposed during the construction of the project.

Further, after reviewing the 2001 model analysis used in the initial study for this project, the District has determined that short-term construction emissions could exceed the District's significant thresholds of 82 lbs/day and mitigation measures should be applied. With the implementation of the recommended mitigation measures, short-term construction related impacts would be reduced to a less than significant level.

Please note that the proposed mitigation measures provided in the initial study are either out of date or conflict with the recommended mitigation measures listed below. APCD recommends that the language be updated as follows:

Recommending Mitigation Measures and Notes to Improvement Plans

ap2 Include the following standard note on the Improvement/Grading Plan: Construction equipment exhaust emissions shall not exceed District Rule 202 Visible Emission limitations. Operators of vehicles and equipment found to exceed opacity limits are to be immediately notified by APCD to cease operations and the equipment must be repaired within 72 hours. Additional information regarding Rule 202 can be found at: http://www.placer.ca.gov/Departments/Air/Rules.aspx **(APCD - Rule 202)**

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ap13 Include the following standard note on the Improvement/Grading Plan: The contractor shall utilize existing power sources (e.g., power poles) or clean fuel generators rather than temporary diesel power generators.

ap14 Include the following standard note on the Improvement/Grading Plan: All on-site stationary equipment which is classified as 50 hp or greater shall either obtain a state issued portable equipment permit or a Placer County APCD issued portable equipment permit. **(APCD - California Portable Equipment Registration Program, Section 2452).**

If you have any questions regarding this communication, please contact me at 530-745-2333 or via email as shown below.

Sincerely,

Angel Rinker

Angel Rinker
Placer County Air Pollution Control District
Associate Planner
arinker@placer.ca.gov
(530) 745-2333

STATE OF CALIFORNIA – CALIFORNIA NATURAL RESOURCES AGENCY
ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF WATER RESOURCES
CENTRAL DISTRICT
3500 INDUSTRIAL BOULEVARD
WEST SACRAMENTO, CA 95691

RECEIVED
AUG - 6 2009
ENVIRONMENTAL UTILITIES
CITY OF ROSEVILLE

August 3, 2009

City of Roseville
Environmental Utilities Department
2005 Hilltop Circle
Roseville, California 95747

Attention: Terri Shirhall
Administrative Analyst

CITY OF ROSEVILLE - AQUIFER STORAGE AND RECOVERY PROJECT

Dear Ms. Shirhall:

The Department of Water Resources is responding to the June 30, 2009 Notice of Preparation and scoping activity for the City of Roseville's (the City) Aquifer Storage and Recovery project (ASR). DWR has previously provided technical support for this project and is familiar with the successful planning progress. We are committed to providing regional coordination support for the City's ASR planning activities. This regional coordination activity will provide guidance to help align important planning activities to utilize resources to achieve best results. These include the California Water Plan Update and resource management strategies, advancement of integrated regional water management planning activities, urban water management planning documents, and drought planning activity outlined by the Governor.

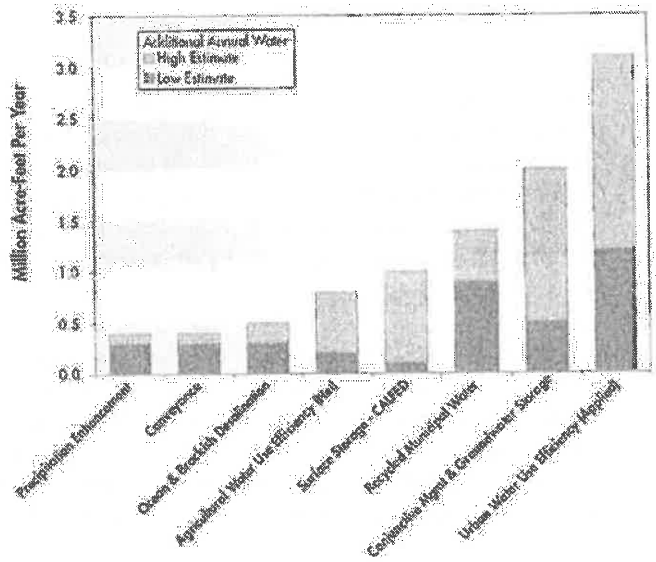
The advancing implementation process should be coordinated to maintain consistency with regional efforts. We understand that the EIR will document the proposed implementation of a city wide ASR project to maintain groundwater as a sustainable resource, improve the City's water supply reliability. This project can advance regional needs and will require continued communication and regional coordination for successful results.

DWR also recognizes the City's commitment to collaborative planning as the ASR project has been included within the City's 2005 Urban Water Management Plan, the Western Placer County Groundwater Management Plan, the 2006 American River Basin Integrated Regional Water Management Plan, and is recognized as a project to meet the City's Water Forum commitments. Finally, DWR understands the City is looking to enhance their monitoring network to further characterize the hydrogeologic conditions beneath the City with the completion of test borings and monitoring wells as part of a DWR AB 303 local groundwater assistance grant.

We recognize the steps to date have produced positive results in water management activities including the design and construction of new infrastructure, pilot and demonstration scale testing, and the development of regulatory processes with the Central Valley Regional Water Quality Control Board. The progress the City has achieved to date, and the commitment from The City to continue to collect data and complete studies are important steps for regional planning and will provide positive elements for project decisions.

The State of California faces a number of challenges to meet its water supply needs in the future, a growing population, changing land use, and environmental and legal restrictions on diversions from the Delta and Colorado River, not to mention the decreasing snow pack and changed hydrology that will result from climate change. A number of approaches will be needed to meet future demands, including water conservation, recycled water, desalination, and other strategies.

As illustrated below, DWR has identified conjunctive management and groundwater storage as one of the resource management strategies in the California Water Plan Update 2005 for making new water supplies available to meet future 2030 year water demands. This illustration depicts statewide estimates. Groundwater storage projects, like The City's ASR project, will provide flexibility, as well as water supply reliability improvements on the local, regional, and statewide levels and have the potential to increase statewide supply by up to 2 million acre-feet per year.



Source: *California State Water Plan Update 2005*

DWR strongly supports and has been working aggressively for the last decade to implement additional groundwater storage through locally driven projects, such as The City's ASR project. For this reason, DWR will continue to support and look for potential opportunities to work with The City, other state agencies, and project stakeholders to develop successful groundwater storage projects to meet California's water needs. Furthermore, DWR looks forward to the opportunity to review the city wide ASR project as outlined in the EIR.

If you have any questions or wish to discuss this matter further, please contact Trevor Joseph of my staff at (916) 376-9619.

Sincerely,

Karl P. Winkler, Chief
North Central Region Office

City of Roseville
Environmental Utilities
Terri Shirhall, Administrative Analyst
2005 Hilltop circle,
Roseville, Ca 95747
(916) 774-5770/ 774-5536
Tshirhall@roseville.ca.us

August 3, 2009

Dear Ms. Shirhall,

Subject: Comments on the Aquifer Storage & Recovery NOP.

Thank you for the opportunity to provide comments on the AS&R NOP.

The presentations on the ASR talk about this source of groundwater only being used as backup in case of drought and emergency due to the reliability and/or shortage of surface water. Yet, the 2-page handout from the Scoping Meeting implies a broader use in light of the increasing demands of water supplies over the last several decades. The DEIR needs to clearly state all the potential uses of the groundwater, how much will be used and when. Since the NOP Handout identified the potential for growth-inducing effects, "Is" the intent to provide an additional sustainable "potable" water resource? Will Roseville use this program as any type of justification for the approval of additional development? If so, what could that justification include and how much, for how much development? Also, please address the short-term and long-term quantity and quality reliability of this groundwater resource?

If additional groundwater will be used as a sustainable resource, Please explain how and/or if the State Water Resource Control Board might have over-site of this process. Are there existing guidelines for an ARS program? What are they?

What exactly are the "Regional Conjunctive Use Program Goals"? Where in California has the ARS been used and for how long? In other programs, at what point(s) is the water being treated? Are any other types of aquifer storage programs for conjunctive use being stored above the ground in storage tanks or below in the groundwater supply? What types of monitoring programs are being conducted? Are the properties in the water in other areas the same as in the

Roseville area? What types of long-term health studies have been conducted? How will these issues be address and monitored in Roseville?

Water Quality and Treatment is of primary concern. Please provide a comparison of groundwater verses the treated surface water. Please identify "any" health issues or risks associate with the various properties. Also, please identify the daily safety limits of the various properties. As an example, identify the safety limits of say - sodium; can too much lead to High Blood Pressure and what groups should be more concerned about the higher levels?

The affect of "Declining groundwater levels" has been raised as an issue. From what I understand the groundwater level in the Sacramento area has declined over a foot over some period of time. Please thoroughly discuss this issue. Has the groundwater levels in the Roseville area been measured, Where, Over what period of time, How deep, How frequently? Has there been a decline in the Roseville area, Over what period of time, etc.? Please include a Table in the DEIR showing the Water Table at various times of the year - in various locations, at various depths, including any historic information from previous readings if they are available.
Will Roseville establish a "No net loss in additional decline" policy? Mitigation should include a Policy for "No net loss in the decline of the groundwater levels." If this is not feasible, please explain why.
What types of monitoring programs will be established to prevent a further decline/drawdown in groundwater levels? How many times and at what times of the year, at what depths? Since groundwater saturation can vary at different times of the year, monitoring should also occur at various times of the year, at various depths and in all of the various locations. Who is going to pay for this?
According to various presentations, we currently have enough surface water supply to meet the current demands. Since there is currently no need for an extra supply of water for the existing residents, this program should be fully funded from new development. Then, it should be used only by new development. Please discuss this and How it will be funded? What are the over-all projected costs?

Although I would like to see no decline in existing groundwater levels (and maybe the return to historic levels, if there has been a decline), I am also concerned about raising levels that could become saturated and elevate groundwater levels that could create a risk of potential of additional flooding during the winter months. Injecting treated water into groundwater during the fall, winter, and spring months when rain downfall and runoff is the greatest would seem to limit the amount of water that could be safely injected into the ground. Please address this. Also, how many wells are in close proximity to creeks or runoff basins? Please clearly identify all well locations in DEIR. How many wells are in areas of wetlands or clay soils? What are the proposed depths of injection? Will this vary from well to well? The surrounding conditions and soil types need to be identified for each well as well as their locations. Please provide all of this information in the DEIR. How will all of this be addressed?

Potentially how much surplus of the City's existing Folsom Lake water entitlements will be injected into the ground? How will this be measured and monitored? State clearly whether or not the recovery amount will be the same as, or not to exceed the injected amount.
How will any extraction/recovery for the delivery system be measured and monitored? If the water will be treated prior to injection, how will it be monitored for quality and/or treatment prior to it being delivered to the public? Does the water properties or quality vary by well site? Will each well be separately monitored? Or, will there be Sample Wells?
Mitigation should be treatment of the recovery amount prior to delivery to the public. If this is not feasible, please explain why.

The handout says: *"An ASR Program would entail injecting available surface water supplies year-around up to the "excess" treatment capacity of the City's water treatment plant."* As it goes on, I get confused by a part of the sentence: about Summer - *"Extraction would then be used to meet customer demand when treatment facilities are at or near capacity . . . ."* Does this mean, The Roseville Plant does not have the "Capacity to Serve"? Does this mean that an additional expansion of treatment facility is necessary? Why isn't the facility able to treat the Supply to meet the Demand? Please explain both of these sentences in detail.

Additionally, we were told we need to "use or lose" our surplus entitlements/contract amounts as another reason to inject the surface water into the ground. I am also confused by this comment. Please explain, the "use or lose" approach. In the past, I thought water users based their contract supply/entitlement amounts on potential build-out or some projected build need to insure the water would be there when things were built and not have a "Paper Water" amount as the identified source for approval of new development. Just because the City is not built-out or an approved project built, why or how can the unused portion be taken away?

Treated water injected into Aquifer will/can have different properties than the groundwater, how will this potentially impact the various beneficial uses that groundwater provides to various wild life and plant species habitat. During the rainy or downfall periods, the injection of water could potentially saturate the ground and could potentially add to additional flows in the creek beds therefore impacting the U.S Waterways and/or potentially vernal pools. Has Fish & Wildlife as well as Fish & Game been notified for comments? From what I have been told anything that can impact the PH in water can be harmful to various plants and in particular impact fish sustainability. How will this be addressed?

During the Scoping Meeting, it was asked if the Del Webb Specific Plan and EIR addressed the use of groundwater. It was stated that it did. Please, include an Attachment or Exhibit supplying the sections from the various Specific Plans/EIRs that addressed the use of groundwater. In particular, please provide the responses from the State Water Quality Control Board to the use of untreated groundwater as a "potable" water source. A proposed "Del Webb" well has been identified on the Handout, please provide the exact location and a copy of the Specific Plan/EIR where this was identified and discussed - include this information as part of an Appendix or Exhibit.

Over-all Water Availability should be part of the decision process in determining the need for an ARS Program. Please identify all available amounts of surface water and the source of each amount of surface water. Please identify when and if any contract might expire. Also, could there be any limitation on delivery of that amount? As an example, the Bureau may need to cut back 25% of our allocation due to drought, so how much would be left for use if this happens? Do we have an adequate delivery and treatment system/facility with a "Capacity to Serve" the Supply to meet the Demand? Also, please identify how much the current surface amount will serve. Will it serve Build-out of the City? Or will it supply, all currently approved projects within the current city boundaries? How will this be impacted with the cumulative impacts of additional project approvals; and, with additional annexations? Please identify by project and all potential annexations how much demand they will need and if we could currently serve each project. Please do not use conservative population projections, use the new requirements to meet the Housing need numbers, such as 30 units to an acre.

Please Note: Living in Roseville, my expectations were the use of Surface Water as the source of "potable" water. Additionally, I am not happy and very concerned that the recovery of the groundwater for public use will not include a treatment process prior to being provided to the public as a potable water source. Mitigation at minimum should include additional treatment prior to public use. If this is not feasible mitigation, please explain why. Health and Safety should be the primary concern prior to any public use.

Please also notify the public and me of any public hearings before the State Water Quality/ & Resource Control Boards.

Thank you for the opportunity to provide NOP comments, please notify and provide me a copy of the DEIR when it is circulated for review.

Respectfully submitted,

Jan McKinsey
[redacted] Stagecoach Circle
Roseville, Ca 95747
(916) 783-9211
janmckin@comcast.net

City of Roseville
Environmental Utilities
Terri Shirhall, Administrative Analyst
2005 Hilltop circle,
Roseville, Ca 95747
(916) 774-5770/ 774-5536
Tshirhall@roseville.ca.us

Sept 3, 2009

Dear Ms. Shirhall,

Subject: Comments on the Aquifer Storage & Recovery NOP.

ADDENDUM

Thank you for the opportunity to provide previous written comments on the AS&R NOP. As I understand it, the release of the Draft EIR has been moved from September until October. If possible I would like to add an Addendum to my comments.

After the close of the NOP comment period in early August, a "Special Water Update Presentation" was held at the August 27, 2009 Planning Commission Hearing. This has raised additional questions that I would like to see covered in the DEIR. Additionally, I would like to clarify a few of my previous questions.

I found the information at the August 27th Hearing informative; and, as previously requested, would like to see the Surface Water Supply and Demand data in the DEIR. I understand we are currently using all the 32,000 AFY from the USBR. I'm not sure how much we are currently using from the PCWA and SJWD contract amounts. Please include those amounts. To clarify my previous question, How much are we currently using within the City Boundaries and How much will be required at build-out? What are the cumulative Demand amounts needed for the potential annexations that are being planned? Are we planning new development "Supply and Demand" amounts based on "Dry Years"? If not, why not?

The Aug 27th Presentation identified One Exception to the Flexible Long-term Water Supply Planning Policies: "the type and source of water supply as "Surface Only"". Will this DEIR allow that policy to be changed? If so, will there be limitation on the amount of groundwater? Will it be 14 percent of the time? What exactly is 14 percent of the time?

Please expand the analysis of the groundwater to address hardness and sensitivity issues. During the Extraction Pilot Test, some seniors at Sun City Roseville raised concerns about hardness, sensitivity, and skin irritations. Although this has not necessarily been considered a "quality" issue at this time, the sensitivity issues could raise health concerns. Please address any properties that may be a concern to certain groups such as seniors or children. Please include, maybe as an Appendix, all information on the Pilot Test and all concerns that were raised during the Pilot Test. When any additional test or the distribution of groundwater occurs in the future, when and will as well as how will the public be notified?

Please analyze and discuss water quality issues including cumulative impacts associated with: Urban Runoff, Drainage and Infiltration of Stromwater, Pesticides, Traffic Pollutants, Reclaimed Water, Railroad yards, Golf Courses and Agriculture including Livestock.

Water Quality as well as "High Quality Water" is my primary concern. See "Attached Articles" referencing water quality issues. One article notes the evolving process of new research that shows "weed killer pose water risk" could now be dangerous at a lower concentration than previously thought. The reliability of groundwater has always seemed to be a concern. How will evolving research impact the City's Risk Management and overall costs as more and more groundwater risks are discovered? Please include these articles possibly as an Appendix in the DEIR along with any other related articles used as reference in the DEIR.

As a project "Alternative" please consider and analyze, including cost comparisons, a Large Storage Tank(s) in the area of the treatment plant. The Tank or Tank(s) could be used to store water prior to treatment and maybe a Tank for storage after treatment. Address any need for an increase in treatment capacity. This may also require purchase or "take' of property for this purpose. Please address this as an Alternative.

Again, Thank you for the opportunity to provide additional NOP comments, please notify and provide me a copy of the DEIR when it is circulated for review.

Respectfully submitted,

Jan McKinsey

Jan McKinsey
[redacted] Stagecoach Circle
Roseville, Ca 95747
(916) 783-9211
janmckin@comcast.net

(3 Attachments from Sacramento Bee Articles)

Does weedkiller pose water risk?

AUG 23, 2009 - SAC BEE

ATRAZINE STUDIES SPUR CONCERNS

By Charles Duhigg
New York Times

For decades, farmers, lawn care workers and professional green thumbs have relied on the popular weedkiller atrazine to protect their crops, golf courses and manicured lawns.

But atrazine often washes into water supplies and has become among the most common contaminants in American reservoirs and other sources of drinking water.

Now, new research suggests atrazine may be dangerous at lower concentrations than previously thought. Recent studies suggest that, even at concentrations meeting current federal standards, it may be associated with birth defects, low birth weights and menstrual problems.

Laboratory experiments suggest that when animals are exposed to brief doses of atrazine before birth, they may be more vulnerable to cancer later.

An investigation by the New York Times has found that in some towns, atrazine concentrations in drinking water have spiked, sometimes for longer than a month. But the reports produced by local water systems often fail to reflect those higher concentrations.

Officials at the Environmental Protection Agency say Americans are not exposed to unsafe levels of atrazine. They say that current regulations are adequate to protect human health, and that the doses of atrazine coming through people's taps are safe – even when concentrations jump.

But some scientists and health advocates disagree. They argue the recent studies offer enough concerns that the government should begin reexamining its regulations.

They also say that local water systems – which have primary responsibility for the safety of drinking water – should be forced to monitor atrazine more frequently, in order to detect short-term increases and warn people when they occur.

The EPA has not cautioned pregnant women about the potential risks of atrazine so that they can consider using inexpensive home filtration systems. And though the agency is aware of new research suggesting risks, it will not formally review those studies until next year at the earliest. Federal scientists who have worked on atrazine say the agency has largely shifted its focus to other compounds.

Interviews with local officials indicate many are unaware atrazine concentrations have at times jumped sharply in their communities. But other officials are concerned.

Forty-three water systems in six states – Illinois, Indiana, Iowa, Kansas, Mississippi and Ohio – recently sued atrazine's manufacturers to force them to pay for removing the chemical from drinking water.

Representatives of the EPA and Syngenta, the company that manufactures most of the atrazine sold, say current federal standards are based on hundreds of studies showing Americans are safe. In a written statement, the EPA said it applied large safety buffers in regulating atrazine and continued to monitor emerging science.

"The exposure that the agency allows under its atrazine drinking water regulations is at least 300 to 1,000 times lower than the level where the agency saw health effects in the most sensitive animal species tested," the statement said.

Syngenta said the lawsuits were baseless.

But the head of another government agency voiced apprehension.

"I'm very concerned about the general population's exposure to atrazine," said Dr. Linda S. Birnbaum, director of the National Institute of Environmental Health Sciences, a division of the Department of Health and Human Services. "We don't really know what these chemicals do to fetuses or prepubescent children."

Atrazine is just one example of what critics say are regulatory weaknesses in the protections of America's drinking water. Health and environmental advocates argue the laws safeguarding drinking water and policing toxins are insufficient, and the EPA is often too slow in evaluating emerging science and too unwilling to warn the public when health concerns arise.

Though the hazards posed by atrazine are far from clear, some scientists and health advocates argue that the chemical deserves special scrutiny because it is so widely used. The European Union, for instance, has banned atrazine as part of a precautionary policy that prohibits pesticides that easily contaminate groundwater.

Some high-ranking EPA officials say there are concerns over atrazine, and that it, among other chemicals, is likely to be closely re-examined by the new EPA administrator, Lisa P. Jackson.

Some of the current regulations governing atrazine in drinking water were established in the 1990s. Critics say science has changed since but regulations have not.

Recent studies suggest that when adults and fetuses are exposed to even small doses of atrazine, like those allowed under law, they may suffer serious health effects. Some scientists worry that atrazine may be safe during many periods of life but dangerous during brief windows of development, like when a fetus is growing and pregnant women are told to drink lots of water.

FAST FACTS

Facts on atrazine:

- **Where it's used:** Atrazine, which is sold under various brand names including AAtrex, is most commonly used on corn in farming states. But it can also be found on lawns, gardens, parks and golf courses.
- **Handling precautions:** EPA officials note that anyone using atrazine must complete a short training course and is warned to wear long-sleeve shirts and pants, as well as chemical-resistant gloves and shoes, when spraying.
- **Limits of usage:** The chemical cannot be applied near lakes, reservoirs or other bodies of water.
- **Reporting requirements:** Local water systems must produce an annual report detailing the highest concentrations of atrazine and other chemicals detected over the previous year.

– New York Times

(Atch 1)

State should aid clean water push

SAC BEE 8-24-09

CONTAMINANTS PERSIST, BUT MORE CAN BE DONE TO PURIFY SOURCES

In Galt and South Lake Tahoe, residents are drinking arsenic with their tap water. Traces of the naturally occurring toxic chemical have leached from old mines, rocks and orchards into groundwater, reaching levels that violate state and federal safety standards.

In dozens of tiny towns that dot the Central Valley, residents regularly sip dangerous levels of nitrates with their water. The chemical comes from fertilizers or fecal matter that washes into the soil from broken septic tanks, or from the tons of manure that flow from dairies. Drinking water in many of these areas is also contaminated with the cancer-causing DBCP. A pesticide that also causes sterility, DBCP was banned in 1977 but persists in groundwater.

When tests show their wells are contaminated, water agencies regularly warn their customers to drink bottled water instead. But that can be expensive, particularly for residents of tiny rural districts, many of whom are impoverished farmworkers. Once groundwater supplies are contaminated, small water districts rarely have the resources to put in new wells or provide the treatment necessary to bring their water up to safe standards. As The Bee's Susan Ferriss reported last week, the state has been less than diligent in helping districts address what is a serious health hazard in too many communities.

Frustrated activists in the Central Valley are pushing legislation that would declare clean drinking water a human right. Assembly Bill 1242 by Ira Ruskin, D-Los Altos, specifically establishes a human right to clean, affordable and accessible water. The bill, which has passed the Assembly and is pending in the Senate, seeks to clarify existing state law that has long given priority to domestic water users. Proponents hope it gives health officials greater incentive and authority to address the problem of contamination.

But the bill does not appropriate any money to make sure that people get the clean water they need, and that's the real barrier here. Though state voters have passed bond measures that provide $230 million for water cleanup, and the federal government provides tens of millions more, a 2007 study estimated that it will cost $39 billion and take 20 years to bring drinking water in California up to federal health standards.

But not every remedy needs new money. The state is not using all the resources now at its disposal to protect public health. A simple example contained in The Bee story is illustrative. Last year, the tiny Tulare community of Alpaugh was barred from obtaining a state grant to build an arsenic treatment system because of a temporary freeze placed on such grants. But when the freeze was lifted in April, no one from the state bothered to inform officials at Alpaugh.

More also needs to be done to address the source of pollution. Tulare is home to more dairies than any other county in the world, a major reason nitrate contamination of groundwater is so pervasive there. The state has the power to force dairies to control waste from their operations. The dangerously elevated levels of nitrate in groundwater suggest that's not being done.

Whether or not California declares that the delivery of clean water is a right rather than simply a public service, the state can and should be doing more to see that all its residents have access to the water they need to sustain their lives.

1241 7

HAZARDOUS SUBSTANCES IN WATER SUPPLIES

The California Department of Health keeps records on public water systems that violate maximum levels of various hazardous contaminants. Here are three years' tally of violations as recorded in the 2007 report, the most recent collection of data available:

TYPE OF CONTAMINANT	VIOLATIONS 2005	2006	2007
Inorganic contaminants	101	120	273
Synthetic organic contaminants	4	5	2
Volatile organic contaminants	0	0	2
Radionuclide contaminants	4	7	10
Total coliform	683	723	456
Disinfectant and disinfection byproducts	100	74	31
Surface water treatment	70	50	26
Filter backwash recycle	NA	0	0
Lead and copper	0	1	4

Note: The information in the state report has been found to be incomplete because county health officials and water systems sometimes are late or fail to report violations.

Source: California Department of Public Health ROBERT DORRELL rdorrell@sacbee.com

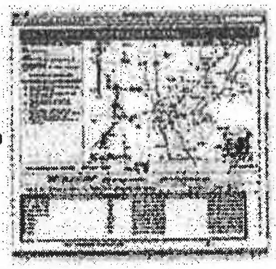
The California Department of Health keeps records on public water systems that violate maximum contaminant levels of various hazardous substances. The 2007 report is the most recent collection of data available. But this information has been found to be incomplete because county health officials and water systems sometimes are late or fail to report violations.

TYPE OF CONTAMINANT	VIOLATIONS 2005	2006	2007
Inorganic contaminants	101	120	273
Synthetic organic contaminants	4	6	2
Volatile organic contaminants	0	0	2
Radionuclide contaminants	4	7	10
Total coliform	683	723	456
Disinfectant and disinfection byproducts	100	74	31
Surface water treatment	70	50	26
Filter backwash recycle	NA	0	0
Lead and copper	0	1	4

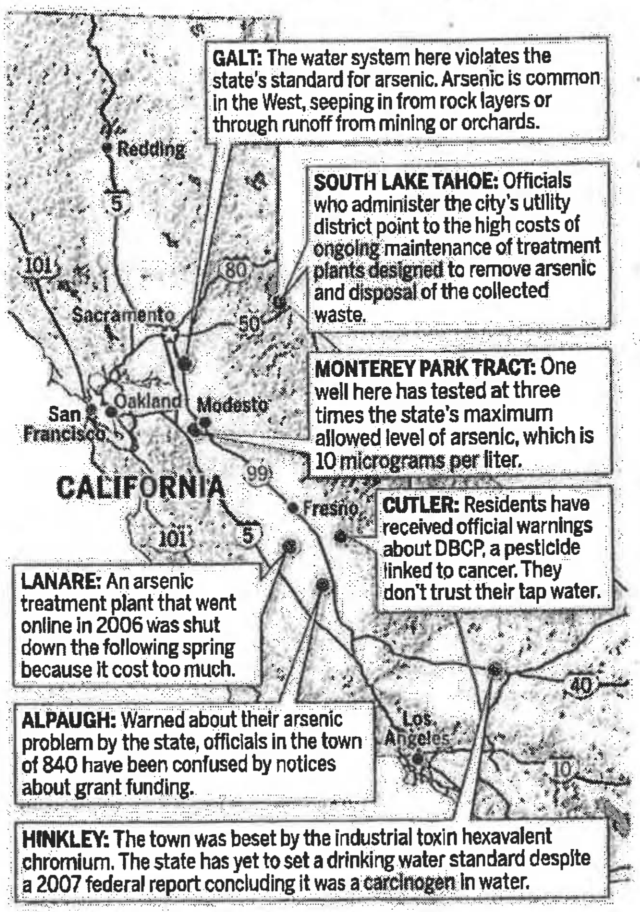
Source: California Department of Public Health

http://geotrackerbeta.ecointeractive.com/gama

The state Water Resources Control Board recently put a database online that allows people to check the health of wells by city and county and state. Contaminants in wells do not reflect what comes out of the tap, but they do offer an indication of the types of problems that exist in certain areas. The database is called **GAMA,** Groundwater Ambient Monitoring and Assessment.



DRINKING WATER CONTAMINATION



Source: Bee reporting by Susan Ferriss ROBERT DORRELL rdorrell@sacbee.com

HIGH NITRATE LEVELS

Nitrates from leaking septic tanks, farm fertilizers and dairy-farm cow manure pollute groundwater in many parts of California. The results illustrated in this map show 9,639 wells tested in 2007.

The wells are a diverse sample. Not all of them furnish drinking water. The well information comes from various state and county agencies.

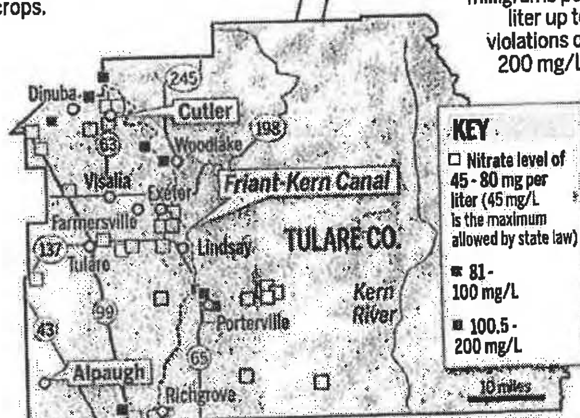
The map does not reflect the quality of water that comes out of the tap in a region, but it does show parts of the state that have problems with nitrates in groundwater.

Source: Map by California State Water Resources Control Board; data from GAMA

TULARE COUNTY WATER SYSTEMS

Many Tulare County towns have high levels of nitrates in their groundwater. Running through the area is the Friant-Kern Canal, part of the government-run system that ferries water from the San Joaquin River to irrigate crops.

The towns have no legal rights to canal water as an alternative drinking water source. The map shows levels of nitrates in groundwater from more than 45 milligrams per liter up to violations of 200 mg/L.

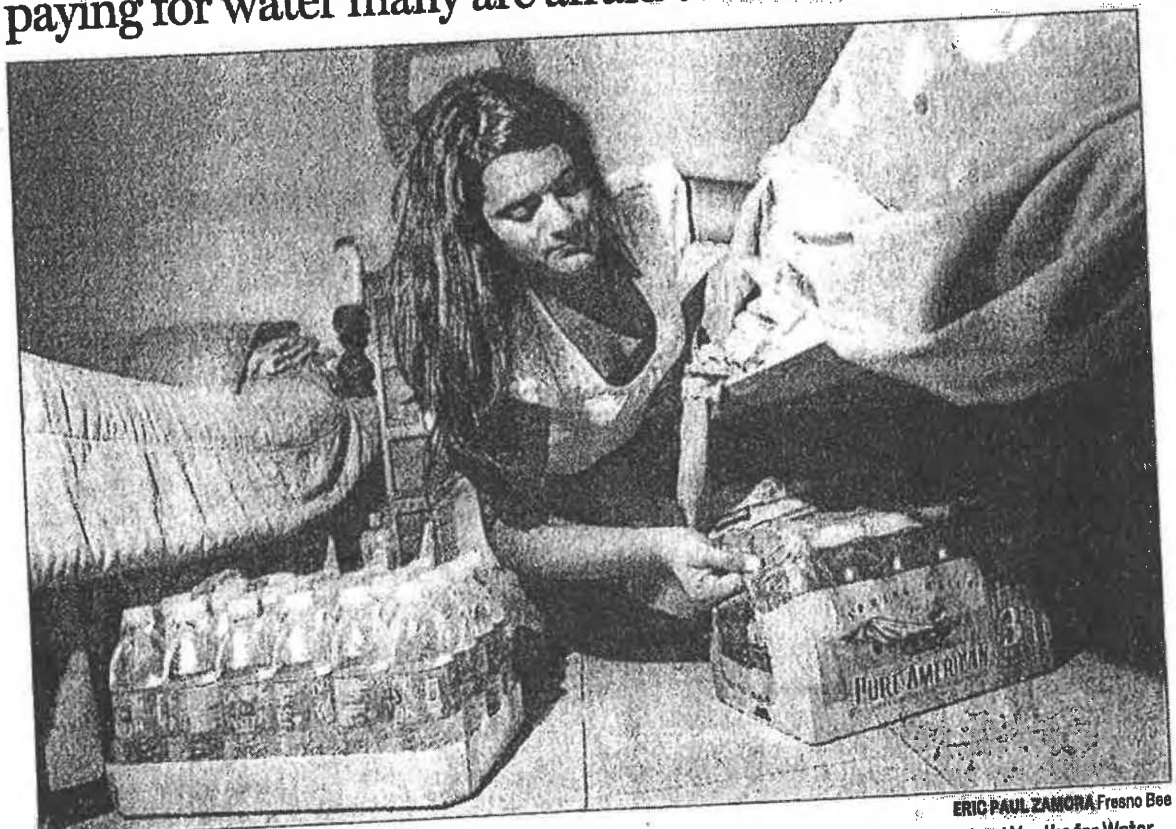


Source: Map by Tulare County Environmental Health Services Division (2008)

(Atch 3)

SAC BEE 8-19-09

Central Valley residents are fed up: They're paying for water many are afraid to drink



ERIC PAUL ZAMORA Fresno Bee

Joanna Mendoza, 13, tucks cases of water under a bed in the Tulare County town of Cutler. The teenager joined Youths for Water to push for improvements in the community's tap water, which contains DBCP, a pesticide that has been linked to cancer.

HECTOR AMEZCUA hamezcua@sacbee.com

David McNeir heads a Monterey Park Tract district with contaminated water. All efforts so far to find cleanup funds have failed.

VIDEO: The Monterey Park Tract neighborhood in Ceres is among the communities fighting to get water that meets state drinking standards. videos.sacbee.com

With funds frozen, no cleanup is in sight

8-19-09

By Susan Ferriss
sferriss@sacbee.com

David McNeir is a bishop of his church and a man of faith. But he has found himself banging his hand on a table more than once when negotiating with public health authorities for clean drinking water.

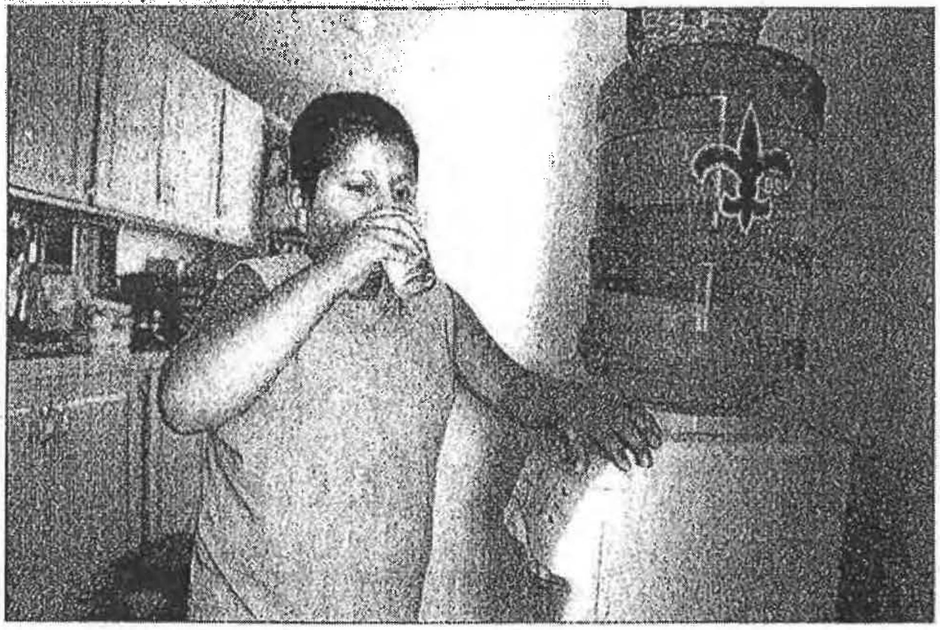
"We've always had bad water," said McNeir, a cannery employee who lives in Monterey Park Tract, an area southwest of Modesto flanked by dairies and farms. "We've been on a list for a project now for four or five years. We've applied for every kind of grant there is."

Up and down the Central Valley, the frustration is palpable.

After years of effort by community activists, politicians and even young teens, the state's progress toward clean water for all is dwarfed by discoveries of more problems.

WATER | Page A16

Jan 17, 2009 SAC BEE



HECTOR AMEZCUA hamezcua@sacbee.com

Daniel Gonzalez, 10, gets a drink of bottled water in Monterey Park Tract, southwest of Modesto, where residents have been warned that their well water has tested above safe levels for both arsenic and nitrates.

Water: $39 billion, 20 years for improvements, U.S. says

FROM PAGE A1

Residents continue to rely on groundwater tainted by pesticides, nitrates, industrial chemicals and arsenic.

Californians have voted twice for bond money to ensure clean water, with $230 million in grants and loans aimed at mostly small and disadvantaged communities.

The state also receives annual federal money for clean-water projects, this year totaling $67 million. And, thanks to the federal stimulus plan, the state's getting another $160 million bump.

But a 2007 federal study estimated it will take $39 billion over 20 years to improve California's drinking water quality.

Adding to delays is the fact that budget problems forced the state to stop taking applications for bond money in December.

"Having money frozen is 10 steps back," said Susana De Anda of the Community Water Organization in Visalia.

De Anda's group has decided it's time to try a new tack: Pass a state law declaring clean water a human right.

A grass-roots movement

Joanna Mendoza, a 13-year-old in the Tulare County town of Cutler, said families are tired of receiving official warnings that their water contains a pesticide linked to cancer.

Residents spend money every month to buy bottled water, on top of paying for what comes out of the tap.

"The only thing that ever changes on those notices is the date," said Mendoza, who belongs to Youths for Water, a group of Central Valley teenagers who are urging their water districts to find ways to improve water quality.

Two decades ago, Cesar Chavez and the United Farm Workers Union rallied farmworkers in the Central Valley to demand better drinking water. As awareness and testing for contaminants grew, water districts and even entire communities have joined the call for action.

That's happening in Monterey Park Tract, where McNeir is chairman of a small utility district that provides water to 48 homes.

In November the state dropped the maximum allowable level of arsenic from 50 to 10 micrograms per liter of water. One well in Monterey Park Tract has three times that standard.

For two decades, McNeir said, local wells also have violated the standard for nitrates, which seep into groundwater from leaking septic tanks, farm fertilizers and – as the state's dairy industry has grown – cow manure.

Attempts to dig new wells have run into more pollution, and efforts to find funding sources have failed.

Now, McNeir's district is looking for money to drill a cleaner well farther away or to tap into a neighboring city's water system.

A growing problem

Officials at California's Public Health Department acknowledge it's difficult to monitor 8,000 public water systems and enforce more than 100 drinking water standards and regulations.

With limited funding, money goes first to water systems contaminated by an acute bacteriological threat, such as fecal matter that can sicken someone instantly. In those cases, the law requires public health authorities to act swiftly, ordering districts to close wells or provide bottled water.

It's much harder to get prompt action when contaminants pose long-term health threats, such as cancer risks.

Yet that may be the biggest challenge.

In November, California followed the federal government in setting a lower safety standard for arsenic in drinking water. That decision meant scores of water systems suddenly were serving up too much arsenic with their drinking water.

Arsenic is common in the West, seeping into water from rock or through runoff from mining or orchards. Even if concentrations do not trigger an immediate water system closure, they can pose cancer risks and vascular and skin problems.

South Lake Tahoe and Galt have water systems that violate the new arsenic standard. Both are developing treatment plants.

Though those two cities can handle the cost, that's not true of all.

"Small systems just don't have that ratepayer base," said Dennis Cocking, spokesman for the South Lake Tahoe utility district. After construction, he warns, districts must shoulder ongoing costs for maintenance and disposal of the concentrated arsenic waste.

In the Fresno County town of Lanare, population 640, a $210,000 arsenic treatment plant went on line in October 2006 and was shut down the following spring. Lanare couldn't afford the treatment chemicals or the electricity.

To the southwest, in Tulare County, Alpaugh – population 840 – received a notice from state health officials on Dec. 18 warning that its drinking water had violated arsenic standards for several years and should be cleaned up.

On Dec. 23, Alpaugh received another letter advising that its state grant had been frozen, and that it should not sign a contract yet to build an arsenic treatment system.

For months, the district waited. In April, the state Department of Finance lifted the stay on some grants awarded before the freeze, including Alpaugh's. But no one on Alpaugh's water board knew that until The Bee told them.

"Well, it's something I would have liked to have known," said Josephine Jennings, the board's executive director.

Contaminants spur warnings

Before arsenic became an issue, the Central Valley's major water-related concerns focused on other chemicals, including perchlorate, the pesticide DBCP and nitrates.

Public health officials consider nitrates an "acute" health risk, but the state policy in most cases is simply to issue a warning that water should not be boiled – which concentrates the nitrates – and that pregnant women and infants should not drink it.

Tulare County is the largest dairy county in the world, and nitrates are pervasive. In groundwater tests of small water systems with more than 200 customers, about 20 percent exceeded state limits.

The Tulare County town of Cutler has lost some of its wells to nitrates. Residents have been warned their water has too much of another contaminant, the pesticide DBCP, which was banned in 1977 for causing cancer and sterility.

Cutler was not listed as violating DBCP standards in a 2007 report. But a new state Water Resources Control Board database shows its wells have violated those standards since 1988.

On June 18, residents received notice once again that their water contains DBCP but that there is no immediate threat requiring them to stop drinking it.

The resulting confusion breeds suspicion, not just of the water, but of the surrounding farms.

Cutler resident Jesus Quevedo, 75, blames his son's death last year from leukemia on the water and on exposure to farm chemicals in the air.

"The farmers are fighting for water to grow crops," he said. "We agree with them. But we are also fighting for water to drink that is pure."

Dionicio Rodriguez, supervisor of the Cutler Public Utility District, said the district was approved for $2.2 million in state grant money this year to dig a new well and install a tank to blend water. That money was frozen.

Looming on the horizon is another potential monster cleanup problem.

More than five years past a January 2004 deadline set by the Legislature, California still has not set a drinking water standard for the carcinogenic industrial toxic substance hexavalent chromium, the subject of the movie "Erin Brockovich," set in the town of Hinkley. State researchers must adopt a public health goal before they can set a maximum contaminant level for the chemical in drinking water.

David Spath, former director of the drinking water and environmental management division of the state Department of Public Health, said hundreds of sources could be in violation once the standard is set. "That's the next train wreck, so to speak," he said.

Policy statement sought

Susana De Anda of the Community Water Organization in Visalia said watching communities struggle for so long without clean drinking water led her to believe a simple, strong statement was in order.

She's hoping AB 1242, a bill known as the Human Right to Water, will require that state agencies act more quickly to assist communities that keep getting overlooked because contamination is not considered an acute threat.

The bill was introduced by Assemblyman Ira Ruskin, D-Los Altos. The Assembly passed it in May, and it is now in the state Senate.

"We're mindful of the budget problems, so it doesn't ask for money," De Anda said. "But this bill is one step forward because it sets a policy. Once you have a policy, then you have to act. It should not be taking years and years to get clean drinking water."

Call Susan Ferriss, Bee Capitol Bureau, (916) 321-1267.

APPENDIX C: EBMUD TECHNICAL MEMORANDUM

Attachment A
Technical Memorandum: A Summary of Operating Aquifer Storage and Recovery Case Systems

East Bay Municipal Utility District, April 7 2005.

TECHNICAL MEMORANDUM

A Summary of Operating Aquifer Storage and Recovery (ASR) Systems

1.0 INTRODUCTION

Aquifer Storage and Recovery (ASR) projects have been developed to address the supply needs of water utilities and their customers throughout many regions of the United States. The purpose of this Technical Memorandum (TM) is to document the location of operating ASR projects and to provide system details if available. The TM also gives specific attention to projects that are similar or of interest relative to East Bay Municipal Utility District's (EBMUD) proposed Bayside Groundwater Project. Projects of interest include those located along the west coast of the US and those with injection and extraction rates of several mgd or greater. It is likely that there are projects that are not included in this study since the use of ASR technology is rapidly expanding.

Research conducted to prepare this TM included reviews of agency web sites and of available technical reports (e.g., studies, research papers, magazine articles, etc.). Telephone calls were also placed with utility representatives in an effort to gain additional insight into their ASR operations. In addition, personal conversations took place with various utility representatives as well as with ASR technical experts to further develop this TM.

2.0 ASR USE IN THE UNITED STATES

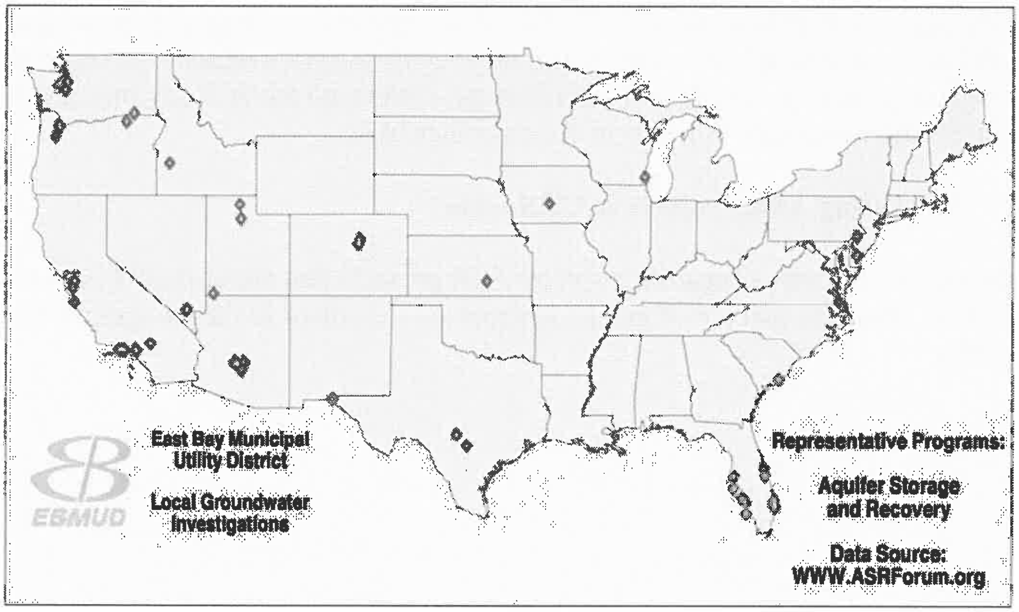
In the US, ASR wells have been used as a means to store water since the late 1960's.[1] EBMUD has identified over 60 active ASR operations in the US (See ASR location Map, Figure 1). This number is a sharp increase from the 3 that were documented as being in operation in the early 1980's.[2] In addition, approximately 100 new ASR facilities are thought to be in development.[1]

As shown on Figure 1, ASR sites are primarily found in growing regions of the US. Examples include the Florida coast (both the Gulf and Atlantic), Arizona (metro Phoenix and Tucson), Nevada (Las Vegas), Texas (El Paso and San Antonio) and the west coast (the Cities of Seattle and Portland, and numerous California locations). There are also a number of sites located in and adjacent to New Jersey.

Research in the ASR field has expanded over time. Studies have shown that generally speaking, ASR projects lead to water quality improvements and do not negatively impact the groundwater.[2]

[1] ASRForum.org website, Pyne, R. David G., ASR Systems LLC, March 2005
[2] "Aquifer Storage and Recovery", Awwa Research Foundation, March 2001

Figure 1
ASR Projects
US Location Map



3.0 ASR PROJECTS OF INTEREST

3.1 Las Vegas Valley Water District and Associated Agency Programs

Within the Las Vegas Valley groundwater basin, the Las Vegas Valley Water District and the City of North Las Vegas artificially recharges unused Colorado River water into the primary aquifer through the use of recharge wells that operate during the winter months. Since the program began in 1987, Southern Nevada has stored about 280,000 acre-feet of water in the local groundwater basin for future use. Southern Nevada Water Agency (SNWA) purveyor members are allowed the ability to bank Colorado River water in the future, utilizing unused and surplus Colorado River water as available.

In addition, the SNWA also performs recharge on behalf of the Las Vegas Valley Groundwater Management Program. This recharge is not intended for recovery, but to assist in managing the groundwater aquifer for the benefit of well users. As of 2004, the SNWA has provided about 9,000 acre-feet of recharge under this program.

Water stored in the aquifer is used to provide emergency summer supplies. 89 wells are in place. Of the 89, 60 are currently used in recharge and recovery operations. A portion of the 60 wells (26 total) are recharge only. Withdrawal rates are a function of a particular well, but in total range in the 800 to 4,000 gpm (approximately 1 to 6 mgd). In total, the LVVWD has the ability to extract groundwater up to a maximum rate of 80 mgd.[3]

The LVVWD ASR project has been in operation for over 15 years, during which time the agency has been able to develop extensive ASR experience. Their system is typically mentioned as an example of a successful, large-scale program which enables drought contingency planning, results in basin recharge, creates no adverse environmental impact, and meets the water quality needs of the customer base.

3.2 Operating ASR Projects in California

Table 1 provides details regarding several ASR projects that are currently in operation in California. Projects that are of greater interest are described in the paragraphs that follow the table.

[3] Telephone Conversation with Erin Cole, LVVWD, Monday March 14, 2005.

Table 1
Operating ASR Projects in California

Location / Owner	Description / Details
City of Pasadena	The City began operation in 1992. 2 wells are in place. Water is sourced from the Metropolitan Water District of Southern Cal. (Met. WDSC).
City of Oxnard	The City began operation of the ASR project in 1991. 4 ASR wells are in operation with an 11 mgd recovery capacity. Water is sourced from Met. WDSC. During the period of 1989 through 1995, the City injected approximately 11,800 AF of water into the local groundwater basins with a similar amount extracted for distribution in the Oxnard Water System as part of the City's seasonal water storage program.[4]
Goleta Water District	The District began ASR operations in 1978. 9 ASR wells are present (as are several additional injection wells). The capacity of the wells vary but on average can extract at a rate of 1 to 2 mgd. Water is sourced from the Cachuma Reservoir.
Calleguas Municipal Water District	The District began ASR operations in 1992. In 1994 2 ASR wells were in operation. 4 additional wells have since been constructed. Plans are to expand the system by as many as 14 additional wells. Water is sourced from Met. WDSC. The extraction capacity of each well is approximately 2 mgd.
City of Camarillo	Operated an ASR system (by converting an existing well into an ASR operation). Shut down that operation recently with plans to construct a new ASR system. Water is sourced from the State Water Project
Zone 7 Water Agency, Pleasanton	ASR project consists of a retrofit of a single existing high capacity well. The well has not been used of late. Zone 7 technical staff supports the development of an ASR program and expects to begin the planning effort in the near future.[5]
Santa Clara Valley Water District, San Jose, California	1 ASR well in operation. This well injects at a rate of approximately 0.4 mgd. Extraction wells are adjacent to the injection well.[6]
Monterey Peninsula Water Management Dist.	1 ASR well in operation as a "demonstration" project. Injection limited by current permit to 1.4 mgd rate (350 Acre FT. max volume). Extraction at a max rate of 2.5 mgd (to not exceed Cal. Water's distribution system limits). Plans in place to request permit to inject up to a max. total volume of 7,000 Acre Ft / Year. [4]

[4] www.oxnardwater.org/documents/plans/uwmp-report.htm, February 28, 2005.
[5] Telephone Conversation with David Lunn of Zone 7 Water Agency, Tuesday March 22, 2005.
[6] Telephone Conversation with Steve Tanner of Padre Associates, Inc., Monday March 28, 2005.

Projects in Southern California are of interest, due to the fact that they have either been in place for a longer period of time, or because their design and/or operational characteristics are close to those of the Bayside Groundwater Project. The project by Monterey Peninsula Water Management District is in relative close proximity to the Bayside region and illustrates that such a facility can be successfully operated, with no subsidence and water quality problems observed.

Details of two Southern California efforts, that of the Calleguas Municipal Water District and of the Goleta Water District, are provided for illustrative purposes.

3.2.1 Calleguas Municipal Water District ASR Project

In an effort to improve water supply reliability for existing and future Ventura County water users, the Calleguas Municipal Water District began implementing the Las Posas Basin ASR Project in the late 1990's.

The project's intended purpose is to provide for the long-term storage of drinking water imported from California's State Water Project. Ultimately, up to 300,000 acre feet of water, or roughly a three (3) year supply for the service area, will be stored in the Las Posas groundwater basin through the program.

Together with other projects currently being implemented by the District, the Las Posas program is intended to "virtually drought proof the Calleguas service area and ensure an adequate drinking water supply in the event of outages of state water facilities due to earthquakes or other emergencies".

The project includes the construction of 26 wells and approximately 30 miles of pipeline (connecting the wells to the District's existing distribution system). The District anticipates that the project will be completed by 2008.

According to George Mulligan, the District's ASR operations manager, they have not experienced water quality or subsidence issues over time. Similarly, other impacts to landowners have not been observed (e.g., artesian / flowing wells, etc.). Operational information learned by staging the construction has enabled them to adjust their designs to improve system performance.[7]

3.2.2 Goleta Water District ASR Project

As noted in Table 2, the Goleta Water District has had an operating ASR project since the late 1970's, with a more significant operation in place since the late 1990's. During the system's more recent operational period, the wells that are in place have primarily been used to inject and store water in the aquifer.

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[7] Telephone conversation with George Mulligan, Calleguas Municipal Water District, March 4, 2005.

As stated in the Goleta Water District's 2005 Water Supply Update, groundwater and in particular the ASR effort has served to back-up the District's water supply. This water has not been drawn upon in 10 years. The District estimates that it could take as much as 1/3 of its supply from groundwater for ten straight years if necessary (long term demand is estimated to be 173,000 Acre-Ft/Yr).

Since the District has not been withdrawing water, the primary concern of local residents has been on the creation of artesian conditions. However, due to the nature of the aquifer (storage volume available, hydraulic properties, etc.), that condition has not been observed.[8]

3.3 Other Projects of Interest

As stated previously, ASR projects can now be found throughout many regions of the US. Areas where rapid growth is occurring correspond to the location of the greatest number of projects.

Florida has projects that ring their coastline (both along the eastern Atlantic Coast as well as along the Gulf Coast). For the purposes of this TM, a review of these projects indicates that those that can be found in the southwestern portion of the State have elements that are of interest to EBMUD, and hence some time has been devoted to a description of those efforts in this TM.

3.3.1 Recent Southwest Florida ASR Developments

The following summary of recent ASR developments in Southwest Florida is based on information presented at a technical conference held by the American Groundwater Trust in 2004.[9]

Of the numerous projects, the City of Tampa's effort to use its ASR project as a drought supply is similar to EBMUD's Bayside Groundwater Project. The following section details the City's efforts

3.3.1.1 City of Tampa ASR project

Since the late 1990's, the City of Tampa has embarked upon an ASR project to address the City's rapid growth combined with its limited water supplies (in particular the limits of their current supply during times of drought). Details of the Tampa ASR facilities are provided in Table 2 below:

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[8] Telephone conversation with Kevin Walsh, General Manager, Goleta Water District
[9] "Recent ASR Developments in Southwest Florida", Mark McNeal, P.G., CH2M HILL, American Ground Water Trust, Aquifer Storage Recovery IV Conference Proceedings, 2004.

Table 2
City of Tampa
Existing ASR Facility Details[10]

Project Element	Details
Wells	8 Existing ASR Wells
System Injection / Recovery Rates	Combined rate of 8 wells = 10 mgd withdrawal (withdrawal sustainable for a period of 100 days = their expected length of drought period / when surface supplies would not be available)
Maximum Aquifer Storage Volume	1 billion gallons
Misc. System Elements	Conveyance Pipeline to direct recovered water to existing treatment plant

The ASR project implemented by the City faced the following challenges:

- Numerous domestic well owners
- The potential for sinkhole development in Florida's limestone geologic environment
- The potential for response in nearby lakes
- Impacts to urban wetlands
- Withdrawal challenges (the need to design a system that allowed withdrawals in dry years and recharge in wet years)
- Water quality challenges (the need to design for fluctuating chloride concentrations)

The results of the implementation and operation of Tampa's ASR system has shown that the above issues can be successfully addressed. Based on system operation since prior to 2000, the system has been shown to:

- Be able to co-exist with residents
  - No impacts to private well owners have been encountered
  - No sinkholes occurred that were attributed to ASR pumpage
  - No ASR-related impacts occurred within the surrounding neighborhood
- Lake level response was deemed to be insignificant

[10] www.tampagov.net

- The system was able to provide approximately 15% of the City of Tampa's water supply during the 2000-2002 drought (the average daily demand is approximately 78 mgd, hence the system supplied approximately 10 mgd during drought months).

3.3.1.2 Other Southwest Florida ASR Projects

Aside from the City of Tampa's efforts, 6 other Southwest Florida water providers have potable water projects. Of those, Manatee County was the first to install and operate ASR wells (as of 1983). Their operation was recently expanded to 6 wells with a total capacity of 10 mgd. Other operations in the region include the Peace River Facility (21 ASR wells, 24 mgd capacity). The remaining communities have smaller ASR programs, yet are planning to expand their efforts greatly over the upcoming years.

Although each of the respective 7 southwestern Florida agency program has had its challenges, ASR is viewed as a very cost effective, safe alternative water supply option of significant importance to the region's water supply.

3.3.2 Projects in the Western US (other than California and Nevada)

Aside from projects that have been constructed in California and Nevada as previously detailed, there are ASR projects operating in several other western states. Table 3 has been prepared to briefly detail efforts underway in Arizona, Oregon and Washington.

Table 3
Operating ASR Projects in the Select Western US States
(not including the States of California and Nevada)

State	Location / Owner-Operator	Description / Details
AZ	Sun Lake City; Pima Utility	The ASR program began operation in 1998. 3 ASR wells are in place with a capacity to store 2.4 mgd of reclaimed water (recovery of water for use as ag. irrigation water)
	Chandler; Municipal Utilities Dept.	The ASR program began operation in 2001. 4 operating ASR wells are in place to receive reclaimed water from the Ocotillo Water Reclamation facility. 5 op. ASR wells are in place - receive water from the Airport Water Recl. Fac.
	City of Fountain Hills	The City operates 3 ASR wells to store reclaimed water.
	City of Glendale	4 ASR wells are in operation. The wells are located at the Arrowhead WWTP. Their purpose is to store reclaimed water.
OR	Salem; City of Salem Public Works Dept.	The ASR system began operation in 1996. 6 ASR wells have been installed. The water is sourced from the North Santiam River.
	City of Beaverton	The ASR system began operation in 1998. 4 ASR wells have been installed.
	Beaverton; Tualatin Valley WD	The ASR system began operation in 1999. 2 ASR wells were installed. Water is sourced from the Bull Run Watershed.
	City of Pendleton	The ASR system began operation in 2003. 2 ASR wells have been installed. The system capacity is 5 mgd. Water is sourced from the Umatilla River.
	City of Tigard	The ASR system began operation in 2003. 1 ASR well is in place. The well's capacity is 1 mgd. Water is sourced from the Trask River.
	City of Portland	The ASR system began operation in 2003. 2 ASR wells are in place. The system's capacity is 3 mgd. Water is sourced from the Bull Run Watershed.
WA	Federal Way; Lakehaven Utility District	The ASR system began operation in the early 1990s. 1 ASR well is in place. The water source is untreated groundwater from the shallow aquifer, stored in the deeper aquifer.
	Seattle; Seattle Water Dept.	The ASR system began operation in 1992. 3 ASR wells are in place. Water is sourced from the Cedar River.
	City of Walla Walla	The ASR system began operation in 2000. 2 ASR wells are in place. The system's capacity is 4 mgd. Water is sourced from Willow Creek.

4.0 PLANS FOR NEW ASR PROJECTS IN CALIFORNIA

In order to meet the challenge of a growing population coupled with limited water supplies (in particular supply shortfalls that occur during times of drought), many of California's water agencies are looking at developing an ASR program or expanding their existing programs. Table 4 notes several programs that are underway or are planned.

Table 4
A Partial Listing of Proposed ASR Projects / Efforts Underway in California

Agency	County	Project Proposals / Plans
Crescenta Valley Water District	Los Angeles	CVWD is evaluating the potential to develop a recharge and conjunctive use program in the Verdugo Basin. Inject and extraction rates will be among the technical issues evaluated.
San Bernardino Valley Water Conservation District	San Bernardino	SBVWCD is constructing two monitoring wells in the San Bernardino Valley to evaluate recharge operations and groundwater levels and flows. Results of this effort will be used to plan for future program(s).
Monte Vista Water District	San Bernardino	MVWD will construct two ASR wells as part of a program to increase recharge operations / reduce basin overdraft. Well plans have not been finalized, but are anticipated to allow operation in the 2-4 mgd range.
Calleguas Municipal Water District	Ventura	CMWD has an expansive ASR program (including distribution pipeline construction elements and ASR well construction components). CMWD is in the process of obtaining permits and financing. Wells constructed that will be used in this operation can inject and extract at a rate of approximately 2 mgd.
City of Roseville	Placer	The City is developing an ASR well for use in augmenting their water supply needs. Currently they are in the permitting stage and have completed pilot testing. The City's well can inject at a rate of approximately 2 mgd and extract at a rate of approx. 4 mgd.
City of Tracy	San Joaquin	The City is developing an ASR well for use in augmenting their water supply needs. Currently they are in the permitting stage and hope to begin pilot testing following agency approval to begin the field effort. Plans call for injection at a rate of approximately 1.4-1.7 mgd, and extraction at a rate of approx. 2.9-3.5 mgd. The City hopes to seasonally store up to 4,600 AF/Y of drinking water.
Monterey Peninsula Water Agency-	Monterey	MPWA is in the process of obtaining permits to operate an ASR facility that will recharge up to 7,000 AF / Yr (based on the positive experience of their demonstration ASR project). The well that would be used for recharge purposes operates at rates ranging from 1.4 to 2.5 mgd.
Zone 7 Water Agency	Alameda	Zone 7 is in the process of evaluating the potential of an ASR program. The rate of injection / extraction will be determined as the program progresses.
Numerous California Water Agencies	NA	Numerous California Water agencies are involved in projects that include surface basins used to recharge the groundwater, and wells constructed for extracting stored water. These programs over time may also include injection wells, as dependent on the growth and expansion of the particular program. Extraction wells on avg. operate in the several mgd range (dependent on facility).

5.0 CONCLUSION

EBMUD's Survey shows that ASR projects are in use throughout the United States. They are a tested and relied upon method of water supply, particularly in the role of providing citizens with much-needed supplemental and/or drought supply.

As urban water needs become more pressing, ASR projects are becoming more and more common. Some ASR projects are quite large, with injection rates ranging up to 80 mgd and total volume of water stored over time approaching 300,000 AF[11]. By comparison, the Bayside Groundwater Project is small, with the currently proposed Phase I having an injection rate of 1 mgd and a 391 AF / year average annual project yield.

[11] "Aquifer Storage and Recovery", data for the Las Vegas Valley ASR project, Awwa Research Foundation, March 2001

APPENDIX D: PURVEYOR SPECIFIC AGREEMENT

CITY OF ROSEVILLE

A. INTRODUCTION

The City of Roseville (Roseville) is located in the southern part of Placer County adjacent to Sacramento County.

Roseville currently has about 24,500 connections, of which about 22,000 are residential.

Roseville has a contract with the United States Bureau of Reclamation (USBR) for 32,000 AF and a contract with PCWA for 30,000 AF of American River water. All surface water is diverted from the Folsom Reservoir.

Roseville also has groundwater wells for emergency backup.

B. SEVEN ELEMENTS OF THE *WATER FORUM AGREEMENT*: INTEGRATED PACKAGE

In order to achieve the Water Forum's two coequal objectives, providing a safe reliable water supply and preserving the values of the Lower American River, all signatories to the *Water Forum Agreement* need to endorse and, where appropriate, participate in each of seven complementary actions.

- Increased Surface Water Diversions
- Actions to Meet Customers' Needs While Reducing Diversion Impacts in Drier Years
- Support for an Improved Pattern of Fishery Flow Releases from Folsom Reservoir
- Lower American River Habitat Management Element
- Water Conservation Element
- Groundwater Management Element
- Water Forum Successor Effort

For each interest to get its needs met, it has to endorse all seven elements. Based on this linkage, signatories agree to endorse and, where appropriate, participate in all seven of these elements.

C. BASELINE DIVERSIONS FROM AMERICAN RIVER

Baseline diversions represent the historic maximum amount of water diverted annually from the American River through the year 1995.

The baseline for Roseville's American River diversion is 19,800 AF.

D. AGREEMENT FOR MEETING ROSEVILLE'S WATER SUPPLY NEEDS TO THE YEAR 2030

1. MOST YEARS: As it applies to the Roseville's portion of the Agreement, Most Years is defined as follows: Years when the projected March through November Unimpaired Inflow to Folsom Reservoir is greater than 950,000 acre feet.

In most years, Roseville will divert and use 54,900 AF.

2. DRIER YEARS: As it applies to the Roseville's portion of the Agreement, Drier Years is defined as follows: Years when the projected March through November Unimpaired Inflow to Folsom Reservoir is less than 950,000 acre feet and greater than or equal to 400,000 acre feet.

In drier years, Roseville will divert and use a decreasing amount of surface water from 54,900 AF to 39,800 AF in proportion to the decrease in unimpaired inflow, from 950,000 to 400,000 AF, to Folsom Reservoir. During drier years Roseville will continue to meet their customers' needs while reducing diversions by additional conservation, using groundwater, and using reclaimed water. Additionally, Roseville will enter into an agreement with the Placer County Water Agency (PCWA) for replacing water to the River, up to 20,000 AF, from reoperation of PCWA's Middle Fork Project (MFP) reservoirs.

3. DRIEST YEARS (i.e. CONFERENCE YEARS): Defined for purposes of the *Water Forum Agreement* as follows: Years when the projected March through November Unimpaired Inflow to Folsom Reservoir is less than 400,000 acre feet.

In the driest years, Roseville will divert and use up to 39,800 AF. In the driest years, Roseville will continue to meet their customers' needs while reducing diversions by additional conservation, using groundwater, and using reclaimed water. Additionally, Roseville will enter into an agreement with PCWA for replacing 20,000 AF of water to the River from reoperation of PCWA's MFP reservoirs.

However it is recognized that in years when the projected unimpaired inflow to Folsom Reservoir is less than 400,000 acre feet there may not be sufficient water available to provide the purveyors with the driest years quantities specified in their agreements and provide the expected driest years flows to the mouth of the American River. In those years Roseville will participate in a conference with other stakeholders on how the available water should be managed. The conferees will be guided by the Conference Year Principles described in Section Four, I. of the *Water Forum Agreement*.

E. SPECIFIC AGREEMENTS FOR COMPLYING WITH THE SEVEN ELEMENTS

(Agreements in italics are common in all Specific Agreements.)

1. All signatories to the *Water Forum Agreement* will endorse all water entitlements needed for the diversions specified in each Purveyor Specific Agreement.

2. All signatories will endorse construction of facilities to divert, treat and distribute water consistent with this Purveyor Specific Agreement and the Water Forum Agreement including diversion structures, treatment plants, pumping stations, wells, storage facilities, and major transmission piping. Endorsement is also to be provided for necessary rights-of-ways, permits, and other endorsements which may be needed, in the context of the following five points:

a. All signatories agree that implementation of the Water Forum Agreement including an Improved Pattern of Fishery Flow Releases, the Updated Lower American River flow standard, the Lower American River Habitat Management Element, Actions to Meet Customers' Needs While Reducing Diversion Impacts in Drier Years, and the Water Conservation Element constitute reasonable and feasible mitigation for any cumulative impacts on the Lower American River caused by diversions included in the Water Forum Agreement.

b. *Environmental impacts of facilities to divert, treat and distribute water will be subject to site-specific environmental review. It is understood that signatories may provide comments on site specific impacts. All signatories will work in good faith to agree on reasonable and feasible mitigation for any site-specific impacts.*

c. To the extent that the water facilities are consistent with the Water Forum Agreement, signatories agree that they will not object to those water facilities based on the cumulative impacts to the Lower American River. Nor will signatories object to water facilities consistent with the Water Forum Agreement based on the planned growth to be served by those water facilities.(See Section Four IV, Relationship of Water Forum Agreement to Land Use Decision Making.)

d. In the planning for new water diversion, treatment, and distribution facilities identified in the Water Forum Agreement, water purveyors signatory to the Agreement will either provide for a public participation process, such as meeting with already established citizen advisory committees, or other appropriate means to help design and implement these projects.

e. All signatories retain their existing ability to provide input on specific details of facility design, financing, and construction.

3. Endorsement of the water entitlements and related facilities in the Water Forum Agreement means that signatories will expend reasonable efforts to:

a. Speak before stakeholder boards and regulatory bodies,

b. Provide letters of endorsement,

c. Provide supportive comments to the media,

d. Advocate the Water Forum Agreement to other organizations, including environmental organizations that are not signatory to the Water Forum Agreement, and

e. Otherwise respond to requests from other signatories to make public their endorsement of the Water Forum Agreement.

4. All signatories agree that participation in the Water Forum and the Successor Effort is in the best interests of water consumers and the region as a whole. Participation in the Water Forum is the most economically feasible method of ensuring that water demands of the future will be met. Furthermore, provisions for groundwater management, conjunctive use, conservation programs, improved pattern of fishery flow releases from Folsom Reservoir, habitat management, and a reliable dry year supply are in the public interest, and represent reasonable and beneficial use of the water resource.

5. All signatories will not oppose and will endorse where appropriate needed rates and fees applied equitably. This includes endorsement at the California Public Utilities Commission for investor owned utilities' ability to recover all costs of conservation programs, including residential meter retrofit, through rates.

6. All signatories will endorse an Improved Pattern of Fishery Flow Releases from Folsom Reservoir and reduced daily flow fluctuations for the Lower American River. (Reference Section Three, III.)

7. All signatories will endorse formal assurances that the diversions will be consistent with the conditions in the Water Forum Agreement and that an Improved Pattern of Fishery Flow Releases from Folsom Reservoir will be implemented.

8. All signatories will endorse and participate where appropriate in all provisions of the Water Forum Agreement, including all agreements pertaining to other signatories and executed as part of this Agreement.

9. All signatories will participate in education efforts and advocate the Water Forum Agreement to regulatory bodies and signatory stakeholder boards as appropriate.

10. All signatories will participate in the Water Forum Successor Effort to oversee, monitor and report on the implementation of the Water Forum Agreement. (Reference Section Three, VII., *Water Forum Successor Effort). This includes participating with other signatories in carrying out procedural agreements as identified in the Water Forum Agreement. To the extent that conditions change in the future, all signatories will work together in good faith to identify ways to ensure that the two coequal goals of the Water Forum will still be met.*

11. All signatories will endorse and, where appropriate, financially participate in the Lower American River Habitat Management Element (Reference Section Three, IV.,Lower American River Habitat Management Element).

12. All signatories will endorse and, where appropriate, implement the Water Conservation Element of the Agreement (Reference Section Three, V., Water Conservation Element). This purveyor's implementation of water conservation will be as specified in its Water Conservation Plan which is incorporated as Appendix J to the Water Forum Agreement.

13. All signatories will endorse and, where appropriate, participate in implementation of the Sacramento North Area Groundwater Management Authority to maintain a North Area estimated average annual sustainable yield of 131,000 acre feet.

14. All signatories will endorse development of a groundwater management arrangement for the South Area and where appropriate participate in its development, to maintain a South Area estimated average annual sustainable yield of 273,000 acre feet.

15. All signatories will endorse development of a groundwater management arrangement for the Galt Area and where appropriate participate in its development, to maintain a Galt Area estimated average annual sustainable yield of 115,000 acre feet.

16. Signatories authorizing individuals to represent them in matters included within the Water Forum Agreement will ensure that representations made by those individuals are consistent with the Water Forum Agreement and are upheld by the signatories.

17. This Agreement is in force and effect for all signatories for the term of the Memorandum of Understanding, December 31, 2030.

18. Any solution that provides for future needs will have costs. New diversion, treatment, and distribution facilities, wells, conservation programs, and required environmental mitigation will be needed. This Agreement identifies that these solutions must be equitable, fiscally responsible, and make the most efficient use of the public's money.

Water suppliers have both capital costs for facilities and operations and maintenance costs. This Agreement recommends that charges imposed to recover capital costs associated with water acquisition, treatment, or delivery be equitable. Any costs for facilities funded through bonds will be recovered as provided by law. In addition, signatories to the Water Forum Agreement agree that operational, maintenance and replacement costs should be recovered from beneficiaries of the system in accordance with California Government Code Sections 53720 to

53730 (Proposition 62) and California Constitution, Articles XIII, C and XIII, D (Proposition 218) and other laws to the extent they are applicable.

19. All signatories agree to endorse, and where appropriate, participate in Sacramento River Supply for North Sacramento County and Placer County (Reference Section Four, III).

20. All signatories will endorse, and where appropriate, participate in the section of the Water Forum Agreement entitled "Relationship of Water Forum Agreement to Land Use Decision Making" (Reference Four, IV).

21. All signatories will endorse, and where appropriate, participate in the Folsom Reservoir Recreation Program (Reference Section Four, V).

22. Purveyors signatory to the Water Forum Agreement will reference the Water Forum Agreement, including agreed upon estimated average annual sustainable yields of each of the three subareas of the groundwater basin in Sacramento County and limits to diversions from the American River in their water master plans and urban water management plans, which are used in providing information to cities and counties as required under Chapter 881 of the Statutes of 1995.

23. Any transfers of American River water by signatories will be delivered in a manner consistent with an Improved Pattern of Fishery Flow Releases as referenced in the Water Forum Agreement.

F. ASSURANCES AND CAVEATS

Because the *Water Forum Agreement* is a comprehensive set of linked elements, it is absolutely essential that adequate assurances be secured for every element. In an agreement that will extend over three decades, the timing of these assurances is critical. Full implementation of all seven elements cannot occur simultaneously. Therefore all signatories agree with the provisions in the Assurances and Caveats Section of this *Water Forum Agreement*.

Two particularly important assurances are the updated Lower American River Flow Standard and Upstream American River Diversion Agreements.

All signatories agree they will recommend to the State Water Resources Control Board an updated American River flow standard and updated Declaration of Full Appropriation to protect the fishery, wildlife, recreational and aesthetic values of the Lower American River. The recommendation will include requirements for U.S. Bureau of Reclamation releases to the Lower American River. In addition, the City of Sacramento's Fairbairn diversion will be required to comply with the diversion limitations of the City's Purveyor Specific Agreement. The *Water Forum Agreement* also includes agreed upon dry year reductions by purveyors upstream of Nimbus Dam. The recommendation for an updated Lower American River standard will be consistent with:

Water Forum Agreement provisions on water diversions including dry year diversions,

and

Implementation of the Improved Pattern of Fishery Flow Releases which optimizes the release of water for the fisheries.

The recommendation will also address related issues such as principles to guide water management in the driest years, flexibility in the standard to allow adaptive management, and amending the existing "Declaration of Full Appropriation for the American River."

Purveyors signatory to the *Water Forum Agreement* who divert from upstream of Nimbus Dam agree they will enter into contract with the Bureau that will provide assurances that the upstream diverters will divert only the agreed upon amounts, which include provisions for reductions in dry year and/or other equivalent measures.

In order to have a durable agreement it is necessary to include the following caveats. These are statements describing actions or conditions that must exist for the *Agreement* to be operative.

1. As specified below, each purveyor's commitment to implementing all provisions of the *Water Forum Agreement* is contingent on it successfully obtaining its water supply entitlements and facilities.

a. If a purveyor receives support from the other signatories to the *Agreement* for all of its facilities and entitlements as shown on the chart in Section Three, I., of the *Water Forum Agreement*, "*Major Water Supply Projects that Will Receive Support Upon Signing the Water Forum Agreement*" and if it receives all necessary approvals for some or all of those facilities and entitlements, then the purveyor will fully support and participate in the following provisions of the *Water Forum Agreement*:

(1) Support for the Improved Pattern of Fishery Flow Releases
(2) Water Forum Successor Effort
(3) Water Conservation Element
(4) Lower American River Habitat Management Element
(5) Support for the Updated Lower American River flow standard
(6) Restriction of diversions or implementation of other actions to reduce diversion impacts in drier years as specified in its Purveyor Specific Agreement.

and

b. If a purveyor is not successful in obtaining all necessary approvals for all of its facilities and entitlements as shown on the chart in Section Three, I., of the *Water Forum Agreement*, "*Major Water Supply Projects that will Receive Support Upon Signing the Water Forum Agreement,*" that would constitute a changed condition that would be considered by the Water Forum Successor Effort.

2. All signatories agree that business, citizens, and environmental signatories' obligation to support, and where specified, implement all provisions of the *Water Forum Agreement* is contingent on implementation of those provisions of the *Agreement* that meet their interests.

3. A stakeholder's support for water supply entitlements and facilities is contingent on:

a. Project-specific compliance with the California Environmental Quality Act, and where applicable, the National Environmental Policy Act, federal Endangered Species Act and California Endangered Species Act.

b. Purveyors' commitment in their project-specific EIRs and CEQA findings to: all seven elements of the *Water Forum Agreement*; support for updating the Lower American River flow standard; commitment by those purveyors that divert from upstream of Nimbus Dam to entering into signed diversion agreements with the U.S. Bureau of Reclamation; commitment by the City of Sacramento to inclusion of the terms of the diversion provisions of its Purveyor Specific Agreement into its water rights.

c. Signed diversion agreements between purveyors that divert upstream of Nimbus Dam and the U.S. Bureau of Reclamation. Other signatories to the *Water Forum Agreement* shall be third party beneficiaries to the diversion agreements solely for the purpose of seeking specific performance of the diversion agreements relating to reductions in surface water deliveries and/or diversions if Reclamation fails to enforce any of those provisions. The status of a signatory to the *Water Forum Agreement* as a third party beneficiary to the diversion agreements is dependent on that signatory complying with all the terms of the *Water Forum Agreement*, including support for the purveyor specific agreement for the purveyor's project. This is not to intend to create any other third party beneficiaries to the diversion agreements, and expressly denies the creation of any third party beneficiary rights hereunder for any other person or entity.

d. Adequate progress on the updated Lower American River standard. The schedule for obtaining the updated standard is in Section Four, I., of the *Water Forum Agreement*.

e. Adequate progress in construction of the Temperature Control Device.

f. Adequate progress in addressing the Sacramento River and Bay-Delta conditions associated with implementation of the *Water Forum Agreement*.

4. Environmental stakeholders' support for facilities and entitlements is dependent upon the future environmental conditions in the Lower American River being substantially equivalent to or better than the conditions projected in the Water Forum EIR. If the future environmental conditions in Lower American River environment are significantly worse than the conditions projected in the EIR, this would constitute a changed condition that would be considered by the Water Forum Successor Effort. Significant new information on the needs of the Lower American River fisheries, which was not known at the time of execution of the *Water Forum*

Agreement, would also constitute a changed condition that would be considered by the Water Forum Successor Effort.

G. REMAINING ISSUES

None

APPENDIX E: ANTIDEGRADATION ANALYSIS

Antidegradation Analysis for Aquifer Storage and Recovery (ASR)

prepared by:

City of Roseville California

and

AQUAVEO™

August 2011

TABLE OF CONTENTS

1. INTRODUCTION

The City of Roseville Aquifer Storage and Recovery Program (referred to in this document as the "ASR Program," "proposed project," or "ASR") is a project proposed by the City of Roseville to improve the City's water supply reliability, maintain groundwater as a sustainable resource, and meet regional conjunctive use program goals. ASR is a process where treated surface water supply is injected by specially designed groundwater wells into the groundwater aquifer for storage when water is plentiful and then later recovered for municipal use thereby enhancing the City's water supply reliability.

In 2003, at the direction of the RWQCB, the City conducted a limited pilot project, the Phase 1 Pilot Study. The Phase 1 Pilot Study was designed to test ASR at the Diamond Creek Well (Well Number 6) located in Leonard Duke Davis Park near the City's northern boundary. During the Phase I Pilot Study the only constituent in the extracted drinking water that posed a concern to the Central Valley RWQCB was Disinfection By-Products (DBPs) such as trihalomethanes (THMs) and haloacitic acids (HAAs). These constituents do not normally occur in groundwater. Although THM concentrations in the extracted water were elevated relative to native groundwater, the concentrations during the pilot study were well below Title 22 drinking water standards and did not pose a significant health risk to consumers. The DBP concentrations in the extracted water were comparable to those typically found in the City's drinking water. Based on the water quality results of the Phase I Pilot study, it was determined that beneficial uses of the water were not impacted although elements of DBPs are higher compare to the background groundwater quality.

In 2006 the City of Roseville initiated a second pilot ASR project referred to as the Phase 2 Test. Beginning December 14, 2005, the Phase 2 Test injected treated drinking water at a rate of 1,356 gpm, for a period of 142 days totaling 830 AF into the groundwater aquifer adjacent to Diamond Creek Well. Beginning on July 17, 2007 this water was extracted from the aquifer and delivered to city utility customers. This continued through February 2008, when nearly three times the injection volume was extracted when pumping ceased. Approximately 697 million gallons, (2,140 acre feet) of water was extracted during the Phase 2 Pump Test.

Results from Phase II Demonstration Testing showed that HAAs concentration decreased below detection limit within 4 ½ months and remained below non-detectable for the rest of the testing period. This strongly suggests natural attenuation of the constituent. Attenuation processes such as microbial breakdown or sorption reaction can and do occur in the aquifer. THM concentrations throughout the testing period consisted primarily of chloroform, while the remaining three species (bromoform, dibromochloromethan, and bromodichloromethane) concentrations were consistently detected near the reporting limit of 0.5 ug/L. As expected, the concentration of total THMs in groundwater is lower than the water delivered to customers in the vicinity of the Diamond Creek Well because native groundwater contains very little or no THMs.

Fluoride is naturally present in the groundwater in low concentrations as identified through our Phase II testing. The City also adds fluoride to the drinking water as mandated by the State of California. A decline in fluoride concentration in the aquifer also occurred as injected water is mixed with native groundwater.

1.1. Purpose of Analysis/Report

The CVRWQCB's principal concern with ASR projects using treated drinking water is water quality degradation resulting from the introduction of disinfection byproducts and fluoride into the groundwater system. The City's potable water proposed for injection contains higher amounts of DBPs, specifically chloroform, and fluoride compared to native groundwater. However, chloroform and fluoride levels are allowed under drinking water regulations because of the need to protect public health. The City's drinking water, which is proposed for injection could increase levels of chloroform and fluoride in the natural groundwater. Based on current permitting mechanism, this is considered a discharge of waste warranting issuance of Waste Discharge Requirements. Hence, the Central Valley Regional Water Quality Control Board (CVRWQCB) has requested an antidegradation analysis be performed in accordance with state and federal policies.

This antidegradation analysis has been performed to assess the nature and degree which injecting treated drinking water would have on existing groundwater quality. Even though the proposed project's storage of treated drinking water in the aquifer may alter groundwater quality with respect to disinfection byproducts and fluoride, the injected water is not expected to adversely affect any current or future beneficial uses. A number of water quality parameters would improve within the storage zone including: Total Organic Carbon, Total Dissolved Solids, Chloride, Manganese, Radon, Nitrate, and Sulfate.

This report will: 1) assess potential groundwater quality changes, 2) determine whether the changes are significant, and 3) if significant, are the changes justified and consistent with maximum benefit to the people of the State while meeting best practicable treatment and control (BPTC). This analysis also assesses whether resultant conditions would be protective of the groundwater's existing beneficial uses, and whether allowing incremental degradation defined herein would be consistent with maximum benefit to the people of the State, given the economic and social benefits of the project versus the water quality impacts and the cost and feasibility of alternatives.

1.2. Project Description

The City of Roseville's Aquifer Storage and Recovery Program (referred to in this document as the "ASR Program," "proposed project," or "ASR") is a project proposed by the City of Roseville to improve the City's water supply reliability, maintain groundwater as a sustainable resource, and meet regional conjunctive use program goals. ASR is a process where treated surface water is injected by specially designed groundwater wells into the aquifer for storage and then later recovered for municipal use thereby enhancing the City's water supply reliability.

Water Supply and Treatment – Barton Road Water Treatment Plant
The proposed project would use surface water (raw water) from Folsom Lake as the source of injected water. Raw water will be treated at the City's Barton Road Water Treatment Plant in Granite Bay. Utilizing conventional water treatment methods including flocculation, sedimentation, filtration, and disinfection, treated water would flow through the City's water distribution pipelines to injection well sites.

Groundwater Wells
The ASR program would involve the use of thirteen specially designed wells capable of both injection and extraction of water and one well solely for injection. Table 1-1 below provides a status summary of each well and Figure 1-1, Water Service Area and ASR Well Sites, shows the existing and planned location of proposed ASR wells within the City.

Table 1-1. ASR Project Wells

Well No.	Well Name & Plan Area	Type of Well	Constructed	Top Side Infrastructure
4	Darling*	Injection & Extraction	1958	Completed
5	Oakmont*	Injection & Extraction	1977	Completed
6	Diamond Creek	Injection & Extraction	2003	Completed
7	Woodcreek North	Injection & Extraction	2008	Completed
8	Hayden Parkway (Fiddyment Ranch)	Injection & Extraction	Drilled in 2006.	Not completed
9	West Side Dr #1 (W-77)	Injection & Extraction	Drilled in 2006.	Not completed
11	Woodcreek West	Injection & Extraction	Yet to be drilled.	Not completed
12	Del Webb (Sun City Well)	Injection & Extraction	Yet to be drilled.	Not completed
13	Hewlett Packard (HP)	Injection	Yet to be drilled.	Not completed
14	Fiddyment Road (F-66)	Injection & Extraction	Yet to be drilled.	Not completed
TBD	Eastern Sierra Vista Well	Injection & Extraction	Yet to be drilled.	Not completed
TBD	Western Sierra Vista Well	Injection & Extraction	Yet to be drilled.	Not completed
TBD	Creekview Specific Plan	Injection & Extraction	Yet to be drilled	Not completed

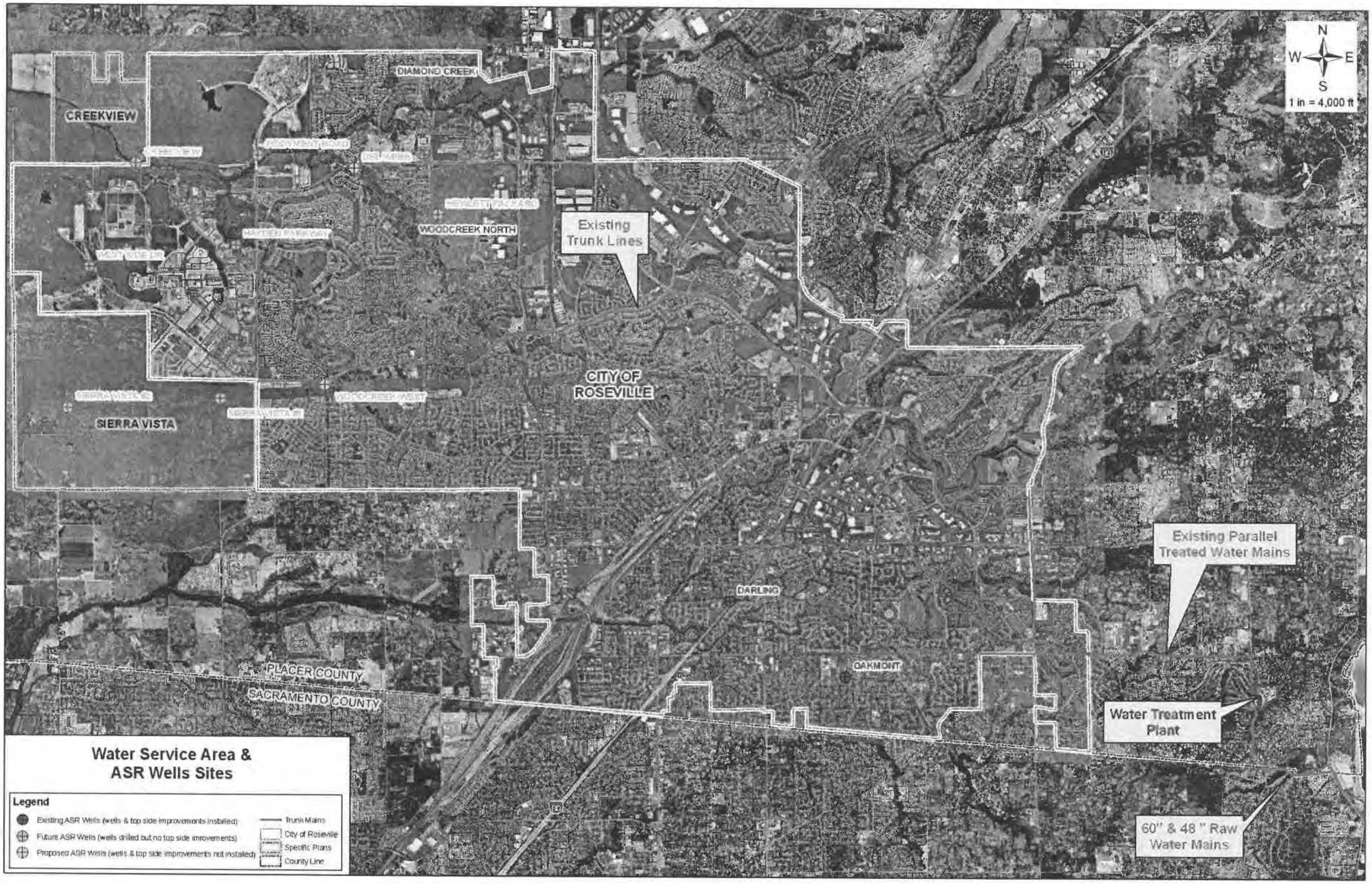

Figure 1-1. City of Roseville Water Service Area and ASR Well Sites

As shown in Table 1-1, the City has constructed four wells, all of which are equipped for both injection and extraction. Nine more wells are planned as components of approved Specific Plan projects, and approved along with certification of those Specific Plan EIRs.

The City's municipal wells typically include "top side" (above ground) and below ground (well casing) improvements. Top side improvements typically include a small structure to house and secure the above ground ASR well equipment and support infrastructure such as pumps, electrical and disinfection equipment (Figure 3: Typical "Top Side" well improvement). Alternatively top side improvements can be protected by perimeter fencing to enclose and secure the above ground infrastructure. The type of top side improvement typically depends on site specific conditions and the potential need for noise mitigation (which is normally accomplished with a building). As indicated in Table 1, of the 13 planned ASR wells, 6 are existing and of those 4 have existing top side improvements. Seven wells remain to be drilled and a total of 9 wells still require some form of top side improvement.

Once groundwater has been extracted from the aquifer it would be pumped into the existing city's potable water distribution system and delivered to customers. In the City's previous ASR demonstration study, DPH required the City to continue to disinfect and fluoridate the groundwater extracted from ASR projects so the levels are optimal and consistent with City's general water system operations.

<u>Operational Characteristics</u>
The Proposed ASR Program involves injecting surface water obtained from Folsom Lake into the North American Sub basin, basin number 5-21.64 as defined in Department of Water Resources' Bulletin 118, for storage and subsequent extraction and use within the City's water service area. Raw water would be treated utilizing available treatment capacity at the City's Barton Road Water Treatment Plant. Most injection would occur during fall, winter, and spring months when American River water is plentiful and customer demands are lowest. Summer injection would occur on a more limited basis when raw water available to the City exceeds customer demands. Typically when groundwater is extracted for municipal supply, it is from the Mehrten formation. It is anticipated that ASR storage would also mainly be the Mehrten formation.

Under existing operation groundwater extraction would normally occur when the City's surface water supplies are cut back significantly in response to drought conditions. Under the City's proposed ASR Program, extraction would occur as identified above and could also occur during normal water years. For example, extraction during a normal water year could occur to meet other system operational goals (such as peaking as discussed further below) or to meet regulatory requirements that may be imposed on the proposed ARS Program to "manage" or control the migration of injected water. Such requirements would be determined based on the permit issued by the RWQCB and any other requirements requested by CDPH. Detailed ASR operational parameters (i.e., the amount of water injection, storage duration and extraction) have been developed for this project based on groundwater modeling and consultation with RWQCB staff. The current operational parameters, may be modified as a result of the permit process, are further defined below.

The amount of water injected would be based on water availability under existing contracts, citywide water demands, and availability of treatment plant capacity at the City's water treatment plant. To ensure all impacts from injection of treated drinking water are considered, a maximum water conservation factor has been included for available water in all three scenarios.

A total of six predictive simulations were developed using three potential ASR operational scenarios, including ASR operations that apply injection only, injection/extraction in the same year, and injection/extraction based on hydrogeologic cycle. The simulation period for each analysis ran from October 2006 through September 2050. Each of the three scenarios was simulated with or without conservation measures in place. The significance of whether conservation measures were in place relates to projected demand, which has a direct impact on the amount of water available that could be injected and/or extracted during the simulation period.

Predictive scenarios with conservation include urban water demand estimates that incorporate reductions in per capita demand (i.e. the amount of water usage per person) for municipalities. The reductions in per capita demand correspond to the proposed 2009 Water Conservation Act introduced by Senator Steinberg which sets a goal of reducing per capita urban water use by 20% by December 31, 2020, with an intermediate goal of reducing per capita water use by at least 10% by December 31, 2015. Conservation measures for calculating irrigation demand estimates were guided by proposed goals of achieving incremental progress towards a 5% reduction in irrigation demands by December 31, 2030, achieved from improvements in irrigation efficiencies, in accordance with the Sacramento Regional Water Master Plan (Aquaveo. 2010).

Predictive scenarios without conservation measures in place assume per capita demand remains constant at 2006 levels and improvements in irrigations efficiencies have not been achieved.

Model nomenclatures for the six predictive simulations are as follows:

- Scenario 1a: Injection only (with conservation)
- Scenario 1b: Injection only (without conservation)
- Scenario 2a: Injection and extraction within the same year (with conservation)
- Scenario 2b: Injection and extraction within the same year (without conservation)
- Scenario 3a: Injection and extraction based on hydrologic water year type (with conservation)
- Scenario 3b: Injection and extraction based on hydrologic water year type (without conservation)

The first set of ASR operational scenarios (Scenario 1a and Scenario 1b) involved injection only. Injection wells were run at maximum capacity until the available water supply was depleted. The available water supply for injection was established based upon the available treatment plant capacity (100 million gallons per day), minus projected water demand. **It should be noted that both Scenarios 1a and 1b are intended to show worst case impacts to the groundwater aquifer based on beneficial uses identified in the basin plan over a 50 year time period**. Injection only operations has minimum probability of occurring as the City will be utilizing its surface water contracts at buildout and there will be minimal water available for the city to utilized groundwater storage.

The second set of ASR operational scenarios (Scenario 2a and Scenario 2b) include both injection and extraction activities within the same year. Each year, injection was allowed from January through June, capturing times of high precipitation and snowmelt. Extraction began in August and continued until the total amount of extracted groundwater was equal to the total amount of injected water each year. Both injection and extraction rates were limited by either available capacity or water supply.

The third set of ASR operational scenarios (Scenario 3a and Scenario 3b) was established to represent potential ASR operations based on three different hydrologic water year types: a wet/normal water year, a drier water year, and a critical (driest) water year (developed in the Water Forum Process). Water year classifications impact both available supply and restrictions on injection or extraction.

Roseville has land use authority within its corporate limits and can therefore ensure that the City's ASR Program is operated in a manner that would not conflict with other ASR programs or municipal wells. Should ASR Program water travel beyond the City boundary, the City would coordinate with the appropriate regulatory agencies regarding any issues that may affect other groundwater users.

2. REGULATORY REQUIREMENTS AND CONSIDERATIONS

Antidegradation policies and guidance have been issued at both the federal and state levels for surface water quality. These policies are intended to protect existing water quality. While groundwater is not a water body of the US and is not within the confines of the federal antidegradation policies, the applicable State policies and guidelines for implementation are described in this section. As stated in a 1987 Policy Memorandum from the SWRCB to the RWQCBs:

> *Where only ground waters are affected, State Board Resolution no. 68-16 still applies, but does not incorporate the federal antidegradation policy; the State and Regional Boards must apply the general policies set for the State Board Resolution no. 68-16 to changes in ground water quality, but need not address the specific, three-part test established by the federal antidegradation policy.*

2.1. State Antidegradation Policy, Resolution No. 68-16

The SWRCB adopted Resolution No. 68-16 as a policy statement to implement the Legislature's intent that waters of the state shall be regulated to achieve the highest water quality consistent with maximum benefit to the people of the state. The Legislature also recognized varying water quality throughout the state and stated that their intent was to maintain the highest water quality available to the maximum extent possible. Therefore, the state policy requires changes in water quality must:

a) Be consistent with maximum benefit principle for the people of the State,
b) Not unreasonably affect present and anticipated beneficial uses of water, and
c) Not result in water quality less than that prescribed in water quality control plans or policies.

The full text of the state policy is provided below:

> *Whereas the California Legislature has declared that it is the policy of the State that the granting of permits and licenses for unappropriated water and the disposal of wastes in the waters of the State shall be so regulated as to achieve the highest water quality consistent with maximum benefit to the people of the State and shall be controlled so as to promote the peace, health, safety and welfare of the people of the State; and*
>
> *Whereas water quality control policies have been and are being adopted for waters of the State; and*
>
> *Whereas the quality of some waters of the State is higher than that established by the adopted policies and it is the intent and purpose of the Board that such higher quality shall be maintained to the maximum extent possible consistent with the declaration of the Legislature;*

NOW, THEREFORE, BE IT RESOLVED:

1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

2. Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

2.2. Administrative Procedures Update 90-004

In 1990, the SWRCB adopted an Administrative Procedures Update (APU 90-004), which specifies guidance to the Regional Boards for implementing the state and federal antidegradation policies. The guidance establishes a two-tiered process for addressing these policies. The process outlines two levels of analysis - a simple analysis and a complete analysis.

A complete antidegradation analysis is required if the proposed activity results in:

1. A substantial increase in mass emissions of a pollutant, even if there is no other indication that the receiving waters are polluted; or
2. Mortality or significant growth or reproductive impairment of resident species.

In particular, an antidegradation finding based on a complete analysis should be made and, if necessary, an analysis should be conducted when performing the following permit activities:

1. Issuance of a permit for any new discharge, including Section 401 certifications; or
2. Material and substantial alterations to the permitted facility, such as relocation of an existing discharge; or
3. Reissuance or modification of permits which would allow a significant increase in the concentration or mass emission of any pollutant in the discharge.

A "simple" analysis may be employed where it is determined that:

1. A reduction in water quality will be spatially localized or limited with respect to the water body, e.g. confined to the mixing zone;
2. A reduction in water quality is temporarily;

3. A proposed action will produce minor effects which will not result in a significant reduction of water quality; or
4. A proposed activity has been approved in a General Plan and has been adequately subjected to the environmental and economic analysis required in an Environmental Impact Report (EIR) required under the California Environmental Quality Act (CEQA).

The City's proposed injection water meets all drinking standards and is currently used to serve all water customers connected to the system (primarily inside the City Limits). In general, the water quality of the injected drinking water exceeds the background water quality for groundwater. The reduction in groundwater quality is minimal and is confined to mixing zones surrounding each well. Degradation is not permanent. The proposed project would also enhance water resource availabilities by maintaining or reducing groundwater pumping thus benefitting all groundwater users within the North American Subbasin.

2.3. Recycled Water Policy

In 2009, the SWRCB adopted the Recycled Water Policy, which provides direction to the RWQCBs and the public regarding permit issuance for recycled water projects. The policy describes permitting considerations including anti-degradation analysis for groundwater recharge projects using recycled water that have the potential to lower water quality within a groundwater basin. Compliance with Resolution 68-16 can be demonstrated by:

1) A project that utilizes less than 10 percent of the available assimilative capacity in a basin/sub-basin (or multiple projects utilizing less than 20 percent of the available assimilative capacity in a basin/sub-basin) need only conduct an antidegradation analysis verifying the use of the assimilative capacity. For those basins/sub-basins where the Regional Water Boards have not determined the baseline assimilative capacity, the baseline assimilative capacity shall be calculated by the initial project proponent, with review and approval by the Regional Water Board, until such time as the salt/nutrient plan is approved by the Regional Water Board and is in effect. For compliance with this subparagraph, the available assimilative capacity shall be calculated by comparing the mineral water quality objective with the average concentration of the basin/sub-basin, either over the most recent five years of data available or using a data set approved by the Regional Water Board Executive Officer. In determining whether the available assimilative capacity will be exceeded by the project or projects, the Regional Water Board shall calculate the impacts of the project or projects over at least a ten year time frame.

2) In the event a project or multiple projects utilize more than the fraction of the assimilative capacity designated in subparagraph (1), then a Regional Water Board-deemed acceptable antidegradation analysis shall be performed to comply with Resolution No. 68-16. The project proponent shall provide sufficient information for the Regional Water Board to make this determination. An example of an approved method is the method used by the State Water Board in connection with Resolution No. 2004-0060 *and the Regional Water Board in connection with Resolution No. R8-2004-0001. An integrated approach (using surface water, groundwater, recycled water, stormwater, pollution prevention, water conservation, etc.) to the implementation of Resolution No. 68-16 is encouraged.*

The City has followed the procedures outlined in the guidance for conducting a complete antidegradation analysis to develop the baseline and available assimilative capacities of the subbasin using over the most recent five years of data available as the City's proposed ASR project is the first project of such kind within the region.

3. WATER QUALITY STANDARDS

A water quality standard consists of: 1) the designated beneficial uses of a water body to be protected, 2) adopted criterion designed to protect those uses, and 3) an antidegradation policy. Antidegradation policies are presented in Section 2. The following sections describe the beneficial uses and water quality criteria applicable to the receiving water, groundwater of the North American Subbasin.

3.1. Beneficial uses

The beneficial uses of groundwater are:

MUN – municipal and domestic supply, and
AGR – irrigation and stock watering, and
IND – industrial service supply, and
PRO – industrial process supply

3.2. Water Quality Objectives/Water Quality Criteria

To protect designated beneficial uses, the RWQCB applies water quality objectives contained in the Basin Plan and other water quality criteria to receiving waters. For constituents not listed in applicable rules and in the absence of an adopted numeric objective, the RWQCB interprets narrative water quality objectives using water quality criteria developed from other sources. The Regional Board then uses these objectives and criteria to determine whether the proposed project will cause or contribute to a violation of an applicable water quality standard. For groundwater in the City of Roseville where industrial service and process supplies are included, the main water quality standards and criteria should focus on the drinking water standards for municipal and domestic supply (MUN) beneficial use and irrigation and stock watering (AGR) beneficial use.

Water quality objectives for groundwater to protect designated beneficial uses from the Basin Plan, but not required by the federal Clean Water Act are listed below:

Constituents	Objective
Bacteria	2.2/100 mL coliform MPN, 7-day period
Chemical Constituents	
Inorganic Chemicals	Title 22 Section 64431 – Table 64431-A
Fluoride	Title 22 Section 64431 – Table 64431-B
Organic Chemicals	Title 22 Section 64444– Table 64444-A
Secondary MCLs – Consumer Acceptance Limits and Ranges	Title 22 Section 64449 – Tables 64449-A and 64449-B
Lead	0.015 mg/L
Radioactivity	Title 22 Section 64443 – Table 4

Tastes and Odors	Shall not contain taste or odor producing substances in concentrations that cause nuisance or adversely affect beneficial uses
Toxicity	Maintain free of toxic substance regardless toxicity is caused by a single substance or the interactive effect of multiple substances

3.2.1. Drinking Water Quality Standards

The federal Safe Drinking Water Act (SDWA) requires the United States Environmental Protection Agency (USEPA) to establish drinking water standards to protect public health. These drinking water standards regulate the amount of contaminants allowed in water supplied by public water systems for municipal supply. The standards are known as Maximum Contaminant Levels (MCLs). Primary MCLs are enforceable standards, set to protect public health.

As discussed above, the federal government delegates primary responsibility for administration and enforcement of the drinking water regulations to the states. Consequently state standards apply to drinking water regulation at the local level. The California Safe Drinking Water Act requires the California Department of Public Health (CDPH) to adopt drinking water standards to protect public health. Similar to federal drinking water quality standards, Primary MCLs are set to protect public health and are enforceable standards, while Secondary MCLs are set for esthetics such as taste and odor, and are not enforceable. All California Primary MCLs are required to be equal or more stringent than EPA's Primary MCLs. Key regulations governing the City's water quality are in Title 22, Division 4, Chapter 15 of the California Code of Regulation, entitled Domestic Water Quality and Monitoring (commonly referred to as Title 22, Title 22 monitoring, or Title 22 Testing). Title 22 requires that chemical and microbial primary MCLs not be exceeded for water provided to the public from a municipal water supply. These MCLs, which serve as this antidegradation analysis thresholds of significance for drinking water quality, are listed in Appendix A.

In addition to drinking water standards, DPH also regulates the operation of water systems including surface water treatment, water distribution system safety, fluoridation, and others. Based on enacted legislation, DPH has determined that more water systems should be fluoridated as opposed to less. It has been recognized that fluoride in municipal water benefits dental health. This determination has resulted in funding being made available for agencies that currently do not fluoridate. If funding resources are provided to add fluoride to a public water system, then this must be complete and the water system's permit will be conditioned to include fluoride in their operating permit.

The City of Roseville fluoridates its drinking water and has been doing so since the 1950's. When the Roseville treatment plant was designed and constructed in the late 1960's the decision was made to continue this practice. It may have been at the discretion of the City at that time but due to changes in regulations the City is now required to continue this addition. Since the City was already fluoridating its system, the current permit contains the condition to add fluoride. Discontinuing this addition would be in violation of the City's permit and subject to penalties.

3.2.2. Agricultural and Other Objectives

Water Quality for Agriculture, published by the Food and Agriculture Organization of the United Nations in 1985, contains criteria protective of various agricultural uses of water, including irrigation of various types of crops and stock watering. At or below the limits presented in the Water Quality Goals tables (Table 3-1 and Table 3-2), agricultural uses of water should not be limited. These criteria may be used as comparative for determining water quality objectives for chemical constituents that would impair agricultural uses of water.

Table 3-1. Guidelines for Interpretations of Water Quality for Irrigation, *Water Quality for Agriculture*, Table 1, Food and Agriculture Organization of the United Nations

Potential Irrigation Problem		Units	Degree of Restriction on Use		
			None	**Slight to Moderate**	**Severe**
Salinity *(affects crop water availability)*[2]					
	EC_w	dS/m	< 0.7	0.7 – 3.0	> 3.0
	(or)				
	TDS	mg/l	< 450	450 – 2000	> 2000
Infiltration *(affects infiltration rate of water into the soil. Evaluate using EC_w and SAR together)*[3]					
SAR	= 0 – 3 and EC_w =		> 0.7	0.7 – 0.2	< 0.2
	= 3 – 6 =		> 1.2	1.2 – 0.3	< 0.3
	= 6 – 12 =		> 1.9	1.9 – 0.5	< 0.5
	= 12 – 20 =		> 2.9	2.9 – 1.3	< 1.3
	= 20 – 40 =		> 5.0	5.0 – 2.9	< 2.9
Specific Ion Toxicity *(affects sensitive crops)*					
	Sodium (Na)[4]				
	surface irrigation	SAR	< 3	3 – 9	> 9
	sprinkler irrigation	me/l	< 3	> 3	
	Chloride (Cl)[4]				
	surface irrigation	me/l	< 4	4 – 10	> 10
	sprinkler irrigation	me/l	< 3	> 3	
	Boron (B)[5]	mg/l	< 0.7	0.7 – 3.0	> 3.0
	Trace Elements (see Table 21)				
Miscellaneous Effects *(affects susceptible crops)*					
	Nitrogen (NO_3 - N)[6]	mg/l	< 5	5 – 30	> 30

	Bicarbonate (HCO_3)				
	(overhead sprinkling only)	me/l	< 1.5	1.5 – 8.5	> 8.5
	pH		**Normal Range 6.5 – 8.4**		

Table 3-2. Recommended Maximum Concentrations of Trace Elements in Irrigation Water, *Water Quality for Agriculture*, Table 21, Food and Agriculture Organization of the United Nations

Element	Recommended Maximum Concentration[2] (mg/l)	Remarks
Al(aluminium)	5.0	Can cause non-productivity in acid soils (pH < 5.5), but more alkaline soils at pH > 7.0 will precipitate the ion and eliminate any toxicity.
As (arsenic)	0.10	Toxicity to plants varies widely, ranging from 12 mg/l for Sudan grass to less than 0.05 mg/l for rice.
Be (beryllium)	0.10	Toxicity to plants varies widely, ranging from 5 mg/l for kale to 0.5 mg/l for bush beans.
Cd (cadmium)	0.01	Toxic to beans, beets and turnips at concentrations as low as 0.1 mg/l in nutrient solutions. Conservative limits recommended due to its potential for accumulation in plants and soils to concentrations that may be harmful to humans.
Co (cobalt)	0.05	Toxic to tomato plants at 0.1 mg/l in nutrient solution. Tends to be inactivated by neutral and alkaline soils.
Cr (chromium)	0.10	Not generally recognized as an essential growth element. Conservative limits recommended due to lack of knowledge on its toxicity to plants.
Cu (copper)	0.20	Toxic to a number of plants at 0.1 to 1.0 mg/l in nutrient solutions.
F (fluoride)	1.0	Inactivated by neutral and alkaline soils.
Fe (iron)	5.0	Not toxic to plants in aerated soils, but can contribute to soil acidification and loss of availability of essential phosphorus and molybdenum. Overhead sprinkling may result in unsightly deposits on plants, equipment and buildings.
Li (lithium)	2.5	Tolerated by most crops up to 5 mg/l; mobile in soil. Toxic to citrus at low concentrations (<0.075 mg/l). Acts similarly to boron.
Mn (manganese)	0.20	Toxic to a number of crops at a few-tenths to a few mg/l, but usually only in acid soils.
Mo (molybdenum)	0.01	Not toxic to plants at normal concentrations in soil and water. Can be toxic to livestock if forage is grown in soils with high concentrations of available molybdenum.
Ni (nickel)	0.20	Toxic to a number of plants at 0.5 mg/l to 1.0 mg/l; reduced toxicity at neutral or alkaline pH.
Pd (lead)	5.0	Can inhibit plant cell growth at very high concentrations.
Se (selenium)	0.02	Toxic to plants at concentrations as low as 0.025 mg/l and toxic to livestock if forage is grown in soils with relatively high levels of added selenium. An essential element to animals but in very low concentrations.

Sn (tin)		
Ti (titanium)	----	Effectively excluded by plants; specific tolerance unknown.
W (tungsten)		
V (vanadium)	0.10	Toxic to many plants at relatively low concentrations.
Zn (zinc)	2.0	Toxic to many plants at widely varying concentrations; reduced toxicity at pH > 6.0 and in fine textured or organic soils.

4. ENVIRONMENTAL SETTING

The geology underlying the City of Roseville consist of sediments that were deposited during the Cretaceous and early Tertiary periods. However, only the overlying sediments that make up the post-Eocene continental deposits are considered in this evaluation. The marine sediments underlying the post-Eocene sediments consisting of sandstone and shale were deposited about a hundred million years ago when an ancient sea covered what is now the Sacramento and San Joaquin Valleys. These deposits were formed in a saltwater environment and still retain saltwater characteristics; therefore, these deposits are generally not considered a viable source of water in the region. The post-Eocene continental deposits consist of a sequence of sands, silts, and clays that have accumulated over a history of erosional sequences and volcanic eruptions. The post-Eocene continental deposits consist of five primary stratigraphic units in the region, ranging in age from the middle Eocene epoch up to the alluvial sediments of Tertiary-Quaternary origin (Figure 4-1). Figure 4-1 illustrates the geology that was considered during the development of the groundwater model (model) used to determine impacts discussed in this analysis.

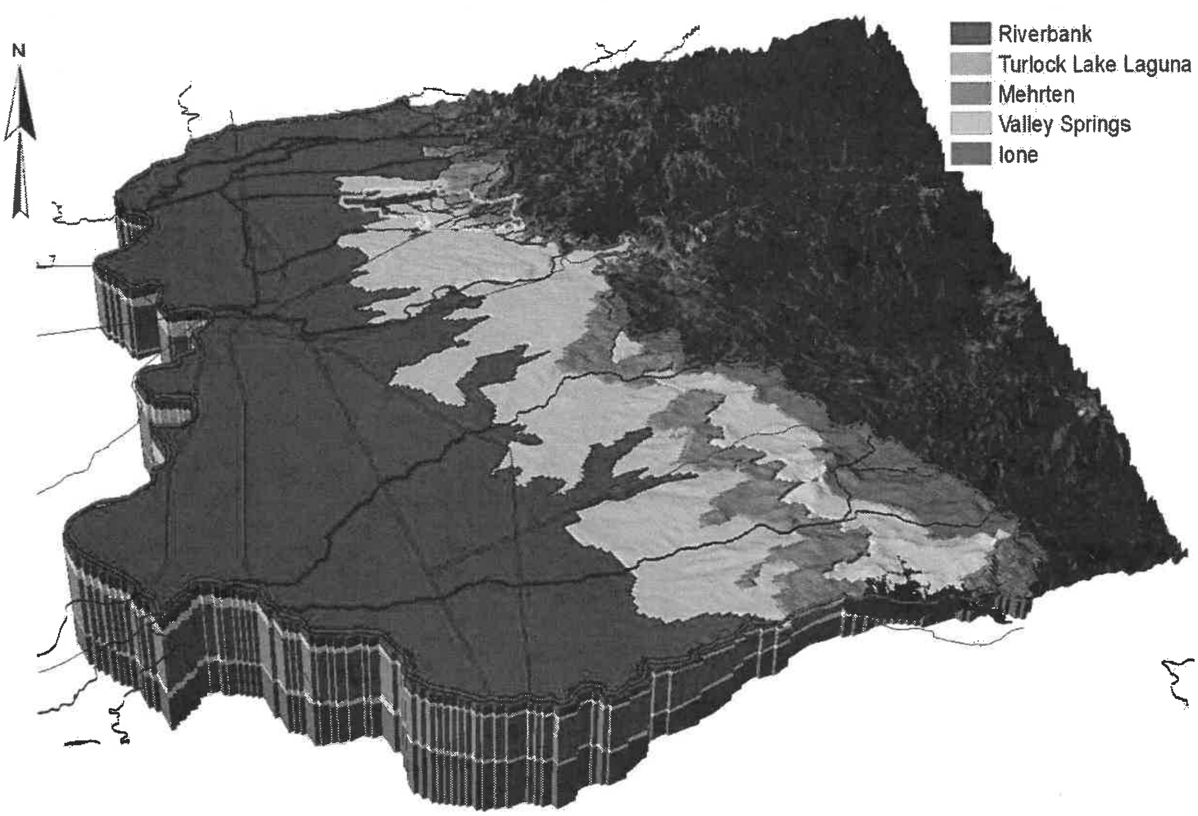

Figure 4-1. Regional Stratigraphy

4.1. The Ione Formation

The oldest formation represented in the model is the Ione Formation. These materials consist of sands, gravels, and clays deposited during the Eocene epoch. The Ione Formation outcrops to the east, where freshwater remains at shallow depths. However this unit dips to the west and is over 2,000 feet below the Sacramento River. The Ione Formation typically has low permeability; although secondary fracturing near the outcrops is believed to provide a source of water to the unit.

4.2. The Valley Springs Formation

During the Miocene period, a series of volcanic eruptions formed the Valley Springs Formation consisting of lenses of light-colored sands with beds of silts and clays, with a characteristic olive green color. Recent geophysical surveys in northeastern Placer County have identified this formation near its outcrop to be highly productive in localized areas. However, this unit is generally low in permeability and is not considered a significant water-bearing unit in the region.

4.3. The Mehrten Formation

During the late Miocene and early Pliocene periods, a series of volcanic eruptions following a period of erosion formed the Mehrten Formation. The formation is andesitic in nature and includes the characteristic "salt and pepper" sands, with beds of impermeable tuff-breccia, forming localized semi-confining units. The Mehrten Formation is the target formation for the proposed ASR operations.

4.4. The Turlock Lake Laguna Formation

Subsequent to the chain of volcanic events that formed the Mehrten Formation, an erosional sequence resulted in a series of continental deposits forming the Turlock Lake, Laguna Formation, which was formerly known as the Fair Oaks Formation. This formation consists of silts, sands, and clays, with hardpan deposits and consolidated gravels at the surface in localized areas along the outcrop to the east in Sacramento County.

4.5. The Riverbank Formation

The Riverbank Formation (formerly the Victor Formation) is the youngest formation represented in the model and consists of sands, silts, and clays from floodplain and alluvial fan deposits. The majority of this unit contains buried hardpan deposits near the surface which restrict the vertical infiltration of groundwater. Stream channels and adjacent areas are composed of alluvial sediments containing unconsolidated sands, gravel, and clay where the majority of the recharge to the underlying aquifers occurs.

4.6. Ancestral Streams

According to the DWR Bulletin 118-6, the relative amounts of coarse-grained to fine-grained materials in the five primary stratigraphic units in the region vary enormously, both vertically and horizontally, but clay and silt deposits far exceed those of coarse-grained materials (DWR, 1978). During the series of depositional, erosional, and volcanic events that formed the primary units, the streams in the region continuously changed course resulting in a complex set of buried ancestral stream channels (Figure 4-2). These highly-permeable channels intersect the primary units and provide a preferential conduit for groundwater to flow in the region.

Figure 4-2. Ancestral Streams

4.7. Surficial Soils

Based on the information provided in the DWR Surficial Outcrop map presented in DWR Bulletin 118-6 (DWR, 1978) and the surficial geology map published by the California Division of Mines within the California Geological Survey, the majority of surficial soils throughout the project domain are covered with hardpan and consolidated deposits

(Qg), clays and silts, or other consolidated sediments of the major geologic formations which impede the vertical percolation of applied water and precipitation. According to the geologic descriptions provided by the DWR, the alluvial sediments and tailings (shown in yellow) are the only high permeable surficial deposits within the Sacramento Regional Model (SRM) area (Figure 4-3).

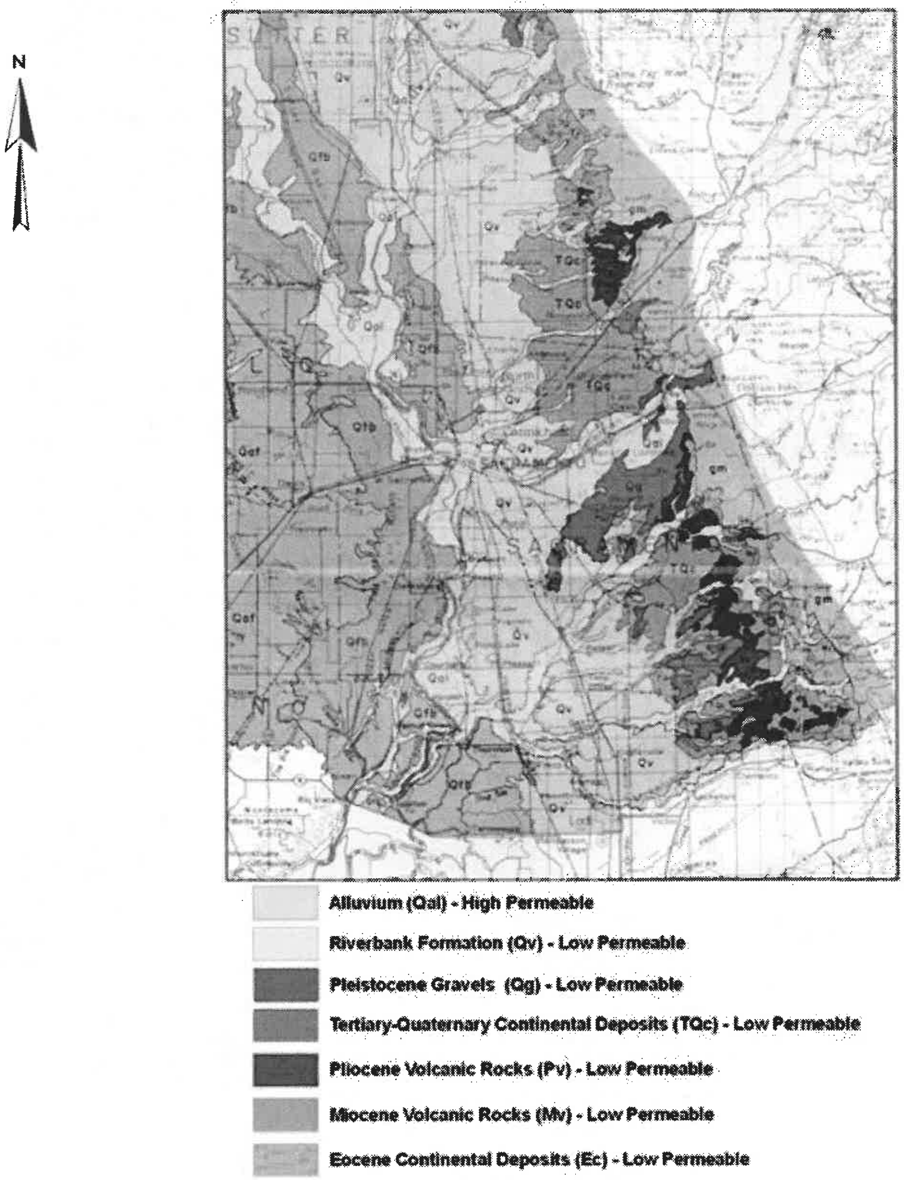

Figure 4-3. DWR Geologic Map of Sacramento Valley Groundwater Basin (1978)

Alluvium is present throughout the entire region, primarily along major stream channels, and cross all major stratigraphic units in the region, providing localized areas of enhanced recharge for each hydrologic unit. Because of the extensive low permeability of the consolidated surficial deposits and the high permeability of the alluvium, it is likely that the majority of the recharge to the model from precipitation and applied water will be concentrated in the areas with coarse, unconsolidated alluvial and colluvial deposits.

4.8. Groundwater Basin

The City of Roseville overlies a portion of the North American subbasin of the Sacramento Valley Groundwater Basin (Figure 4-4). The Sacramento Groundwater Basin is part of the Great Valley Geomorphic Province of California, a broad structural trough bounded by the tilted block of the Sierra Nevada on the east and the complexly folded and faulted Coast Ranges on the west. The general stratigraphy of the basin is a wedge-like formation, becoming thicker moving east to west.

The North American subbasin (DWR Groundwater Basin Number 5-21.64) is located in the eastern central portion of the Sacramento Groundwater Basin, encompassing approximately 351,000 acres (548 square miles) within Sutter, Placer, and Sacramento counties. The North American subbasin is bounded to the north by the Bear River, to the south by the American River, to the west by the Feather River and Sacramento River, and to the east by the bedrock of the Sierra Nevada. The bedrock follows a north-south line extending from the Bear River south to Folsom Lake, which passes about 2 miles east of the town of Lincoln representing the edge of the alluvial deposits (DWR, 1997). The North American subbasin is characterized by low-rolling dissected uplands in the eastern portion contrasted by flat, low-lying flood basin deposits associated with the Bear, Feather, Sacramento, and American rivers. The general direction of drainage is west-southwest.

Sustainable yield is the average amount of water that can be pumped over a long-term period without adversely impairing the economic, social, or environmental qualities of a basin. Based on the findings of the Western Placer County Groundwater Storage Study, the sustainable yield for the North American subbasin is estimated to be 400,000 acre-feet per year, assuming that the basin is in a state of equilibrium at year 2000 levels of groundwater pumping. The 400,000 ac-ft/yr is subdivided between Placer County, Sutter County, and the North Area of Sacramento (area south of the county line to the American River) at 95,000 ac-ft/yr, 175,000 ac-ft/yr, and 130,000 ac-ft/yr, respectively (MWH 2005).

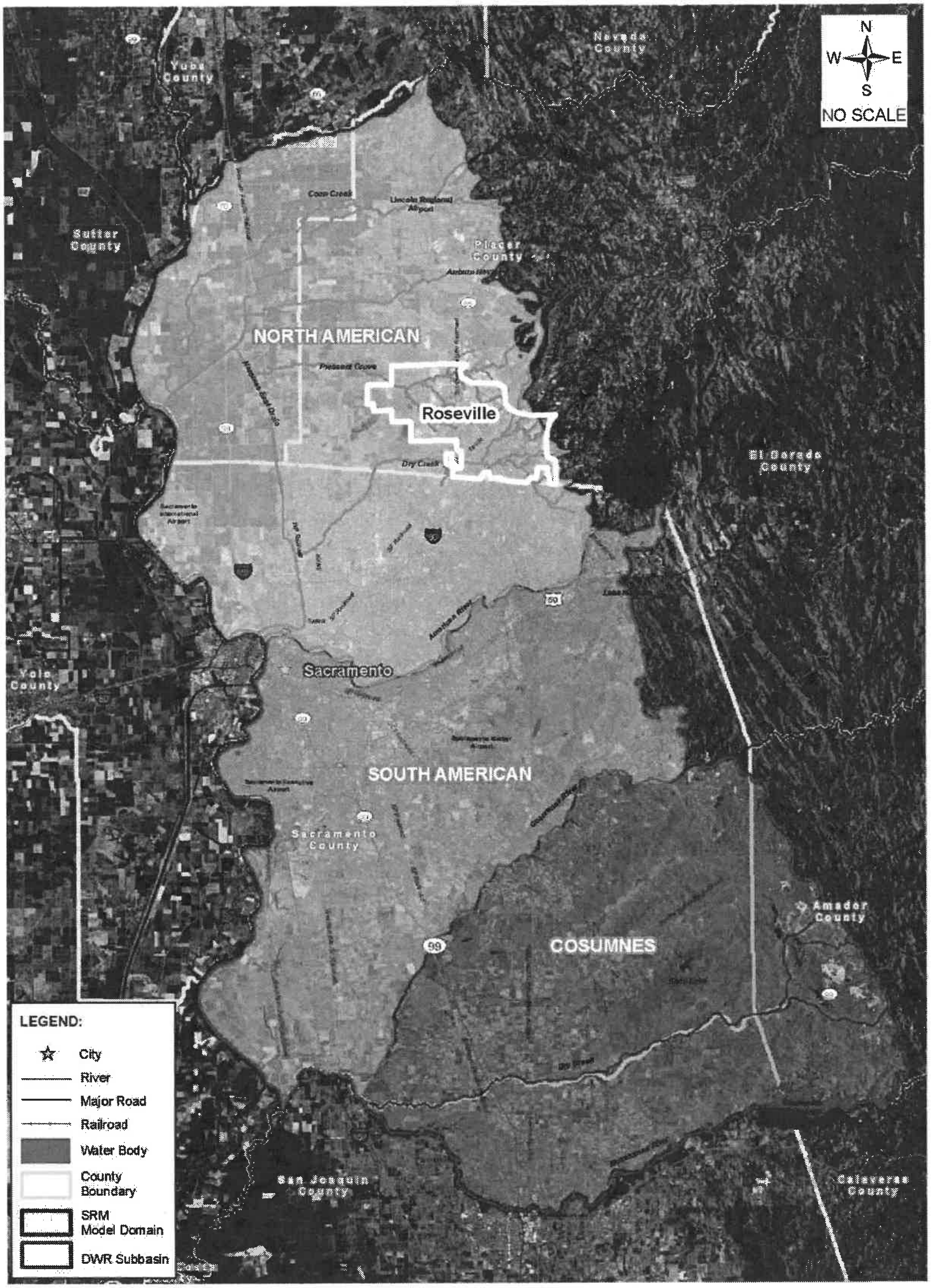

Figure 4-4. DWR Sub-Basins

The hydrogeology beneath the SRM is a heterogeneous system, exhibiting both unconfined and confined characteristics throughout all stratigraphic units within the SRM domain. The shallower deposits are generally unconfined, unless overlain by low permeable deposits such as hardpan or consolidated gravels that may create localized confining conditions. The deeper units are generally confined, except in areas of outcrop. The degree of confinement is a local phenomenon, highly dependent upon the permeability of the overlying deposits, and generally increases with depth.

The Roseville ASR project area is underlain by continental deposits. The upper 300 feet primarily consists of Riverbank and Turlock Lake Laguna formation, and is an unconfined system. Underlying the Turlock Lake Laguna Formation is the Mehrten Formation. The Mehrten Formation is the aquifer of interest and is a semi-confined system, hydraulically connected to the Turlock Lake Laguna Formation. In the vicinity of the Diamond Creek Well, located in the northern section of Roseville, the Turlock Lake Laguna Formation is generally a low permeability unit, consisting primarily of clay and silt. Based on cross sections developed for the City (MWH. 2008) and the lithologic log for the Diamond Creek Well, the Mehrten Formation exists from approximately 310 to 450 feet bgs, consisting primarily of black sands and gravels (Figure 4-5).

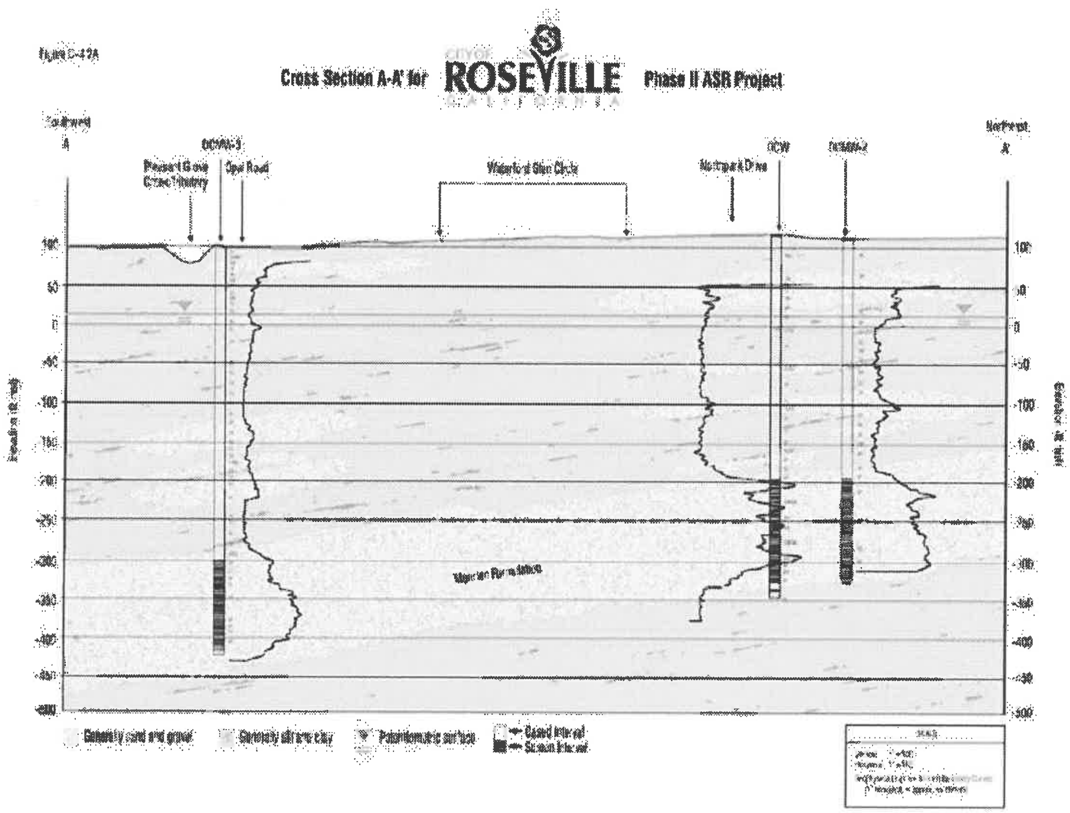

Figure 4-5. Cross Section A-A' around Diamond Creek Wells (MWH 2008)

Regional groundwater flows to the southwest following the natural topographic nature of the basin. The rocks of the Sierra Nevada bound the basin to the east, providing inflow from un-gauged watersheds; however, the rocks of the Sierra Nevada behave as a no-flow boundary in the immediate vicinity of the Roseville Area (MWH 2005). A network of streams entering the model along the eastern periphery near Roseville provides a source of inflow.

4.9. Land Use Authority

The City has land use authority within its corporate limits and can therefore ensure that the City's ASR Program is operated in a manner that would not conflict with other ASR programs or municipal wells. Should ASR Program water travel beyond the City boundary, the City would coordinate with the appropriate regulatory agencies regarding any issues that may affect other groundwater users.

5. ASSESSMENT OF WATER QUALITY IMPACTS

The following sections identify the degree of water quality changes that would occur by the proposed project, relative to that already permitted, and whether water quality would be protective of groundwater's beneficial uses. Since treated water (drinking water) from the City's water utility will be the source water for the ASR program, and all drinking water standards are met prior to injection and delivery, it is reasonable to conclude that water extracted from ASR wells will continue to meet all primary and secondary MCLs. However, in order for groundwater quality impacts to be considered acceptable, the assimilative capacity of the subbasin must not be depleted beyond levels that are considered protective of groundwater's beneficial uses as a result of the proposed ASR operations. Thus, to assess the water quality in groundwater, it is necessary to consider the beneficial uses and their respective objectives for protection. It is also necessary to understand the health of the groundwater system prior to project implementation and how much assimilative capacity is available.

5.1. **Approach**

This assessment identifies incremental changes in water quality that would occur in groundwater due to injection of treated surface water from the American River. As stated by SWRCB, the first element of a complete antidegradation analysis is to "*[c]ompare receiving water quality to the water quality objectives*". California's guidance on antidegradation (APU 90-004) states: "*The baseline water quality should be representative of the water body, accounting for temporal and spatial variability*". The Porter-Cologne Water Quality Control Act (2006) provides a definition of water quality as: "*Quality of the water' refers to chemical, physical, biological, bacteriological, radiological, and other properties and characteristics of water which affect its use.*"

Thus, to assess the water quality in groundwater, it is necessary to consider the beneficial uses and the objectives meant to protect those uses. Water quality conditions are compared to existing water quality objectives and recommended criteria when applicable. Comparisons of water quality are estimated at the injection sites, at a distance from the injection wells, and operation scenarios affecting the water quality. The City's land use authority limits the ability to control the volume of stored water to that amount storage within the city boundaries. Basin effects outside of the City limits will be assessed once those impacts have been identified and to what extent there is degradation beyond initial parameters.

5.2. **Methodology**

Guidelines from Section 9c of the *Recycled Water Policy* were used to establish the protocol for analyzing water quality data and establishing baseline water quality which is representative of pre-project conditions. A statistical analysis was prepared to establish the mean, maximum, and standard deviation for each constituent concentration within the North American subbasin for all available data and a second analysis conducted using only the last five years of data. In accordance with the adopted protocol, the mean concentrations using the last five years of data was used to define background concentrations of the native groundwater for the transport analyses and to calculate assimilative capacity accounting for temporal variability of the data.

The assimilative capacity is calculated by subtracting the mean concentration of the local background data from the MCL for a particular constituent. Two threshold concentrations representing the upper tolerances for each constituent utilizing 10% and 20% of the assimilative capacity for maintaining existing water quality were calculated based on the analysis protocol[1]. Both threshold concentrations were calculated and analyzed because injection wells within the ASR network would be constructed and become operational over the 50 year program, which is based on the City's population growth and capital improvement projects funding. Under current buildout conditions and water demand projections, all ASR wells in the network will be for backup purposes. This phased approach allows for other potential future ASR projects to be implemented within the sub-basin.

Numerical groundwater flow and transport models (a subset of the Sacramento Regional Model) were used to assess the impact of the injected drinking water to native groundwater and to determine the movement of treated drinking water during injection, storage, and extraction operations for selected constituents. Six predictive simulations were developed, three potential ASR operational scenarios with and without conservation measures in place.

Two separate predictive models were developed in order to assess impacts of future water availability with and without water conservation measures in place. The simulations incorporating conservation measures are more conservative, meaning there is more water available for injection. However, simulations that do not incorporate conservation measures result in more water being extracted from the basin over time. This increases pumping in a specific area producing higher gradients that result in a higher flux of water through the porous media.

Operational scenarios for model nomenclatures are as follows:

- Scenario 1a: Injection only (with conservation)
- Scenario 1b: Injection only (without conservation)

It should be noted that Scenario 1a and 1b are developed to show the "worst case" situation resulting from the City's ASR operations. The likelihood of implanting Scenarios 1a and 1b as modeled is very slim.

- Scenario 2a: Injection and extraction within the same year (with conservation)
- Scenario 2b: Injection and extraction within the same year (without conservation)

[1] Section 9c of the Recycled Water Policy for injection into groundwater aquifers

[2] Water year types were based on work done during the development of the Water Forum Process.

- Scenario 3a: Injection and extraction based on hydrologic water year type (with conservation)
- Scenario 3b: Injection and extraction based on hydrologic water year type (without conservation)

The first set of ASR operational scenarios (Scenario 1a and Scenario 1b) involved injection only. Injection wells were run at maximum capacity until the available water supply was depleted. The available water supply for injection was established based upon the available treatment plant capacity (100 million gallons per day), minus projected water demand. The conservative and projected demand with the amount available for injection for Scenario 1 and Scenario 2 is provided Figure 5-1 and Figure 5-2.

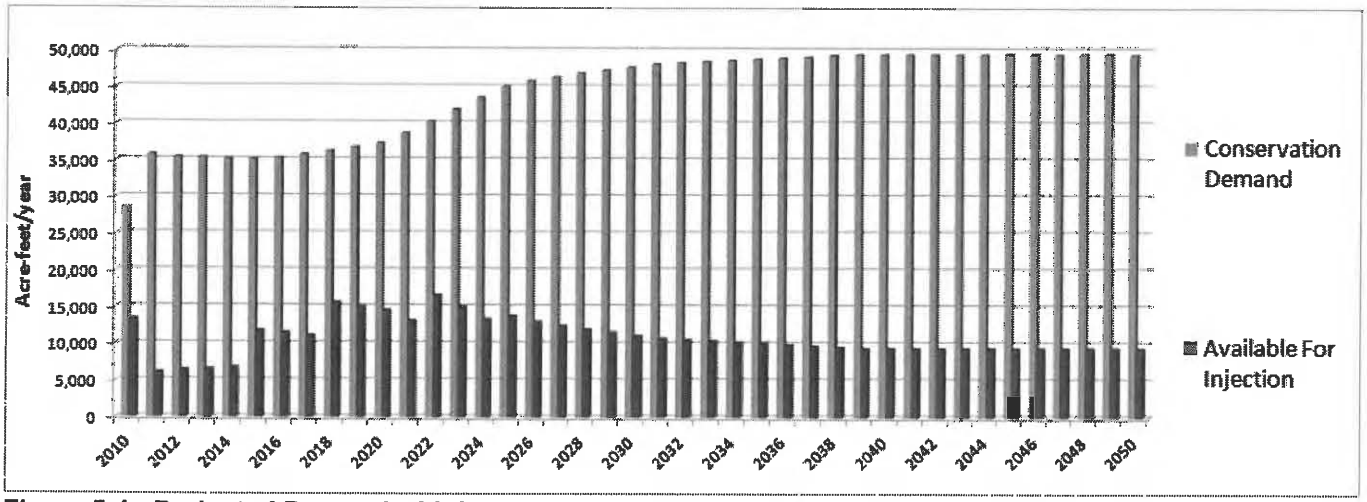

Figure 5-1. Projected Demand with Implementing Conservation Reductions and Water Available for Injection

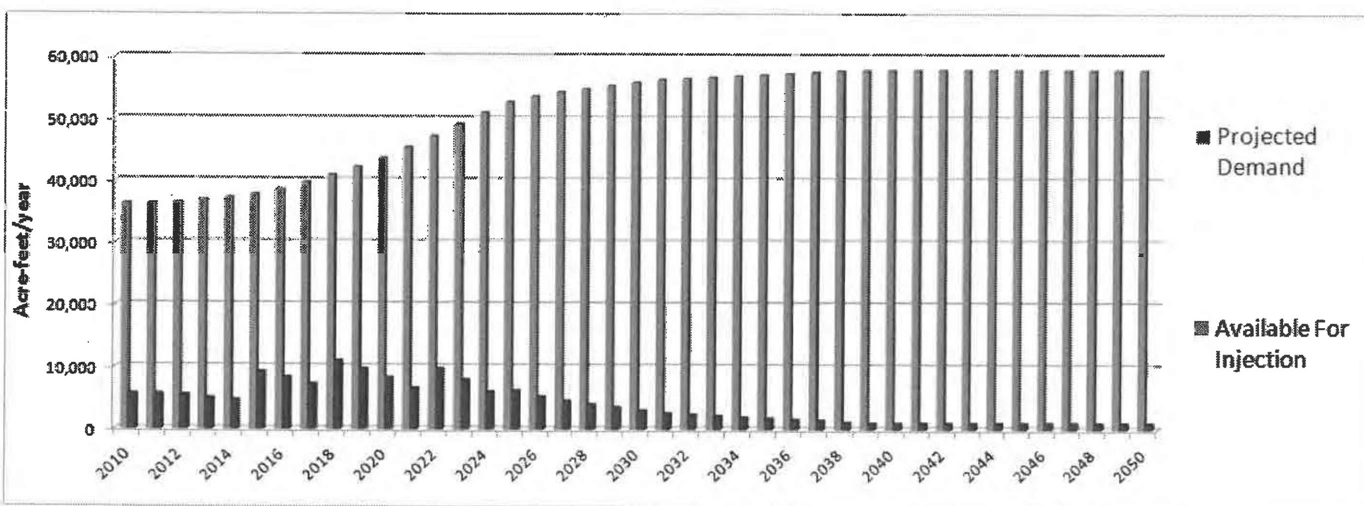

Figure 5-2. Projected Demand without Implementing Conservation Reductions and Water Available for Injection

Injection wells were turned on based upon the construction date estimated in the City's capital improvement plan. The amount of water injected is dependent on both available water for injection and available injection capacity of the ASR well network. The lesser of the two values is the limiting factor for injection.

Annual injection for Scenario 1a and Scenario 1b is provided in Figure 5-3.

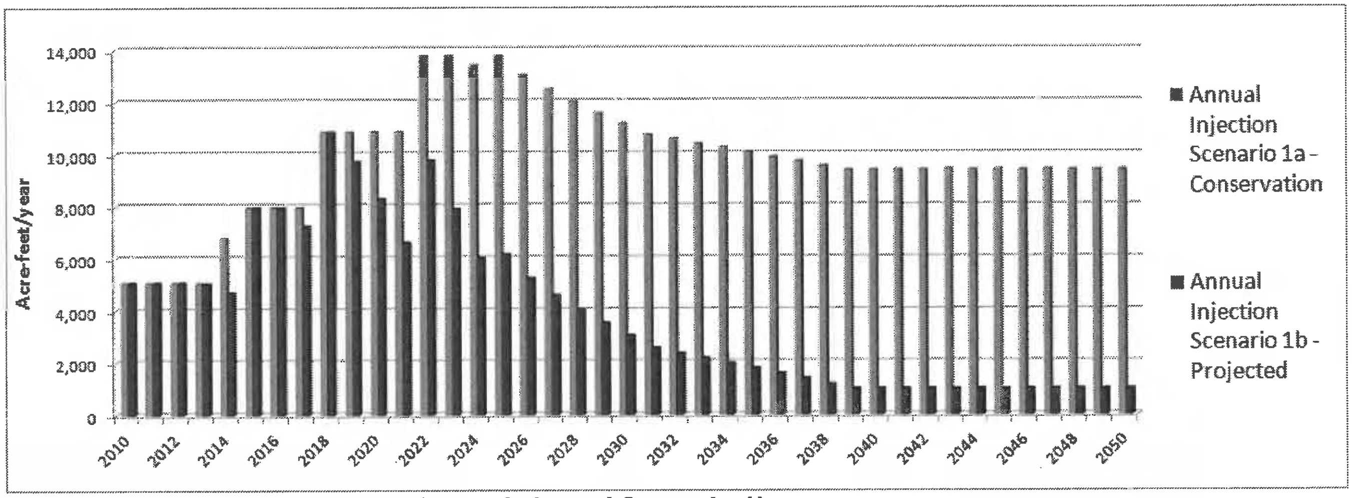

Figure 5-3. Annual Injection for Scenario1a and Scenario 1b

The second set of ASR operational scenarios (Scenario 2a and Scenario 2b) include both injection and extraction activities within the same year. Each year, injection was allowed from January through June, capturing times of high precipitation and snowmelt. Extraction began in August and continued until the total amount of extracted groundwater was equal to the total amount of injected water each year. Both injection and extraction rates were limited by either available capacity or water supply.

Annual injection for Scenario 2a and Scenario2b is provided in Figure 5-4. For both Scenario 2a and 2b, extraction volume is the same as injection volume.

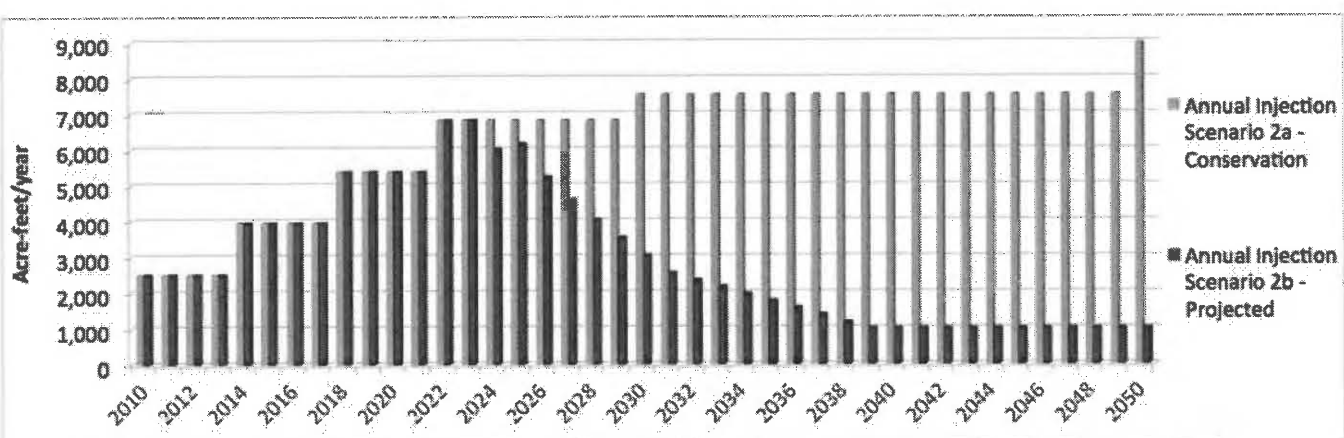

Figure 5-4. Annual Injection for Scenario2a and Scenario 2b

Scenarios 3a and 3b were established to reflect a probable way the ASR program would operate. ASR operations are based upon the hydrologic water year type. Three water year types[2] were used in the analysis, a wet/normal water year, a drier water year, and a critical (driest) water year. Water year classifications are based upon the amount of unimpaired inflow for the American River from March through November of each year. If the annual unimpaired inflow is below 400,000 acre-feet per year, the water year is considered critical (driest). Annual unimpaired inflow above 950,000 acre-feet per year is considered a normal/wet year. Unimpaired inflow between those two spectrums is considered to be a drier water year. The water year classifications impact both the available supply and the restrictions on injection or extraction. The estimated unimpaired flow for Scenario 3 and the available supply from the American River is provided in Figure 5-5 and Figure 5-6.

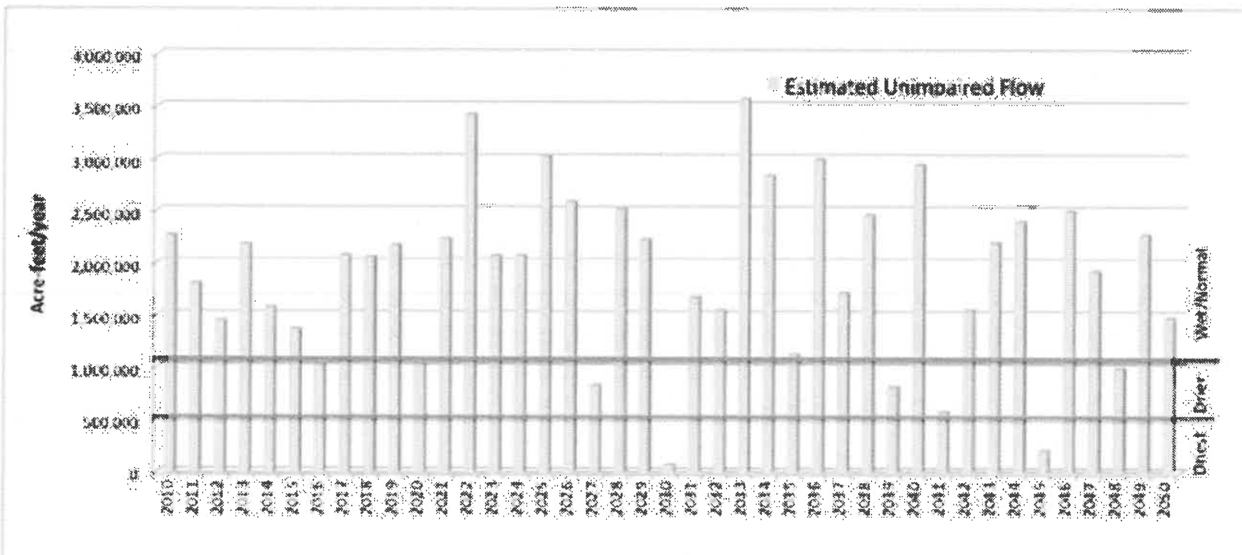

Figure 5-5. Estimated Unimpaired Flow and Water Year Classifications used in Scenario 3a and Scenario 3b

[2] Water year types were based on work done during the development of the Water Forum Process.

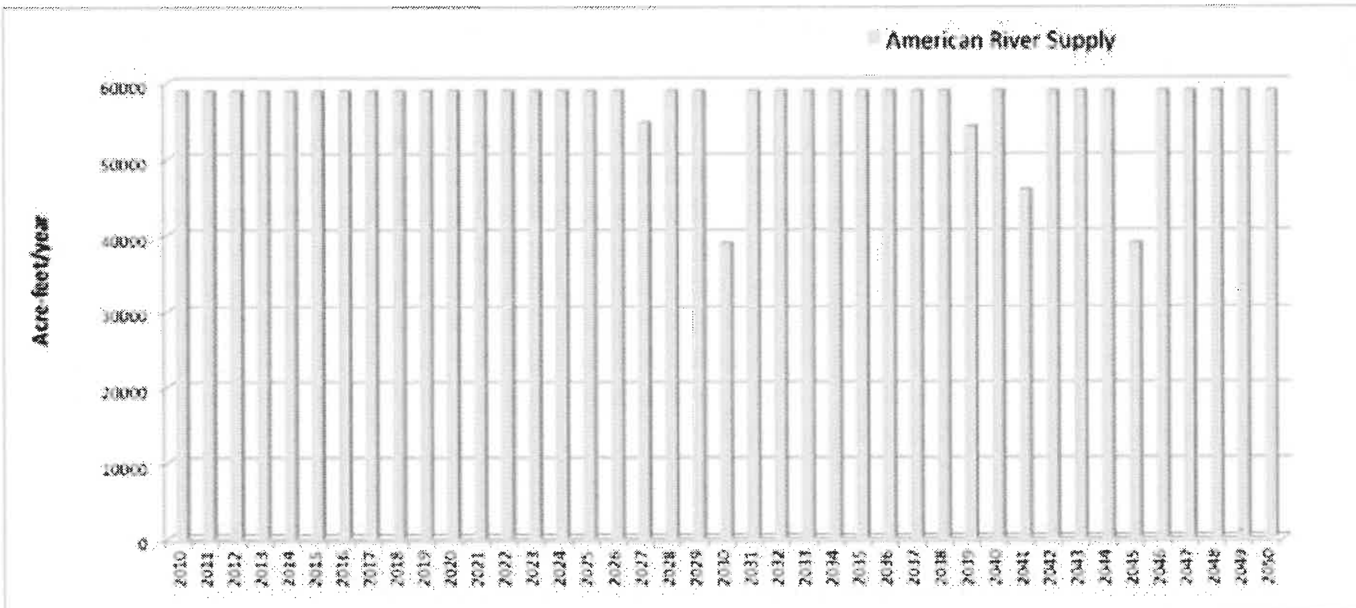

Figure 5-6. American River Supply used in Scenario 3a and Scenario 3b

Information relating to the calculations of water demand, the quantity of water available for injection, the limitations on supply, conservation factor, and methodology applied for generating pumping schedules and water year classifications for Scenario 3 is presented in a technical memorandum included as Appendix B, Technical Memorandum for Development of an Excel-Based Solution for Generating Pumping Files for ASR Transport Scenarios.

Annual injection and extraction for Scenario 3a and Scenario3b is provided Figure 5-7.

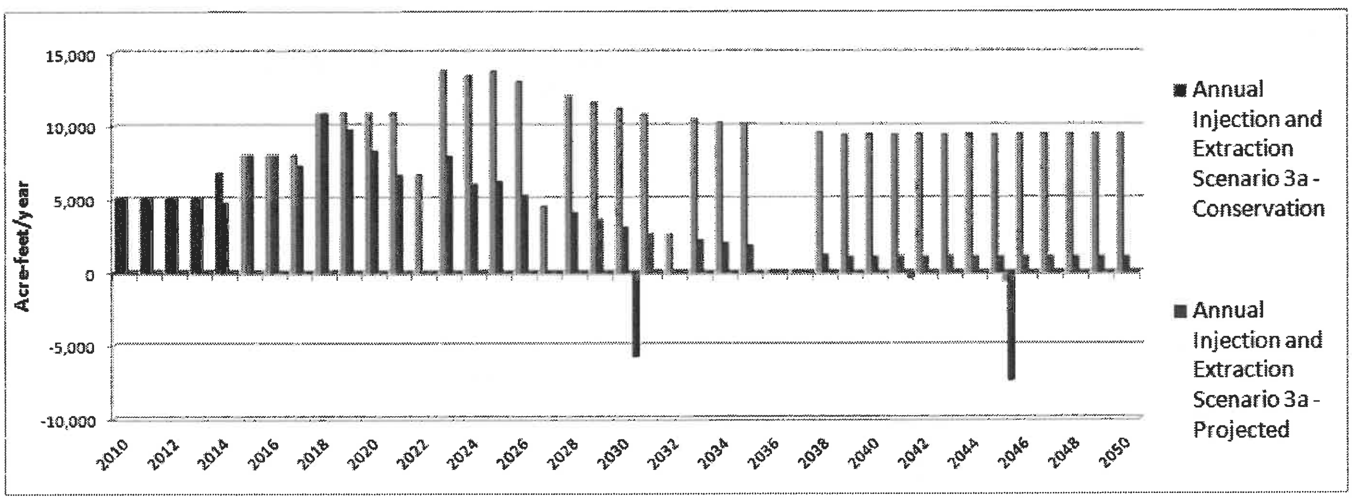

Figure 5-7. Annual Injection and Extraction for Scenario 3a and Scenario 3b

Figure 5-8 shows the ASR well locations and the designated Well ID used in the numerical model for this analysis (shown in parentheses). Water quality impacts were analyzed based on time and distance from the proposed ASR well locations, at the City boundary, and at a distance down gradient of an injection well in October 2030 and

October 2050 at five locations along the City boundary and one location away from the influence of the ASR wells. Impacts to existing streams, creeks, irrigation wells and public supply wells were addressed for all constituents analyzed.

Figure 5-8. City of Roseville ASR Well Network **Locations**

A summary of the well construction dates and well capacity for each well used in modeling scenarios for the ASR well network is provided in Table 5-1.

Table 5-1. City of Roseville ASR Well Network

Well No.	Well Name & Plan Area	Construction Date	Injection Rate (gpm)	Extraction Rate (gpm)
4	Darling	1958	400	800
5	Oakmont	1978	600	1,200
6	Diamond Creek	2003	1,250	2,500
7	Woodcreek North	2008	900	1,800
8	Hayden Parkway (Fiddyment Ranch)	2014	900	1,800
9	West Side Dr #1 (W-77)	2014	900	1,800
11	Woodcreek West	2050	900	1,800

Well No.	Well Name & Plan Area	Construction Date	Injection Rate (gpm)	Extraction Rate (gpm)
12	Del Webb (Sun City Well)	2050	900	1,800
13	Hewlett Packard (HP)	2018	900	0
14	Fiddyment Road (F-66)	2018	900	1,800
TBD	Eastern Sierra Vista – Sierra Vista Specific Plan	2022	900	1,800
TBD	Western Sierra Vista – Sierra Vista Specific Plan	2022	900	1,800
TBD	Creekview Specific Plan	2030	900	1,800

5.3. Computer Model Description

The Sacramento Regional Model is a multi-layer groundwater flow and transport model that was developed on behalf of the City of Roseville to help understand the movement of injected water for various ASR production schedules and potential impacts to natural groundwater gradients and/or water quality within the aquifers. The SRM encompasses an area of approximately 1,360 square miles (871,000 acres) in Northern California, within Placer, Sacramento, Sutter, Amador and San Joaquin counties. The SRM is bounded on the northern end by the Bear River, on the west by the Feather and Sacramento Rivers, on the south by the Mokelumne River, and by the Sierra Nevada Mountains on the east (Figure 5-9).

The SRM was built using the United States Geological Survey (USGS) public domain MODFLOW code (McDonald and Harbaugh, 1988), and it incorporates surface water and groundwater interactions, land use changes, water demand projections, and has both flow and transport capabilities. Since MODFLOW is the most widely used groundwater modeling code, this facilitates future development, use, transfer, and/or review of the model by other interested parties. MODFLOW is a modular, finite difference code for groundwater flow simulations and can be used to simulate three-dimensional problems involving recharge and evapotranspiration, wells, drains, and stream-aquifer interactions. MODFLOW supports a suite of companion codes for performing contaminant transport analysis (MODPATH, MT3DMS, RT3D, SEAM3D, SEAWAT, etc.).

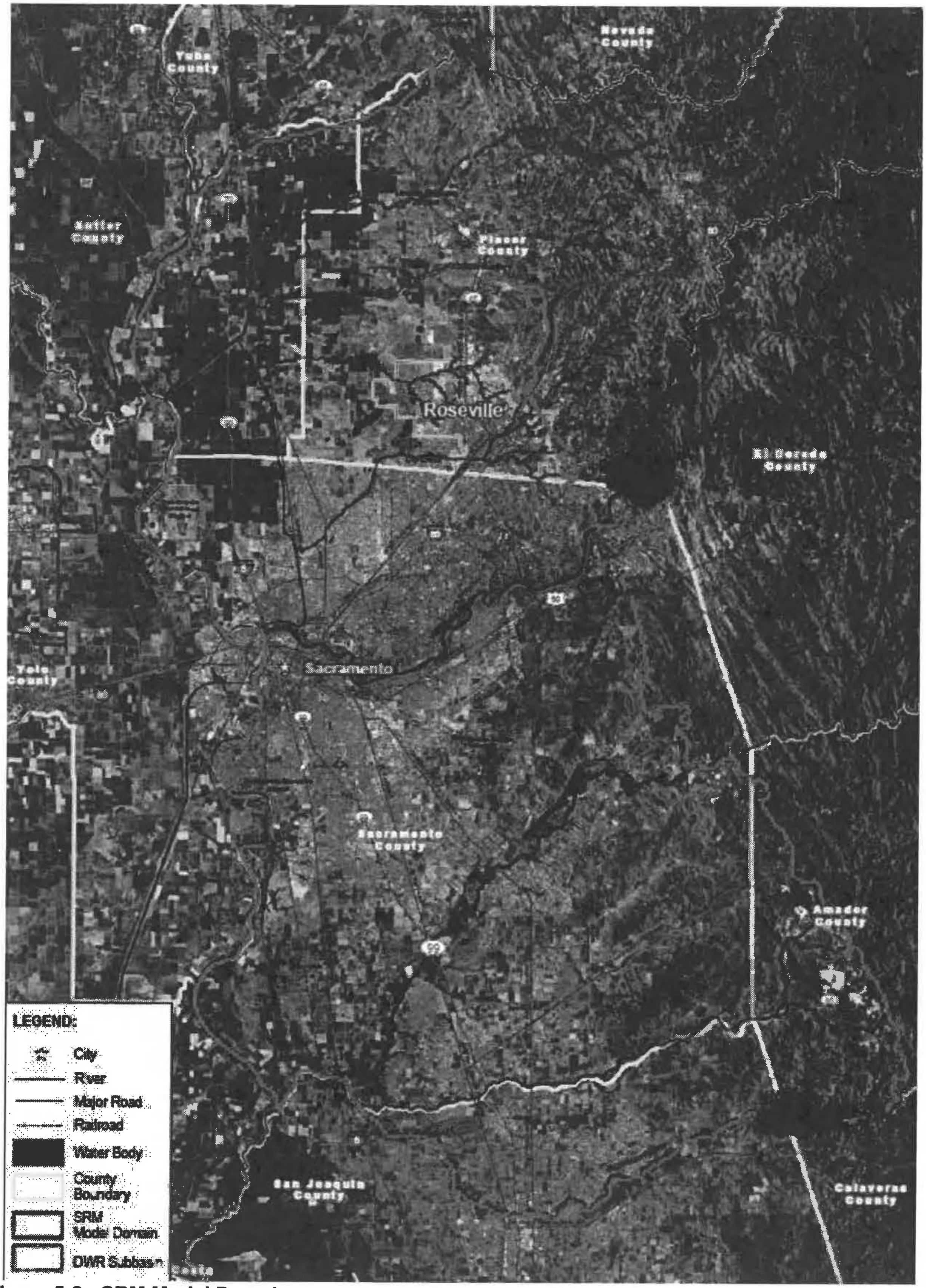

Figure 5-9. SRM Model Domain

The development of the SRM consisted of four primary phases: The first phase was to reproduce the regional stratigraphy and geology, specifically the outcropping of the major formations and surficial land cover characteristics of the region. The second phase was to automate water demand calculations for water budgeting and model input. The water demand framework was established to process complex data efficiently, while maintaining a transparent and flexible database structure to allow easy manipulation and rapid processing. The third phase was to calculate recharge data for the model, including infiltration from precipitation, applied irrigation water and inflow from ungauged watersheds along the eastern side of the model domain. The fourth phase involved developing a methodology for converting the calibration model to a predictive model, and extracting a local model from the SRM predictive regional model for transport analyses. Regional boundary conditions, hydraulic properties, subsurface characterization, recharge, and pumping are inherited from the SRM and applied as input for the local model (Block Model). Horizontal grid refinement was increased in an iterative fashion to achieve increased precision in the block model surrounding the Roseville area.

After the SRM was constructed, the model's ability to replicate the hydrologic system was tested during model calibration. Model calibration is a process of adjusting unknown or estimated model inputs until an acceptable fit to measured observations is achieved. SRM model calibration was conducted in two phases: The first phase included a steady-state calibration using observations from water year 1998 (October 1997 through September 1998). The transient calibration period extended from water year 1998 through water year 2008 (October 1997 through September 2008). Once the transient model was calibrated successfully, models were developed to simulate future conditions (predictive models). The predictive models use water year 2007 from the calibrated transient model as a baseline and simulate aquifer response through water year 2050 (October 2006 through September 2050).

Two separate predictive models were developed in order to assess impacts of the identified scenarios with and without demand conservation measures in place. Future demands that incorporate conservation measures result in reductions in per capita demand in accordance with the proposed 2009 Water Conservation Act introduced by Senator Steinberg. The Act sets a goal of reducing per capita urban water use by as much as 20% by December 31, 2020, with an intermediate goal of reducing per capita water use by at least 10% by December 31, 2015. In accordance with the Sacramento Regional Water Master Plan, conservation measures for irrigation demands were to achieve incremental progress towards a 5% reduction through improvements in irrigation efficiencies, by December 31, 2030. The Sacramento Council of Governments (SACOG) Blueprint 2005 and 2050 land use projections were used to establish the baseline and future land use trends in the model domain. Land use trends were then interpolated from the datasets throughout the predictive model simulation period. Population projections for per capita calculations were established using the latest demographic information provided by senior demographers at SACOG.

The last task for model development included extracting a local block model from a portion of the SRM to improve the accuracy of the calculations for the local region, while maintaining reasonable model run times and preserving the underlying trends of the regional hydrologic system. The boundaries of a local model inherit the regional groundwater flow regime from the SRM. Therefore, the placement of the local boundary is less critical. Figure 5-10 shows the local model domain outlined in green.

Figure 5-10. Local Model Domain

Once a local grid is created, the stratigraphic data from the SRM is transferred to the local model, including material classifications and layer elevations. Figure 5-11 shows an example of a truncation of the SRM using the local model domain.

In addition to the material zones and elevations, the major hydraulic features of the model are also preserved, including rivers, reservoirs, wells, and recharge.

During the conversion from regional to local models, a series of grid refinements in both the horizontal and vertical direction were performed in an iterative fashion to increase the resolution beyond the grid resolution of the regional model. A review of groundwater elevations in the upper layers of the model showed that the Riverbank Formation and parts of the Turlock Lake Laguna Formation were either unsaturated or showed minimal vertical gradients within the upper layers of the underlying aquifers within the local domain. In order to maximize model processing speeds for transport analyses without impacting the model's ability to make predictions, refinement in both the horizontal and vertical direction was implemented. Final grid cell assignments around eight of the ASR wells were refined from 1,000 feet by 1,000 feet uniform grid spacing to 200 feet by 200 feet. The model was also refined in the vertical direction, combining the first five layers of the regional model into one layer (Layer 1) for the local analysis. Layers 6,7,8,9 and 10 of the SRM correspond to layers 2,3,4,5 and 6 of the local model. Additional grid refinement beyond the selected resolution was not warranted based on significant increases in processing time and minimal impact on the models results. Layer consolidation of the SRM in the block model did not impact the integrity of the model calibration as a result of this transformation.

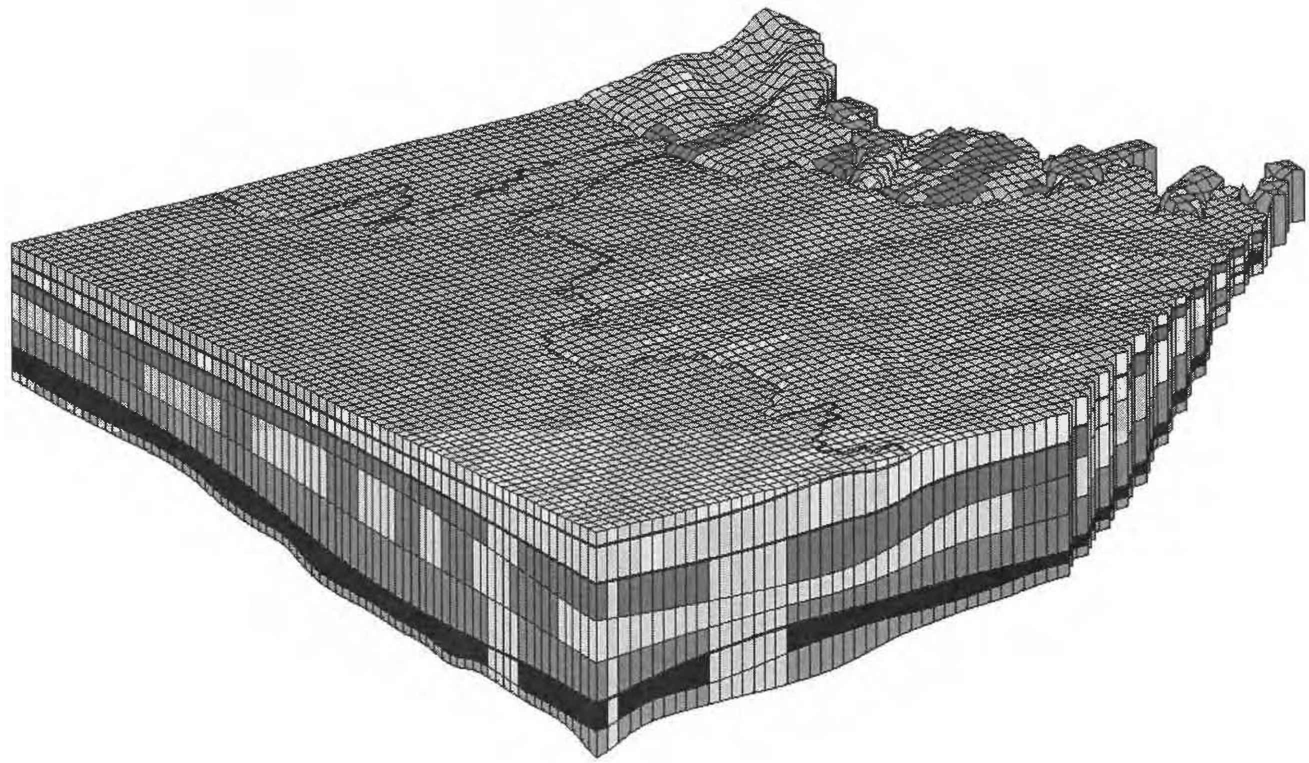

Figure 5-11. Local Model Grid Conversion

The transport of all constituents was treated conservatively. Sorption and attenuation are not included in the transport simulations. Inclusion of these transport parameters would result in a decrease of aqueous-phase concentrations and would decrease the total distance of the constituent plume would travel.

Additional information pertaining to the SRM is available in the *Sacramento Regional Model Groundwater Modeling Report* (Aquaveo. 2010).

5.4. Selection of Water Quality Constituents

Even though the proposed project's storage of treated drinking water may lead to groundwater quality changes with respect to disinfection byproducts and fluoride, the injected water is not expected to adversely affect any current or future beneficial uses. A number of water quality parameters would improve within the storage zone including total dissolved solids, chloride, boron, sodium, and salts in general, including nitrate. The analysis will assess potential groundwater quality changes and determine whether the changes are significant.

The source for the City's water supply is a surface water supply from the American River. Water is stored in Folsom Reservoir typically has low dissolved mineral content and low alkalinity. In general, water quality from the City's distribution system is better for irrigation, livestock watering, and industrial uses because of its soft water quality. DBPs and fluoride concentrations in the City's drinking water meet or exceed all drinking water standards. DBP's and fluoride are a result of treatment requirements by CDPH for the surface water source (American River Water).

Slightly elevated DBPs and fluoride concentrations in the extracted groundwater are a result of injecting the City's drinking water into the aquifer. Background concentrations of fluoride are naturally occurring in low amounts, but are increased because of the injection of the City's drinking water. DBP's do not exist naturally in the aquifer and increase when injection operations occur.

As shown in the City's Phase II Demonstration Study, HAAs naturally attenuate due to sorption and/or biodegradation. All other THMs decreased, except for chloroform. Chloroform typically makes up about 90% of the total THMs reported in analytical data collected in the Demonstration Study. Due to its longevity and perseverance, chloroform was one of the constituents selected for analysis in the anti-degradation study.

Although not specifically analyzed for during the Demonstration Study, fluoride is a known constituent, that is used as a tracer and it is expected to remain in the groundwater aquifer for a considerable period without attenuating. Because fluoride is expected to persist in the groundwater for a considerable period, fluoride was specifically selected for analysis in the anti-degradation study.

With respect to agricultural water use, constituents from *Water Quality for Agriculture* by Ayres and Westcot were considered and analyzed. In Ayres and Wetcot, the constituents and their concentration are listed in *Table 1 - Guidelines for interpretations of water quality for irrigation*, and *Table 21 - Recommended maximum concentrations of trace elements in irrigation water*. Table 1 constituents included EC (or TDS), Sodium Absorption Ratio (SAR), sodium, chloride, boron, nitrate nitrogen, bicarbonate, and pH and Table 21 listed 20 trace elements, including fluoride. Tables 1 and 21 are listed previously in Table 3-1 and Table 3-2 of this document.

Not all constituents in Ayres and Westcot's Tables 1 and 21, have an established MCL nor are they lower than drinking water standards. The proposed ASR injection water meets all the concentrations for constituents recommended by Ayres and Westcot. TDS, sodium, chloride, nitrate, and bicarbonate from Table 1 are present in the proposed injection water so they are included in the anti-degradation analysis. However, with the lower concentrations in the injection water, it is anticipated that these water quality parameters would improve within the storage zone and the analysis would determine whether the changes are significant. In addition, boron is not present in the injection water therefore ASR operations will only improve the water quality objectives for boron, similar to other constituents listed above.

Six additional constituents from Ayres and Westcot's Table 21 have lower recommended maximum concentration compare to drinking water MCLs. They are listed below for reference but will not be analyzed for this study as they are not present in the City's water supply. Since they are not present, it is assumed that there will be no degradation to the aquifer - receiving water.

Table 5-2. Water Quality Comparison

Constituents	Recommended maximum concentration for Irrigation Water (mg/L)	Drinking Water MCLs (mg/L)	City of Roseville treated water distribution system concentration (mg/L)
Fluoride (F) *(Fluoride is listed for reference only and will be analyzed for antidegradation analaysis.)*	1.0	2.0 (primary MCL)	0.7 (fluoridation level)
Selenium (Se)	0.02	0.05 (primary MCL)	None detect
Copper (Cu)	0.20	1.0 (secondary MCL)	None detect
Zinc (Zn)	2.0	5.0 (secondary MCL)	None detect
Cobalt (Co)	0.05	No MCL	None detect
Molybdenum (Mo)	0.01	No MCL	None detect
Vanadium (V)	0.10	No MCL	None detect

For transport modeling, a total of 18 water quality parameters were analyzed including: two regulated inorganic compounds, fluoride and nitrate (as NO_3), five unregulated inorganic compounds, chloride, hardness (total as $CaCO_3$), sodium, sulfate, and total dissolved solids (TDS), and two categories of disinfection byproducts, including total THMs and five Haloacetic acids (HAAs), as well as the individual components of each group of THMs. Regulatory guidelines do not exist for water hardness and sodium, and the individual components of the DBPs. For the remaining parameters, either the primary or secondary MCLs or agricultural water quality objectives were used for comparison.

5.5. Background Groundwater Quality

Background water quality of the North American Subbasin was established using information from the CDPH's Water Quality Monitoring Database and local analytical data collected by Roseville at the Diamond Creek Monitoring Wells during baseline sampling events. The water quality sampling locations are associated by specific geographic area and water system. Spatial coordinate information for data in the CDPH Water Quality Monitoring database was not available. To account for spatial variability of the data, groundwater chemical data was spatially located at the midpoints of each zip code area associated with the water system from which the sample was collected. Spatial coordinate information for the monitoring wells from which samples were collected at the City of Roseville, the City of Lincoln, Carmichael Water District, Sacramento Suburban Water District, and California American Water Company was available and used to relate data to a more precise geographic location. Figure 5-12 illustrates groundwater well locations and the zip codes included in this analysis. Background water quality was assessed for over 200 constituents regulated for drinking water and agricultural beneficial uses.

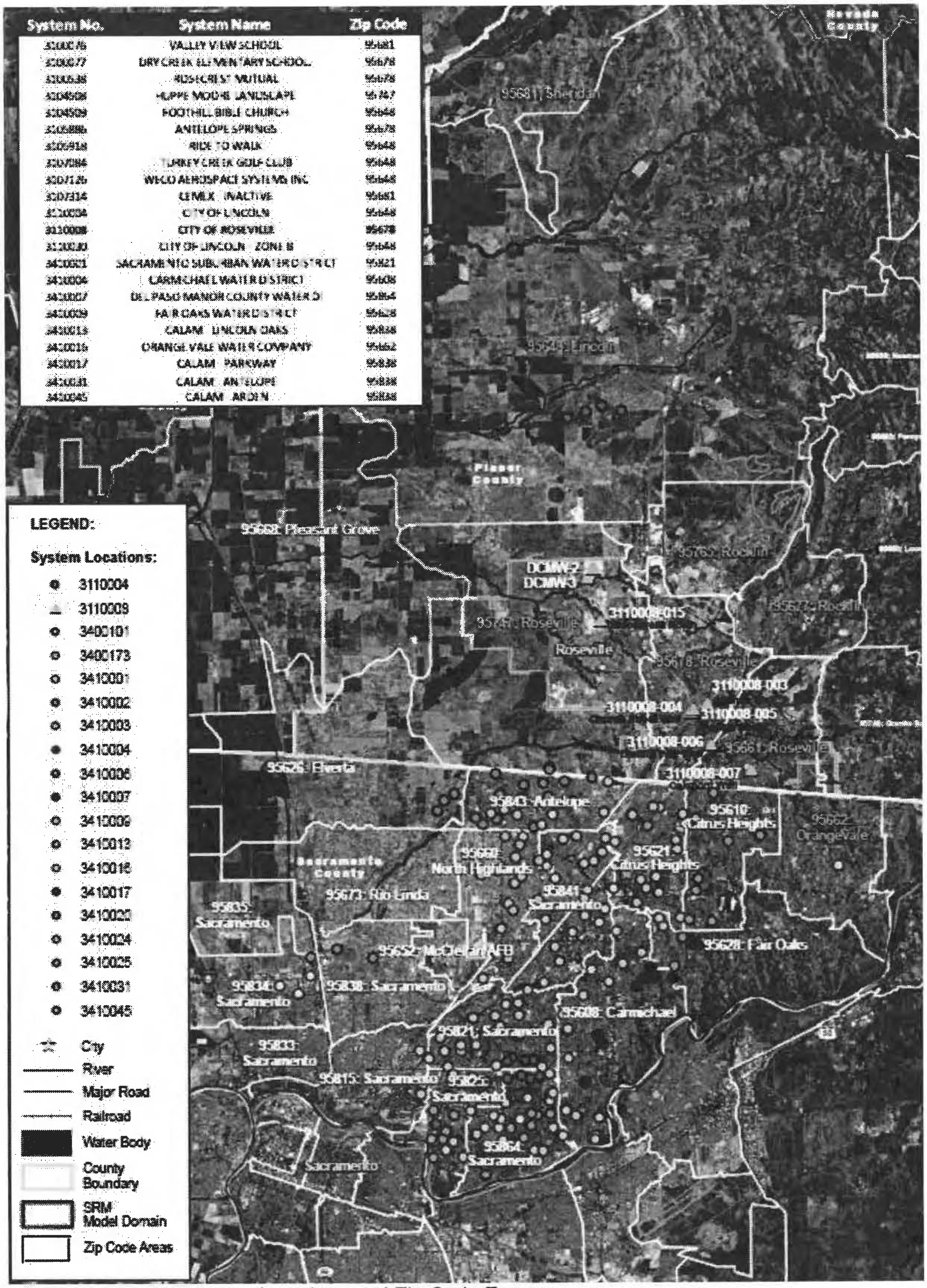

Figure 5-12. CDPH Sampling Locations and Zip Code Zones

Table 5-3 provides a summary of regulatory guidelines, mean concentrations using the 2005-2010 dataset, calculated assimilative capacity, and the threshold concentration for each parameter.

Table 5-3. Background Water Quality Analysis

Parameter	Regulatory Guidelines	Units	North American Subbasin			
	MCL (Ag for fluoride)		2005 - 2010 Mean	Assimilative Capacity	10% Threshold Concentration	20% Threshold Concentration
Chemicals with MCLs in 22 CCR §64431 —Inorganic Compounds						
Fluoride [1]	2	mg/L	0.19	1.81	0.37	0.55
Fluoride (for Agricultural)	1	mg/L	0.19	0.81	0.27	0.35
Nitrate (as NO_3) [1]	45	mg/L	9.39	35.61	12.95	16.51
Chemicals with MCLs in 22 CCR §64533 —Disinfection Byproducts						
Total Trihalomethanes [1]	80	µg/L	0.59	79.41	8.53	16.47
Bromodichloromethane	-	µg/L	0.02	N/A	N/A	N/A
Bromoform	-	µg/L	0.01	N/A	N/A	N/A
Chloroform	-	µg/L	0.17	N/A	N/A	N/A
Dibromochloromethane	-	µg/L	3.4E-03	N/A	N/A	N/A
Unregulated VOCs						
Haloacetic Acids (5) (HAA5) [1]	60	µg/L	3.25	N/A	N/A	N/A
Dibromoacetic Acid (DBAA)	-	µg/L	0	N/A	N/A	N/A
Dichloroacetic Acid (DCAA)	-	µg/L	1.29	N/A	N/A	N/A
Monobromoacetic Acid (MBAA)	-	µg/L	0	N/A	N/A	N/A
Monochloroacetic Acid (MCAA)	-	µg/L	0.34	N/A	N/A	N/A
Trichloroacetic Acid (TCAA)	-	µg/L	1.64	N/A	N/A	N/A
Unregulated Inorganic Chemicals, Physical Properties, and Minerals						
Choride [2]	250	mg/L	29.76	N/A	N/A	N/A
Hardness (Total) as $CaCO_3$	-	mg/L	115.31	N/A	N/A	N/A
Sodium	-	mg/L	22.54	N/A	N/A	N/A
Sulfate [2]	250	mg/L	7.87	N/A	N/A	N/A
Total Dissolved Solids [2]	500	mg/L	275	N/A	N/A	N/A

Notes:
CCR = California Code of Regulations
[1] *Primary MCL*
[2] *Secondary MCL (Recommended Consumer Acceptance Contaminant Levels)*

Units are reported as follows:
µg/L = micrograms per liter
mg/L = milligrams per liter

5.6. Injection Water Quality

Treated surface water delivered from the City's Barton Road Water Treatment Plant will be the source water for injection under the City's ASR Program. Injection water quality is compiled from the City's water quality testing. The dataset includes data submitted to CDPH and constituents analyzed for water treatment operations and distribution qualities by the City. Where water quality data is not available for conservative constituents, water distribution data (treated Folsom Lake water) were used for injection water quality. Table 5-3 provides a summary of injection water concentrations.

Table 5-4. Injection Water Quality Concentrations

Parameter	Units	Injection Concentrations	
		City of Roseville Distribution System	Folsom Lake Surface Water
		Average Concentration	Average Concentration
Chemicals with MCLs in 22 CCR §64431 —Inorganic Compounds			
Fluoride [1]	mg/L	0.7	-
Nitrate (as NO_3) [1]	mg/L	-	0
Disinfection Byproducts - THMs			
Total Trihalomethanes [1]	µg/L	36.99	-
Bromodichloromethane	µg/L	3.19	-
Bromoform	µg/L	0.04	-
Chloroform	µg/L	34.42	-
Dibromochloromethane	µg/L	0.06	-
Disinfection Byproducts - HAAs			
Haloacetic Acids (5) (HAA5) [1]	µg/L	20.40	-
Dibromoacetic Acid (DBAA)	µg/L	0.00	-
Dichloroacetic Acid (DCAA)	µg/L	8.13	-
Monobromoacetic Acid (MBAA)	µg/L	0.31	-
Monochloroacetic Acid (MCAA)	µg/L	0.06	-
Trichloroacetic Acid (TCAA)	µg/L	12.86	-
Unregulated Inorganic Chemicals, Physical Properties, and Minerals			
Chloride [2]	mg/L	-	1.8
Hardness (Total) as $CaCO_3$	mg/L	-	22
Sodium	mg/L	-	3
Sulfate [2]	mg/L	-	2.2
Total Dissolved Solids [2]	mg/L	-	42

Notes:

CCR = California Code of Regulations

Units are reported as follows:

µg/L = micrograms per liter

mg/L = milligrams per liter

5.7. Results

Results from the transport analysis were compared to baseline conditions and 10% and 20% of the available assimilative capacity in the subbasin. Groundwater concentrations are presented comparing to the 10% and 20% of the available assimilative capacity.

Water quality impacts were analyzed based on time and distance from the proposed ASR well locations, at the City boundary, and at a distance down gradient of an injection well in October 2030 and October 2050 for selected constituents that exceed threshold concentrations beyond City limits. Impacts to existing streams, creeks, irrigation wells and public supply wells are discussed relative to threshold concentrations.

Five locations (location numbers 1,2,3,5 and 6) at the City boundary are down gradient of an ASR well, and one location (location number 4) away from the influence of the ASR wells, were selected to present the simulated water quality impacts.

Figure 5-13. Modeling Analysis Locations

5.7.1. Fluoride

Fluoride is a naturally occurring element in the environment; however, the City has added fluoride to its water for dental protection for over 40 years. Since then regulations at the State level have made this practice a mandatory process. Since fluoride has an effect on plant growth, both drinking water and agricultural beneficial uses are being considered when analyzing fluoride impacts. The level of fluoridation for the City of Roseville treatment process is maintained at 0.7 mg/L. The regulatory guideline for fluoride for drinking water is the primary MCL at 2 mg/L. The recommended maximum concentration for irrigation water suggested by Ayres and Westcot is 1 mg/L.

Native groundwater in the North American subbasin contains fluoride concentrations at 0.19 mg/L. Using the drinking water MCL, the assimilative capacity for fluoride in the North American subbasin is 1.81 mg/L. 10% of the available assimilative capacity including background concentration is 0.37 mg/L and 20% of the available assimilative capacity is 0.55 mg/L. Using the recommended irrigation water concentration, the available assimilative capacity for fluoride is 0.81 mg/L. 10% and 20% of the available assimilative capacity with background concentrations are 0.27 mg/L and 0.35 mg/L respectively. Injection water was assigned 0.7 mg/L of fluoride for the transport analyses.

The following is a summary of the results for fluoride for each of the six predictive scenarios.

Scenario 1a. Fluoride

Figure 5-14 shows fluoride concentrations at the 10% available assimilative capacity level with respect to drinking water beneficial use in the upper layer of the Mehrten Formation for Scenario 1a in October 2030 and October 2050.

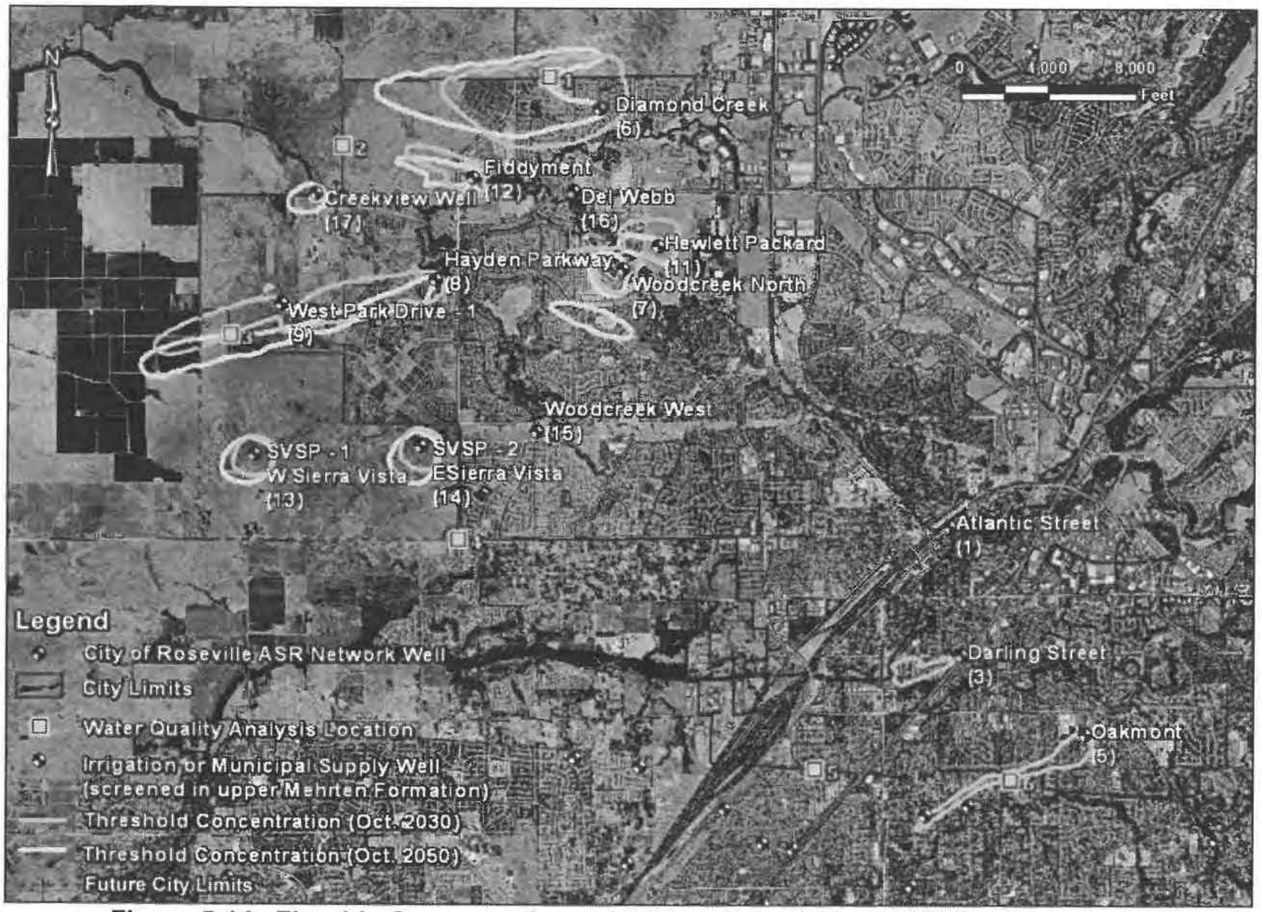

Figure 5-14. Fluoride Concentrations at 0.37 mg/L in 2030 and 2050 – Scenario 1a

Fluoride concentrations first exceed 0.37 mg/L in Scenario 1a beyond the City limits down gradient of Diamond Creek well (Scenario 1a-1), West Park well (Scenario 1a-3), and Oakmont well (Scenario 1a-6) in September 2016, October 2023, and September 2017, respectively, as shown in Figure 5-15.

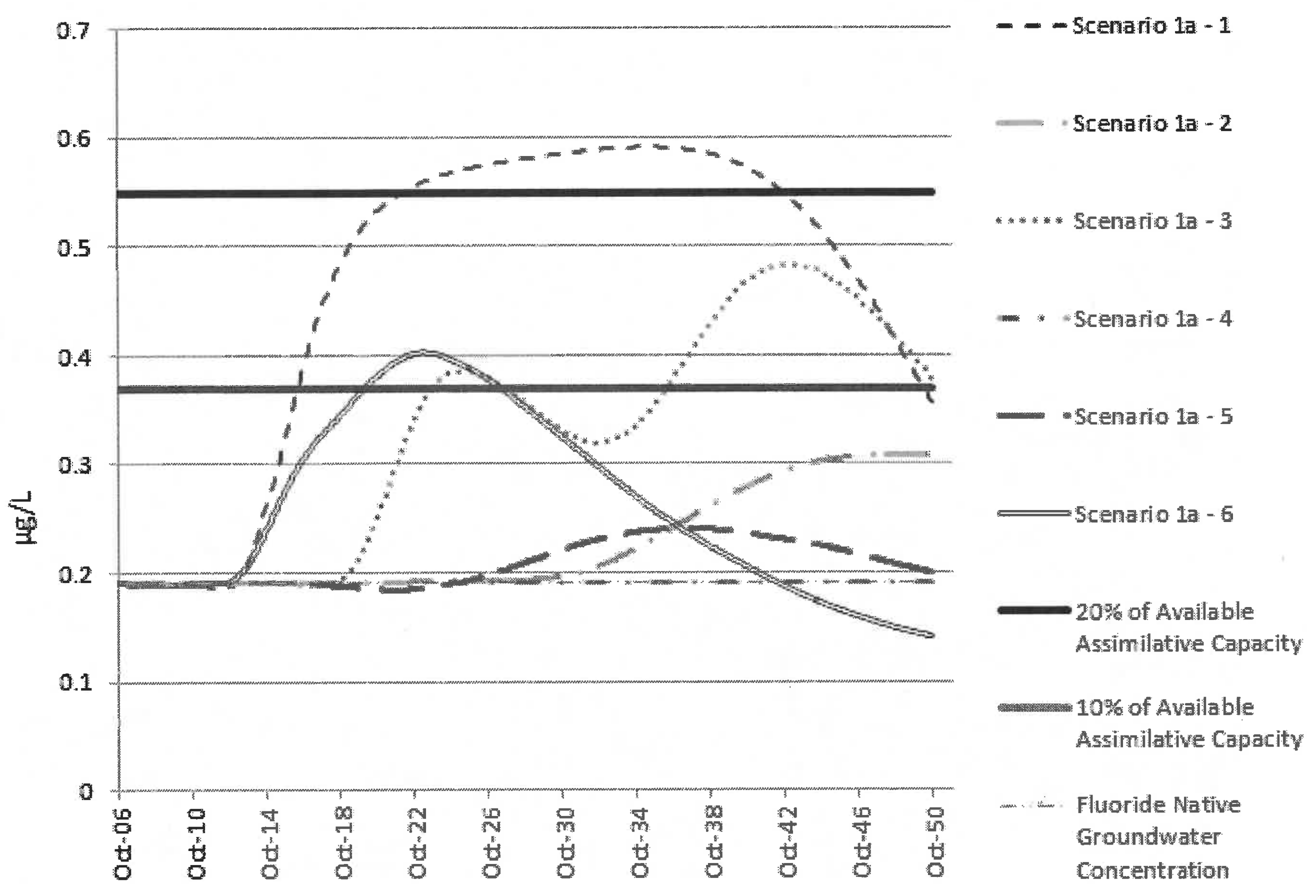

Figure 5-15. Fluoride Concentrations at the City Boundary with respect to drinking water beneficial use – Scenario 1a

In October 2030, fluoride concentrations exceed 0.37 mg/L in the Turlock Lake Laguna Formation approximately 1,000 feet and 6,000 feet beyond the City limits, down gradient of the Diamond Creek well and Oakmont well, respectively. In October 2050, fluoride concentrations exceed 0.37 mg/L less than 1,000 feet down gradient of the Diamond Creek well. Fluoride concentrations do not exceed 0.37 mg/L in the Valley Springs or Ione Formation beyond City limits through 2050.

With respect to agricultural uses, as shown in Figure 5-16, the 10% and 20% of the available assimilative capacity s are 0.27 mg/L and 0.35 mg/L, respectively. Fluoride concentrations first exceed 10% of available assimilative capacity in December 2014 and 20% available assimilative capacity in March 2016. Fluoride concentrations exceed 10% and 20% of available assimilative capacity in September 2015 and February 2019. Available assimilative capacity was not used beyond 10% and 20% at Scenario 1a-3 from Hayden Parkway well until April 2021 and February 2023, respectively, as shown in Figure 5-16.

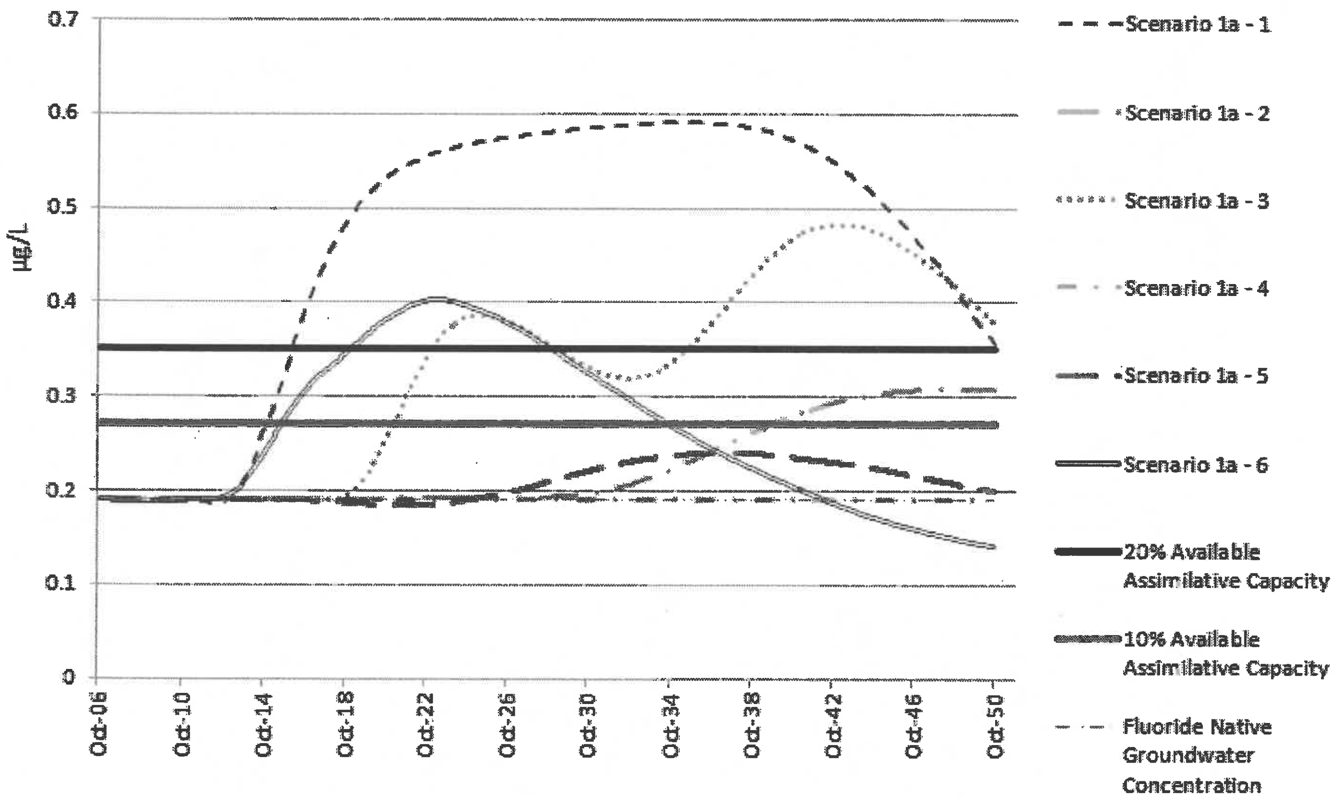

Figure 5-16 Fluoride Concentrations at the City Boundary with respect to agricultural beneficial use – Scenario 1a

There are no known public supply wells, agricultural wells, or municipal wells in areas not already mentioned where greater than 10% of the available assimilative capacity has been diminished from project operations. There are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within the area of impacted groundwater. The additional impacts resulting from Scenario 1a operations do not constitute a threat to the protection of groundwater's beneficial uses in the area.

Scenario 1b. Fluoride

Figure 5-17 shows fluoride levels at its threshold concentration in the upper layer of the Mehrten Formation for Scenario 1b in October 2030 and October 2050.

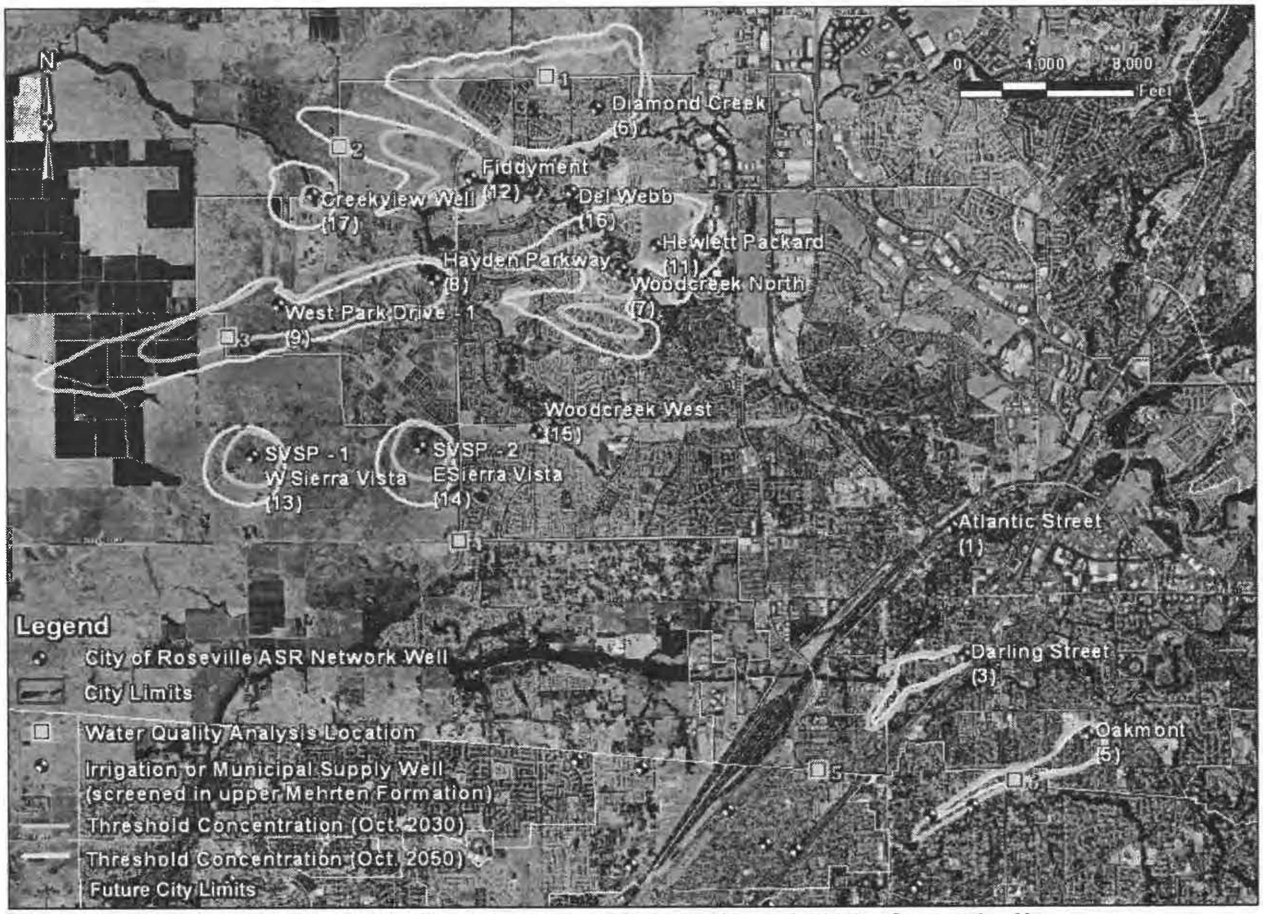

Figure 5-17. Fluoride Concentrations at 0.37 mg/L in 2030 and 2050 - Scenario 1b

Fluoride concentrations first exceed 10% of the available assimilative capacity based on drinking water beneficial use in Scenario 1b beyond the City limits down gradient of the Diamond Creek well (Scenario 1b-1), Hayden Parkway well (Scenario 1b-3), and Oakmont well (Scenario 1b-6) in May 2016, January 2023, and July 2019, respectively, as shown in Figure 5-18. Fluoride concentrations exceed 20% of the available assimilative capacity based on municipal beneficial use in Scenario 1b down gradient of the Diamond Creek Well and Hayden Parkway well in June 2021 and August 2038, respectively, as shown in Figure 5-18.

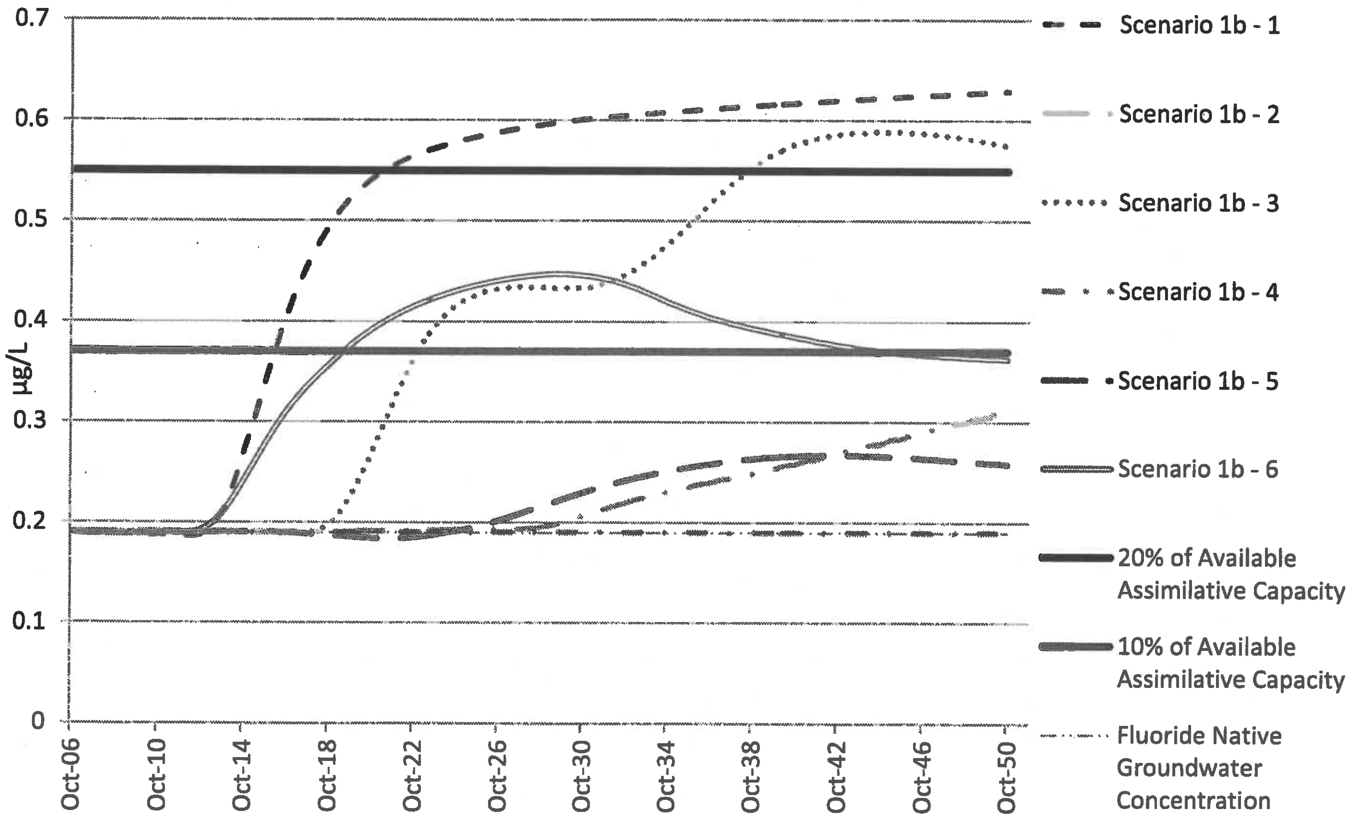

Figure 5-18. Fluoride Concentrations at the City Boundary with respect to drinking water beneficial use – Scenario 1b

In October 2030, fluoride concentrations exceed threshold concentrations in the Turlock Lake Laguna Formation approximately 1,500 feet and 10,000 feet beyond the City limits, down gradient of the Diamond Creek well and Oakmont well, respectively. In October 2050, fluoride concentrations exceed threshold concentrations approximately 2,000 feet and 15,000 feet down gradient of the Diamond Creek well and Oakmont well, respectively. Fluoride concentrations exceed threshold concentrations approximately 500 feet and 1,000 feet down gradient of the Diamond Creek Well in the Valley Springs Formation in October 2030 and October 2050, respectively. Fluoride concentrations do not exceed threshold concentrations in the Ione Formation beyond City limits through 2050.

There are public supply wells in Citrus Heights Water District and California American Water Company's Lincoln Oaks System down gradient of the Oakmont well where greater than 10% of the available assimilative capacity were affected by the City's proposed ASR project operations in the Turlock Lake Laguna Formation and Mehrten Formation. However, the additional impacts resulting from Scenario 1b operations do not constitute a threat to the protection of groundwater's beneficial uses in the area. There are no known public supply wells, agricultural wells, or municipal wells in areas not already mentioned where greater than 10% of the available assimilative capacity has been impacted from project operations.

With respect to agricultural beneficial use, Fluoride concentrations exceeded the 10% assimilative capacity availability down gradient of Diamond Creek well, Oakmont well, Hayden Parkway well, and Fiddyment well in November 2014, August 2015, November 2020, and January 2043, respectively. 20% of the available assimilative capacity was not exceeded down gradient of Diamond Creek well until January 2016, Oakmont Well in July 2018, and Hayden Parkway well in July 2022.

There are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within the area of impacted groundwater.

Although the projected fluoride concentration would exceed the current and planned future City boundary, agricultural impacts from the City's proposed ASR operation with fluoridated water is minimal. Currently the area is identified as rice production fields. The area of impact has been planned for future development by Placer County. A final EIR for the Regional University Specific Plan (RUSP) was certified by Placer County on December 9, 2008. RUSP comprises of 1,157.5 acres located at the western boundary of the City of Roseville, approximately 1.6 miles north of Base Line Road. According to Regional University Specific Plan document:

> *"PCWA [Placer County Water Agency] will provide treated surface water to the Plan area from the beginning of its development. Recycled water from PGWWTP will be used for non-potable irrigation supply when recycled water becomes available in 2010 (RMC, 2006). After recycled water is available, water provided by PCWA will be used to meet some irrigation demands, because the available recycled water supply may be somewhat less than the peak summer day irrigation demand. Groundwater will be used for drought protection, water supply emergencies and during PCWA maintenance events."*

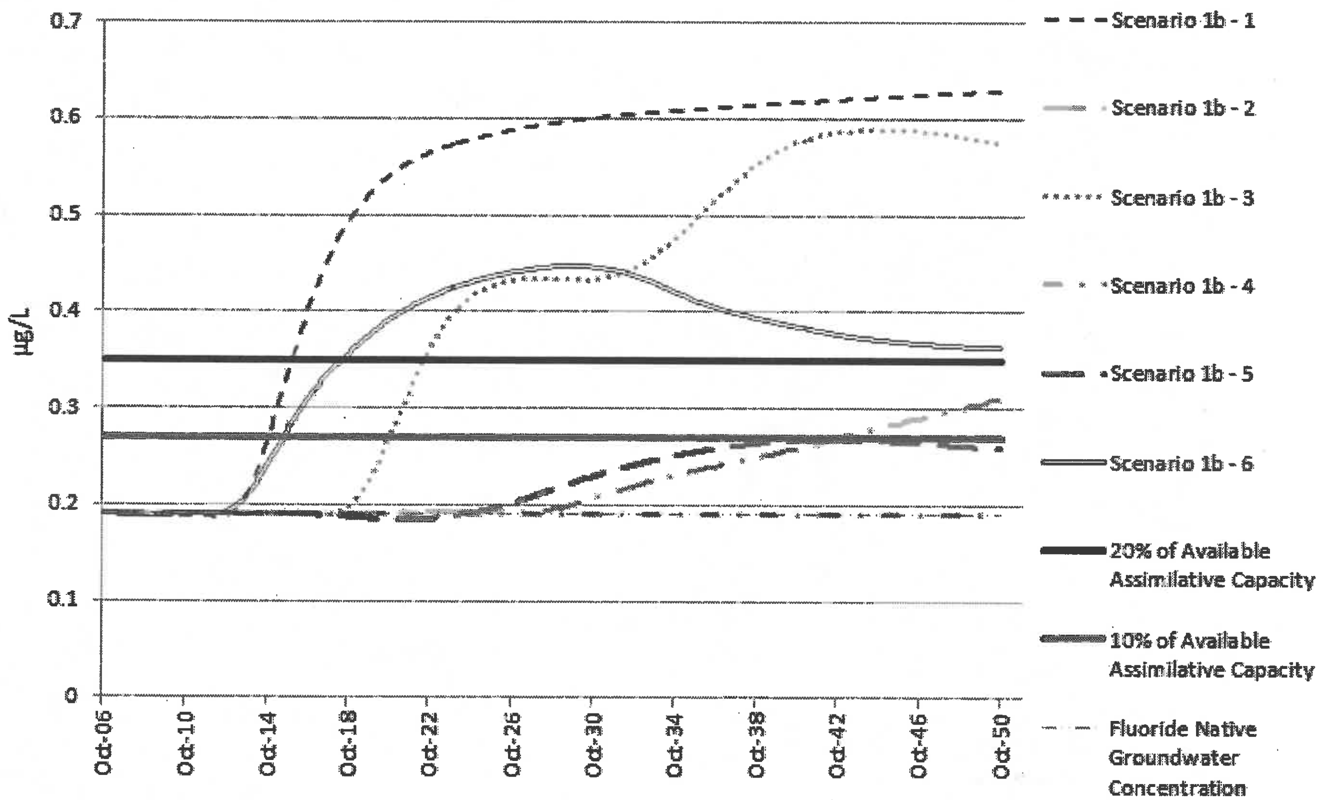

Figure 5-19 Fluoride Concentrations at the City Boundary with respect to agricultural beneficial use – Scenario 1b

It should also be noted that both Scenarios 1a and 1b are for injection of treated drinking water into the ASR wells only, no extraction of the water is accounted for. This exercise is intended to show the worst case impacts to the groundwater aquifer based on the beneficial uses identified in the basin plan over a 50 year time period.

Scenario 2a. Fluoride

Figure 5-20 shows fluoride levels at its threshold concentration in the upper layer of the Mehrten Formation for Scenario 2a in October 2030 and October 2050.

Figure 5-20. Fluoride Concentrations at 0.37 mg/L in 2030 and 2050 - Scenario 2a

Fluoride concentrations do not exceed the 10% or 20% of available assimilative capacity beyond the City limits as shown in Figure 5-21.

Fluoride concentrations do not exceed threshold concentrations in the Turlock Lake Laguna Formation, the Valley Springs Formation or the Ione Formation beyond City limits through 2050. There are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within the area of impacted groundwater. There are no known public supply wells, agricultural wells, or municipal wells in areas where greater than 10% assimilative capacity has been diminished from project operations.

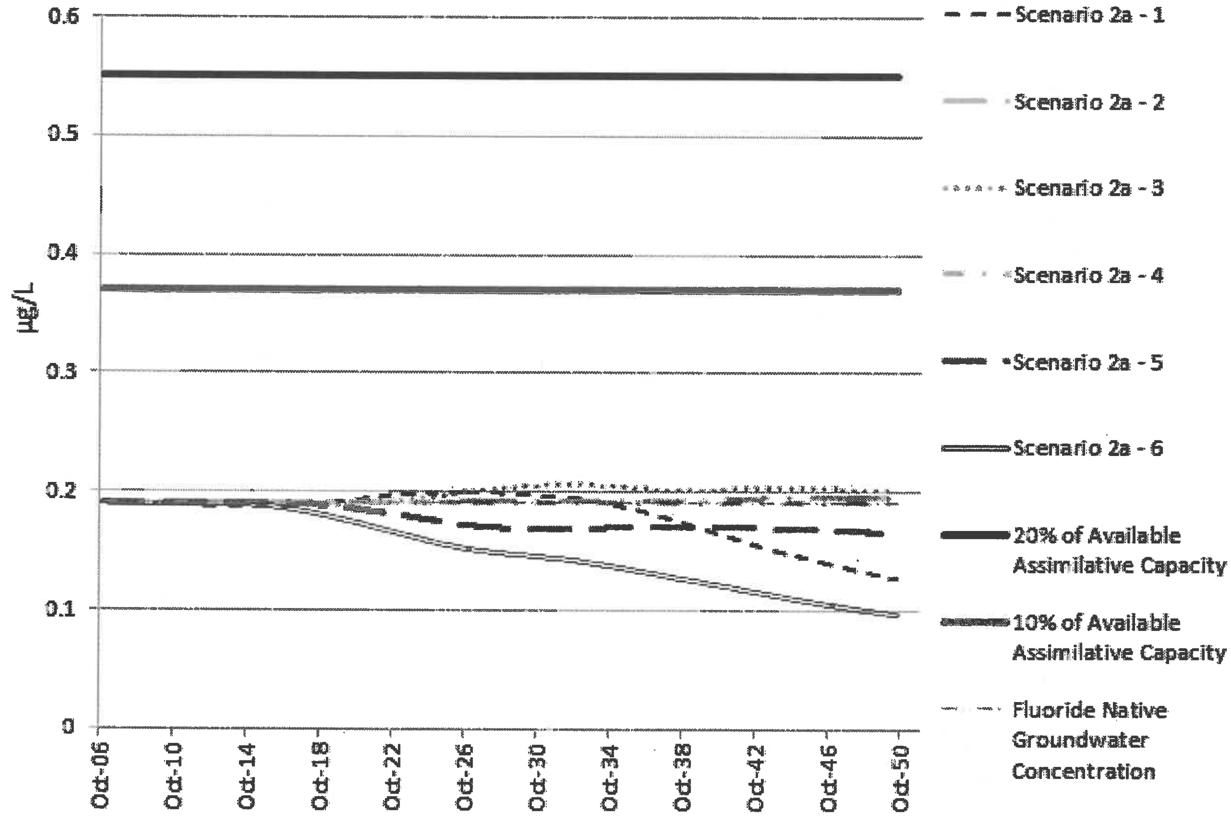

Figure 5-21. Fluoride Concentrations at the City Boundary with respect to drinking water beneficial use – Scenario 2a

With respect to agricultural beneficial use and assimilative capacity, fluoride concentrations from the City's proposed ASR operations are within the 10% and 20% of assimilative capacity availability for the entire modeling time frame, as shown in Figure 5-22. It is expected that the extraction operation would remove most, if not all, injected water and the remainder fluoride, if any, would be negligible and the existing groundwater condition would remain.

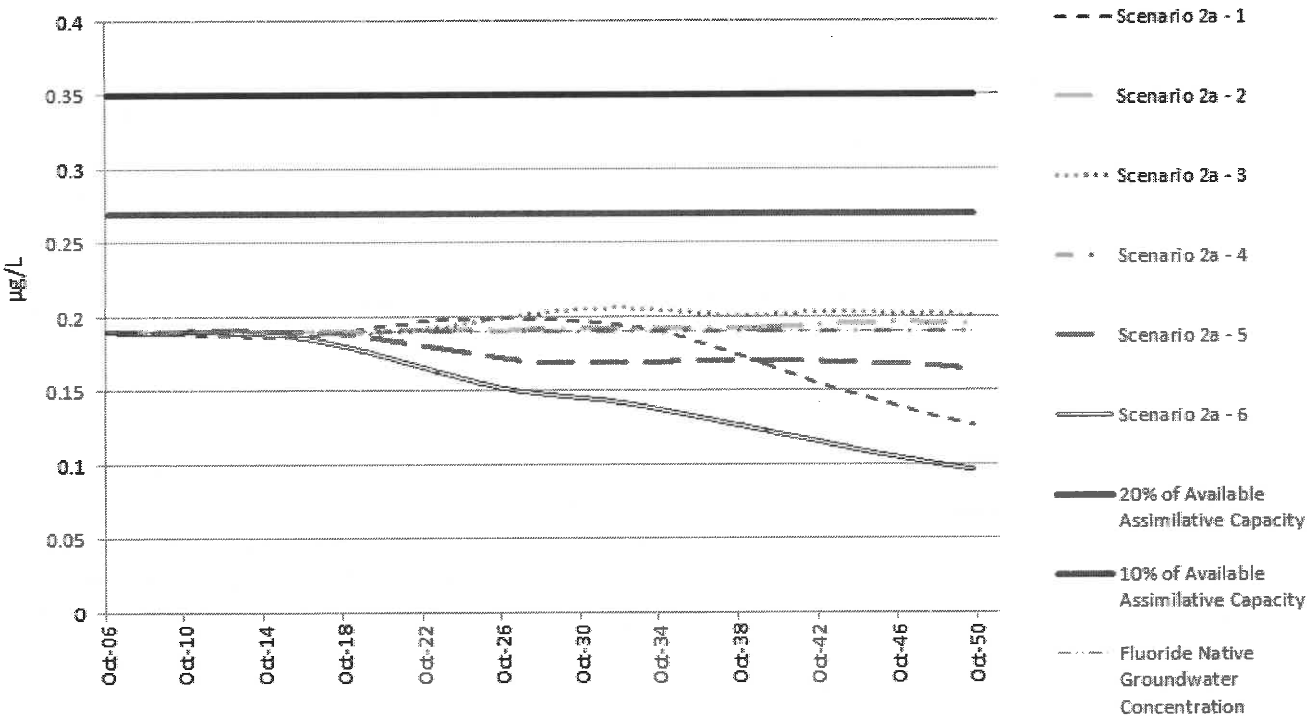

Figure 5-22. Fluoride Concentrations at the City Boundary with respect to agricultural beneficial use – Scenario 2a.

Scenario 2b Fluoride

Figure 5-23 shows fluoride levels at its threshold concentration in the upper layer of the Mehrten Formation for Scenario 2b in October 2030 and October 2050.

Figure 5-23. Fluoride Concentrations at 0.37 mg/L in 2030 and 2050 - Scenario 2b

Fluoride concentrations do not exceed 10% and 20% of the available assimilative capacity for drinking water beneficial use in Scenario 2b beyond the City limits, as shown in Figure 5-24. Fluoride concentrations do not exceed threshold concentrations in the Turlock Lake Laguna Formation, the Valley Springs Formation or the Ione Formation beyond City limits through 2050. There are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within the area of impacted groundwater.

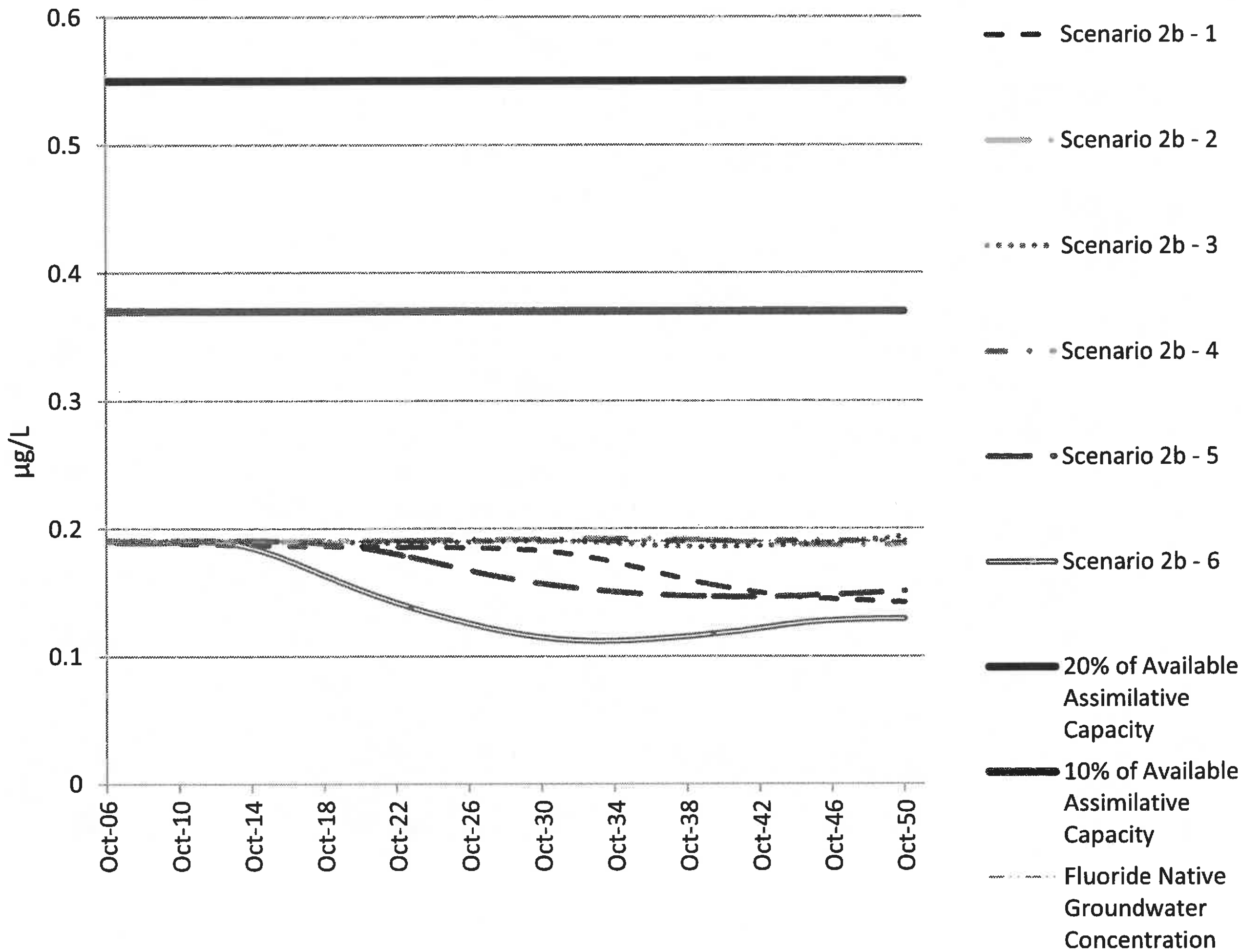

Figure 5-24. Fluoride Concentrations at the City Boundary with respect to drinking water beneficial use – Scenario 2b

With respect to agricultural beneficial use and assimilative capacity, fluoride concentrations from the City's proposed ASR operations are within the 10% and 20% of assimilative capacity availability for the entire modeling time frame, as shown in Figure 5-25. It is expected that the extraction operation would remove most, if not all, injected water and the remainder fluoride, if any, would be negligible and the existing groundwater condition would remain.

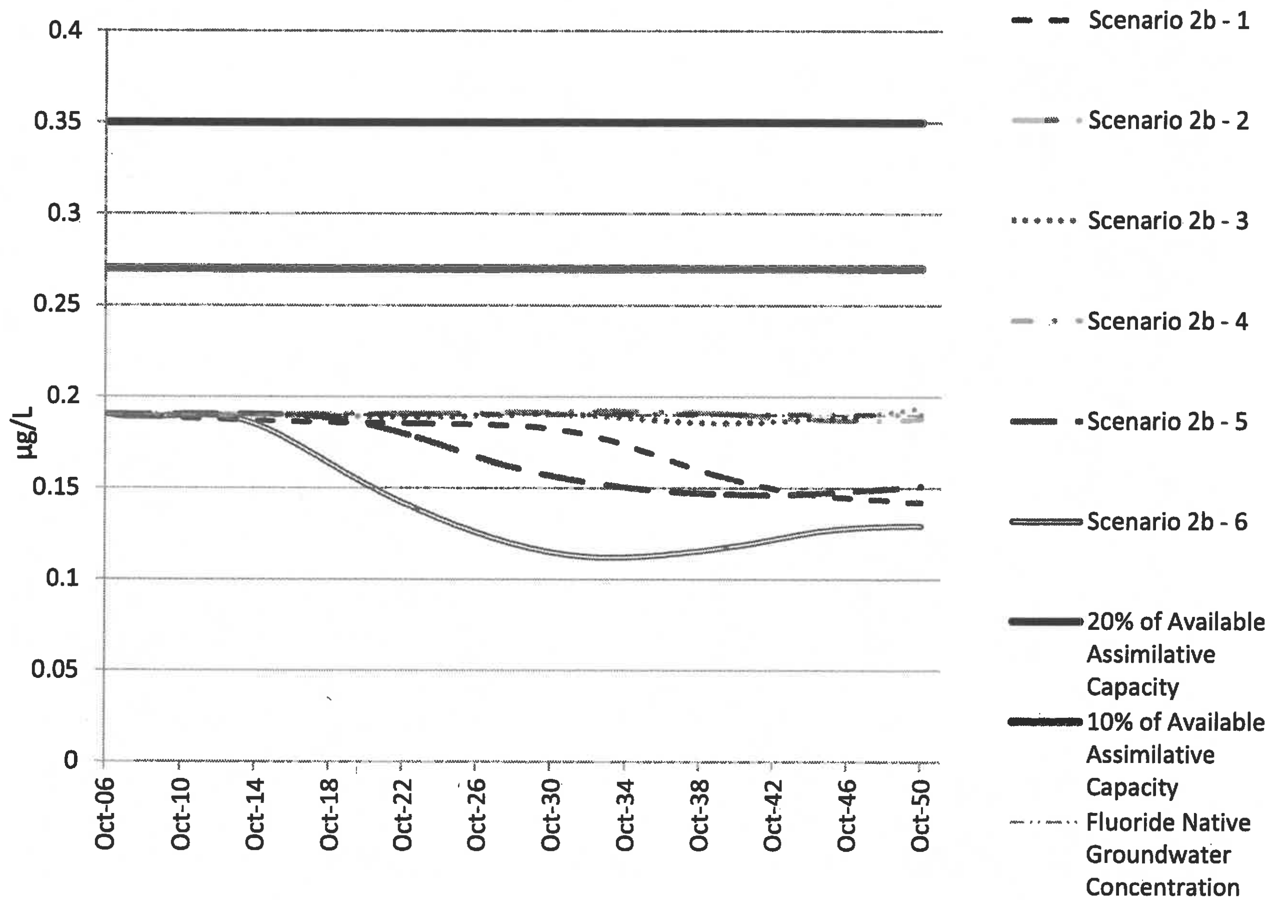

Figure 5-25. Fluoride Concentrations at the City Boundary with respect to agricultural beneficial use – Scenario 2b

Scenario 3a. Fluoride

Figure 5-26 shows fluoride levels at its threshold concentration in the upper layer of the Mehrten Formation for Scenario 3a in October 2030 and October 2050.

Figure 5-26. Fluoride Concentrations at 0.37 mg/L in 2030 and 2050 - Scenario 3a

Fluoride concentrations only exceed the 10% available assimilative capacity in Scenario 3a beyond the City limits down gradient of the Diamond Creek Well in July 2021, as shown in Figure 5-27. Fluoride concentrations do not exceed 10% or 20% of the available assimilative capacity in Scenario 3a beyond the City limits at the other five analysis locations.

Fluoride concentrations do not exceed threshold concentrations in the Turlock Lake Laguna Formation, the Valley Springs Formation or the Ione Formation beyond City limits through 2050. There are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within the area of impacted groundwater.

There are no other known public supply wells or municipal wells in areas where greater than 10% of the available assimilative capacity has been affected from project operations.

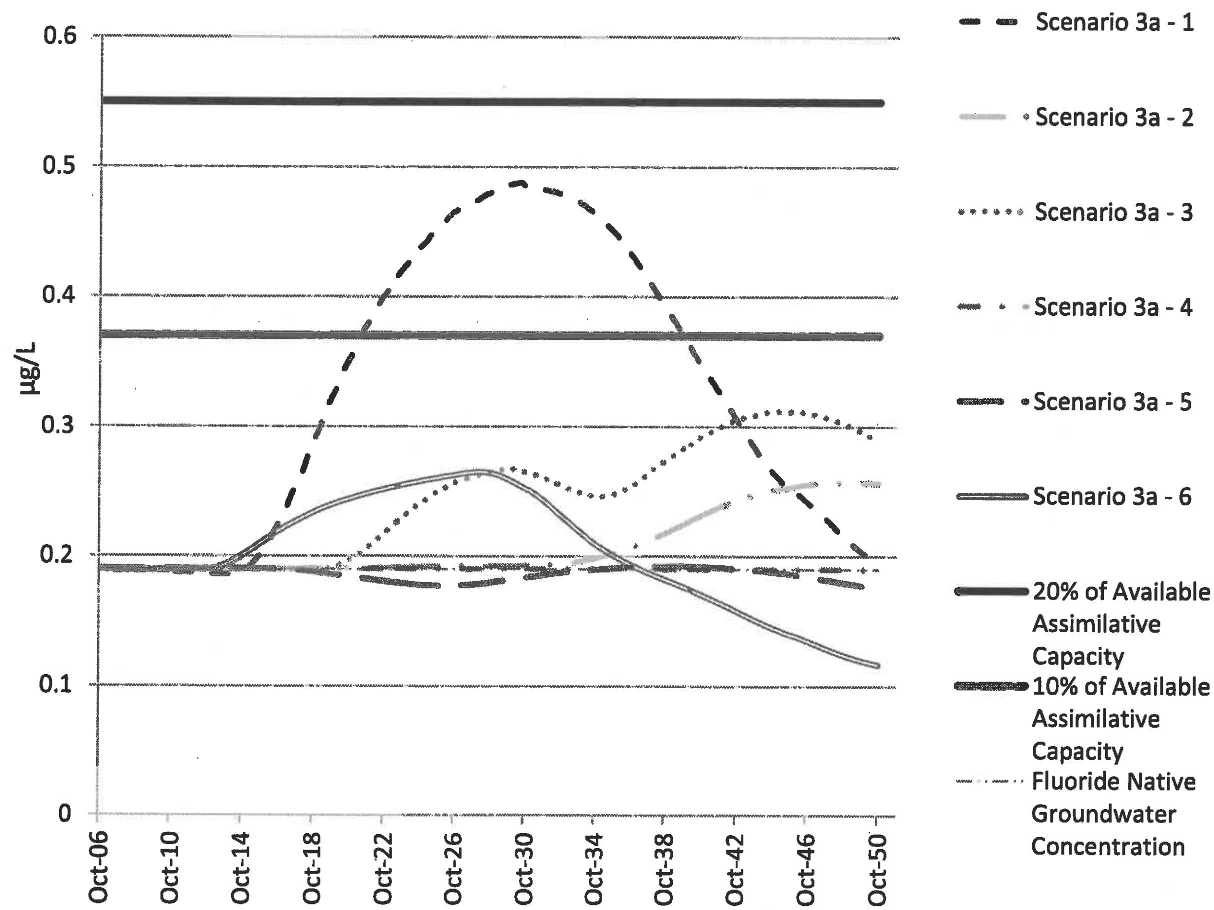

Figure 5-27. Fluoride Concentrations at the City Boundary with respect to drinking water beneficial use – Scenario 3a

With respect to agricultural beneficial use, fluoride concentrations first exceed 10% of available assimilative capacity in May 2018 and 20% available assimilative capacity in October 2020 down gradient of Diamond Creek well as shown in Figure 5-28. 10% of the available assimilative capacity down gradient of Hayden Parkway well would be used by July 2038 for fluoride. Although assimilative capacity impacts would occur from the City's proposed ASR operations, it is unlikely that the agricultural beneficial use would be affected as the area is slated for development with water supplies provided by PCWA with groundwater being backup supplies. Agricultural beneficial use would no longer be present within the area.

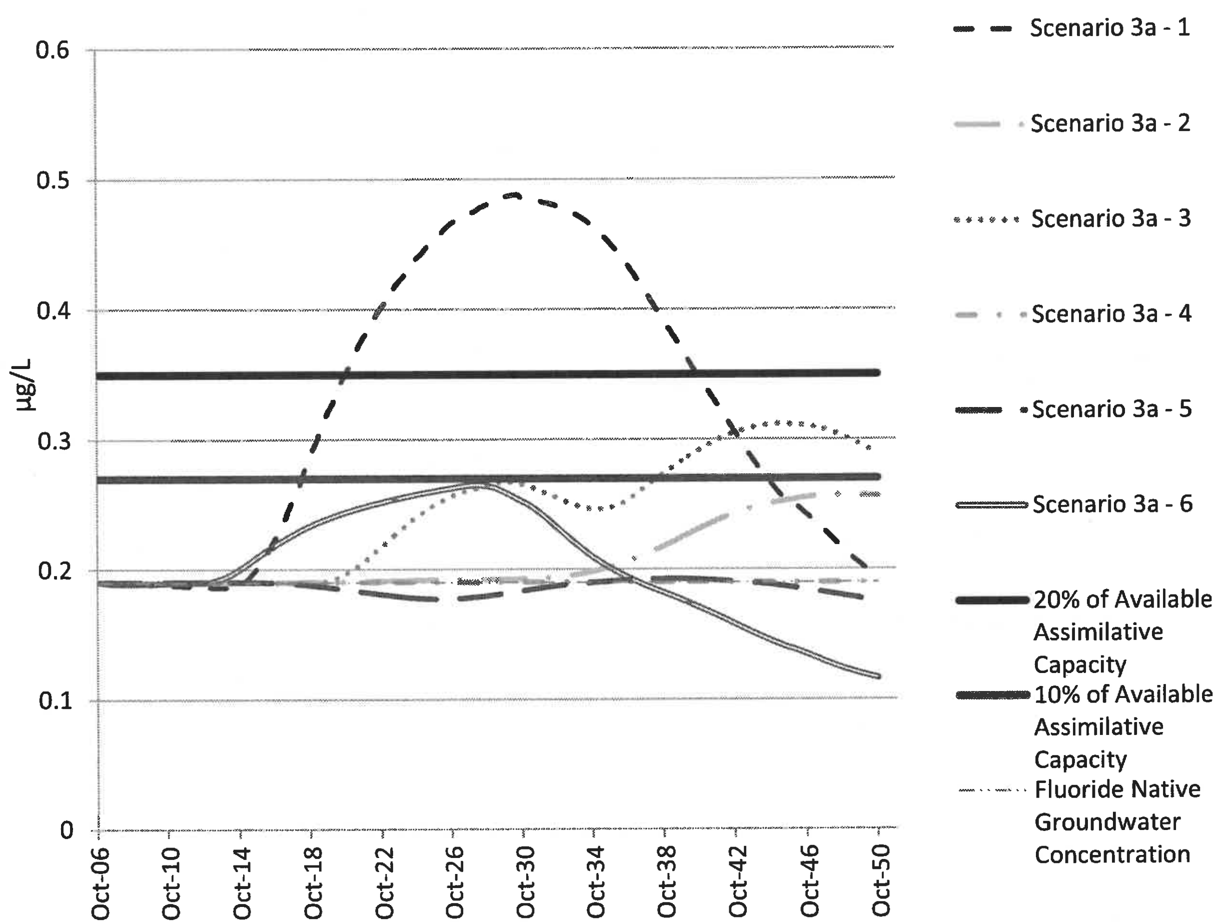

Figure 5-28. Fluoride Concentrations at the City Boundary with respect to agricultural beneficial uses – Scenario 3a.

Scenario 3b. Fluoride

Figure 5-29 shows fluoride levels at its threshold concentration in the upper layer of the Mehrten Formation for Scenario 3b in October 2030 and October 2050.

Figure 5-29. Fluoride Concentrations at 0.37 mg/L in 2030 and 2050 - Scenario 3b

Fluoride concentrations first exceed the 10% available assimilative capacity in Scenario 3b beyond the City limits down gradient of the Diamond Creek well (Scenario 3b-1) in July 2021, as shown in Figure 5-30. Fluoride concentrations do not exceed threshold concentrations in Scenario 3b beyond the City limits at the other five analysis locations.

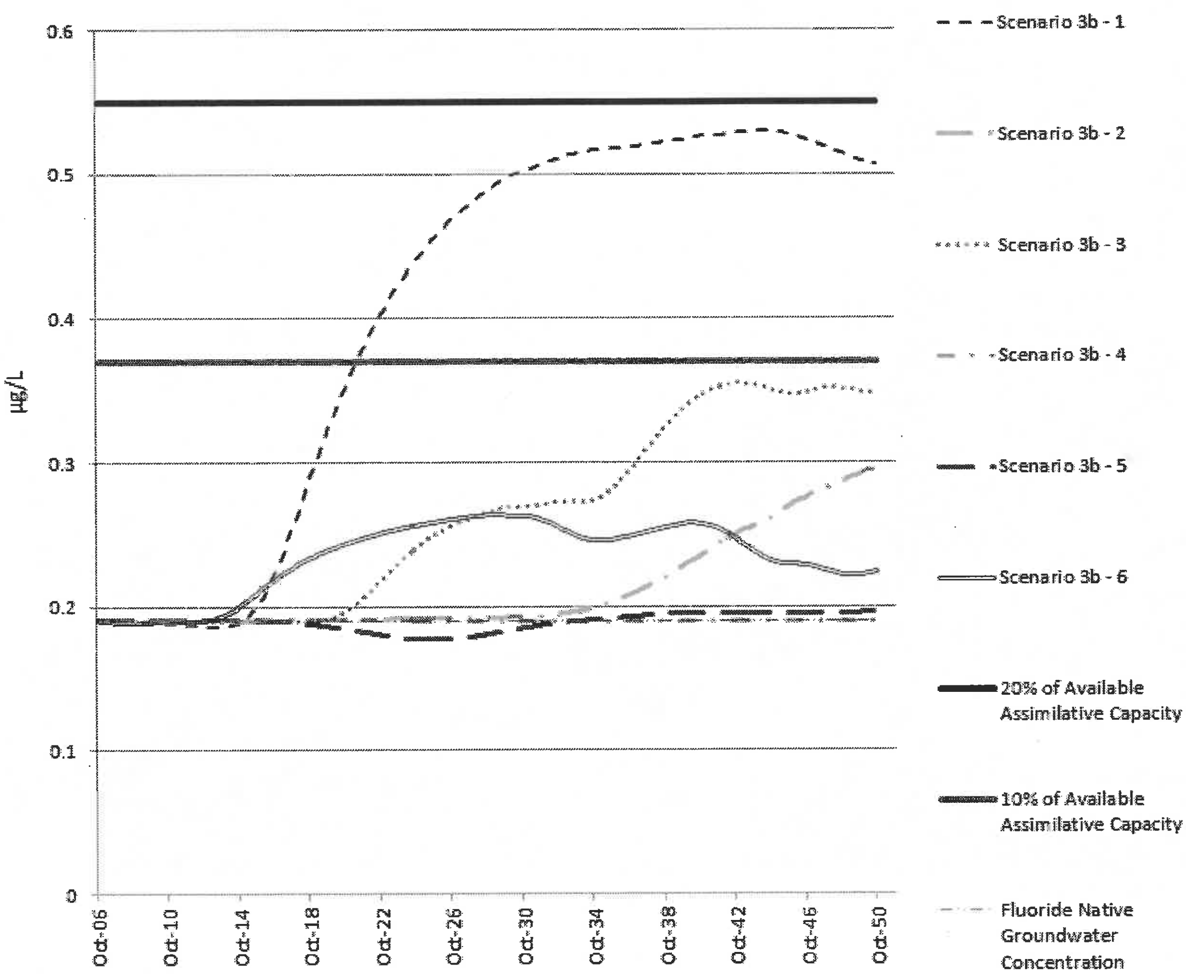

Figure 5-30. Fluoride Concentrations at the City Boundary with respect to drinking water beneficial uses – Scenario 3b.

Fluoride concentrations do not exceed threshold concentrations in the Turlock Lake Laguna Formation, the Valley Springs Formation or the Ione Formation beyond City limits through 2050. There are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within the area of impacted groundwater. There are no known public supply wells, agricultural wells, or municipal wells in areas where greater than 10% of available assimilative capacity has been diminished from project operations.

With respect to agricultural beneficial use, fluoride concentrations first exceed 10% of available assimilative capacity in May 2018 and 20% available assimilative capacity in September 2020 down gradient of Diamond Creek well as shown in **Error! Reference source not found.** 10% and 20% of the available assimilative capacity down gradient of Hayden Parkway well would be used by May 2031 and June 2041, respectively. Although assimilative capacity impacts would occur from the City's proposed ASR

operations, it is unlikely that the agricultural beneficial use would be affected as the area is slated for development with municipal water supplies provided by PCWA with groundwater being backup supplies. Agricultural beneficial use would no longer be present within the area.
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5.7.2. Nitrate (as NO3)

Nitrate naturally occurs in the environment as a result of the degradation of organic materials. However, anthropogenic sources of nitrate can also come from improper sewage disposals and over application of fertilizers. The regulatory guideline for nitrate is the primary MCL. The primary MCL for nitrate is 45 mg/L. Native groundwater in the North American subbasin contains nitrate concentrations at 9.39 mg/L. The assimilative capacity for nitrate in the North American subbasin is 35.61mg/L. The 10% and 20% available assimilative capacity for the basin are 12.59 mg/L and 16.51 mg/L, respectively. Injection water did not contain detectable levels of nitrate for the transport analyses.

Nitrate concentrations in the groundwater decreased in the vicinity of the ASR pumping wells as a result of the ASR operations. The simulated results at the six water quality analysis locations from each of the six predictive simulations are presented in (Figure 5-31 through Figure 5-36).

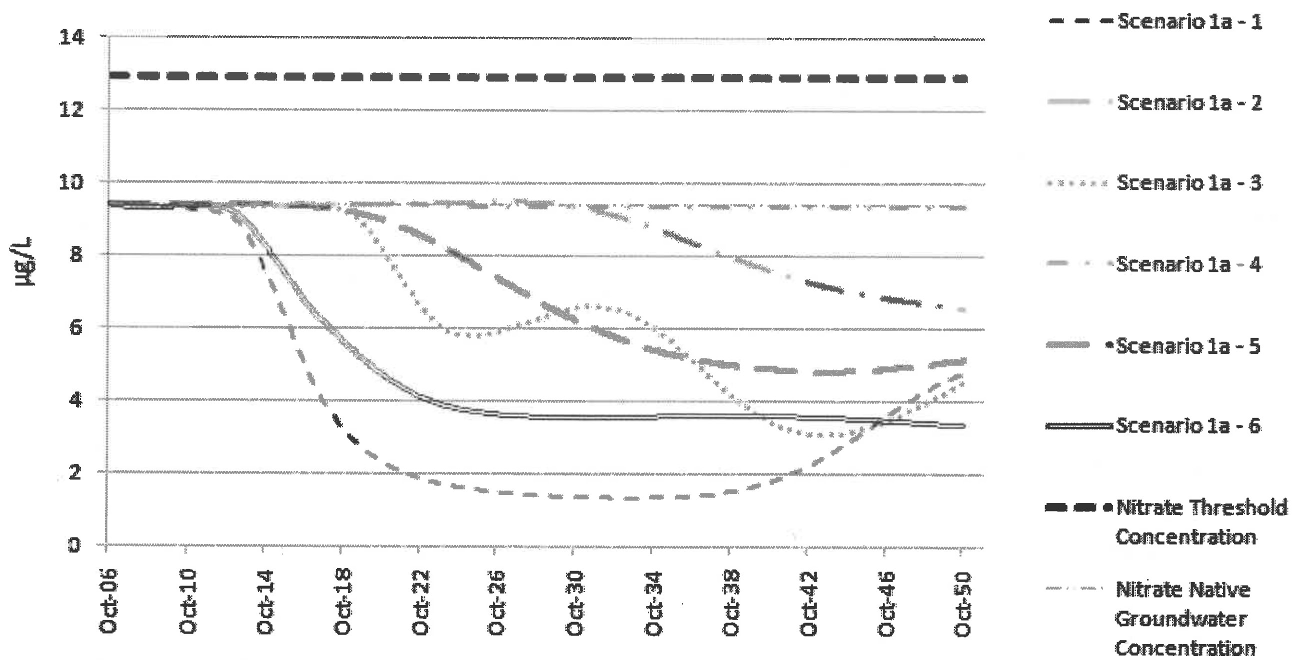

Figure 5-31. Nitrate Concentrations at the City Boundary – Scenario 1a

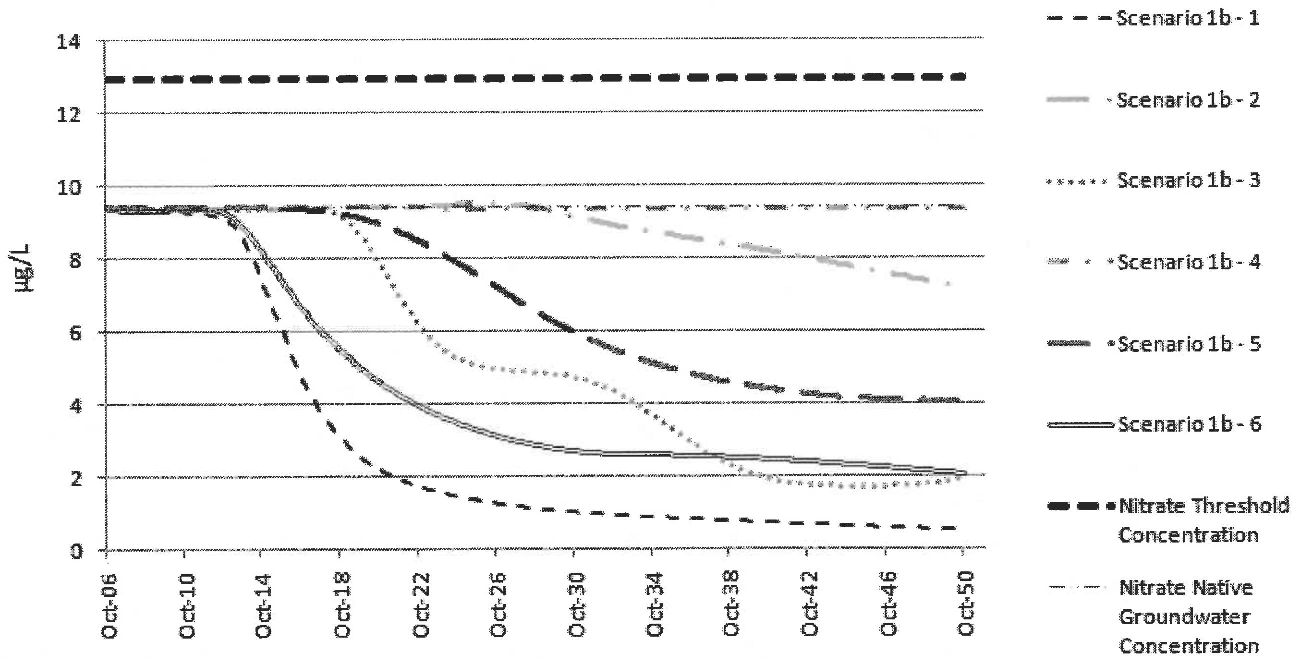

Figure 5-32. Nitrate Concentrations at the City Boundary - Scenario 1b

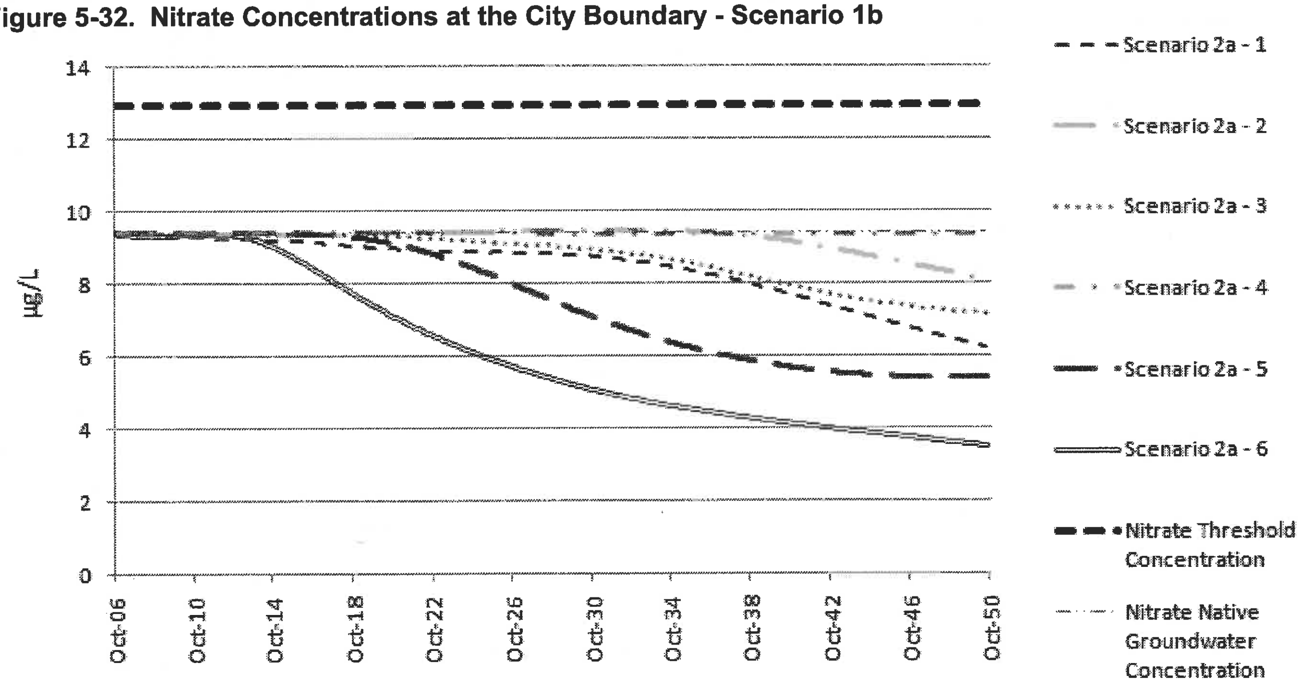

Figure 5-33. Nitrate Concentrations at the City Boundary - Scenario 2a

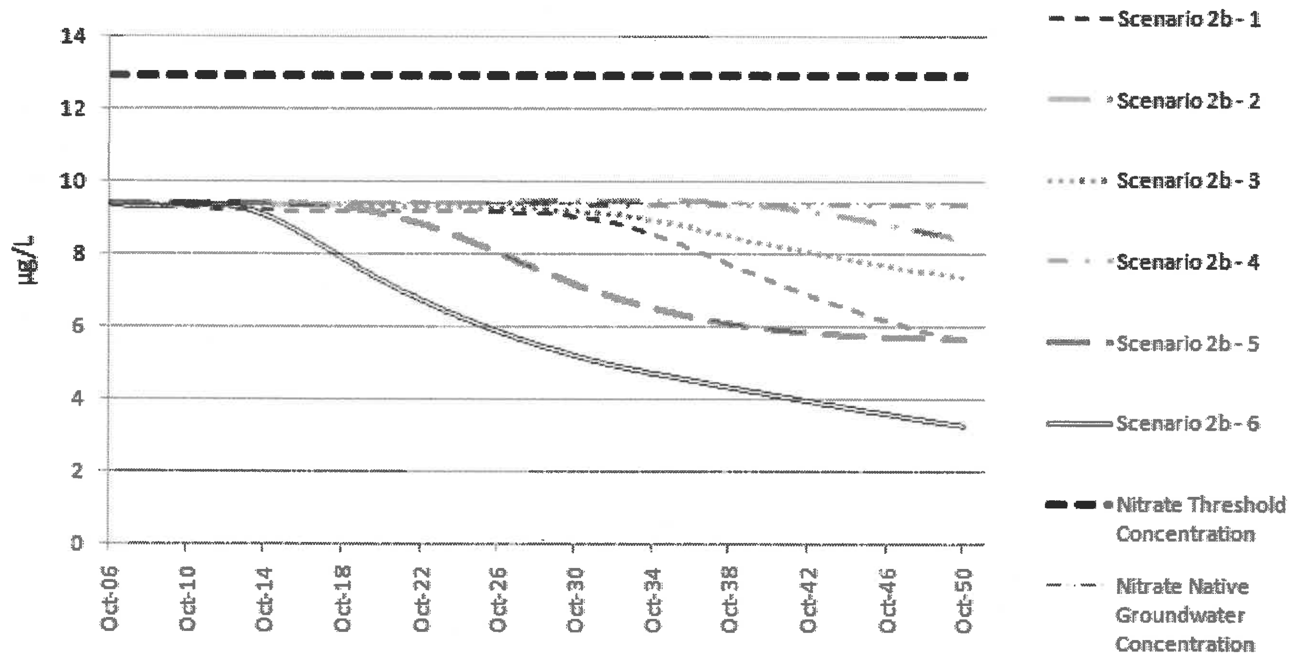

Figure 5-34. Nitrate Concentrations at the City Boundary - Scenario 2b

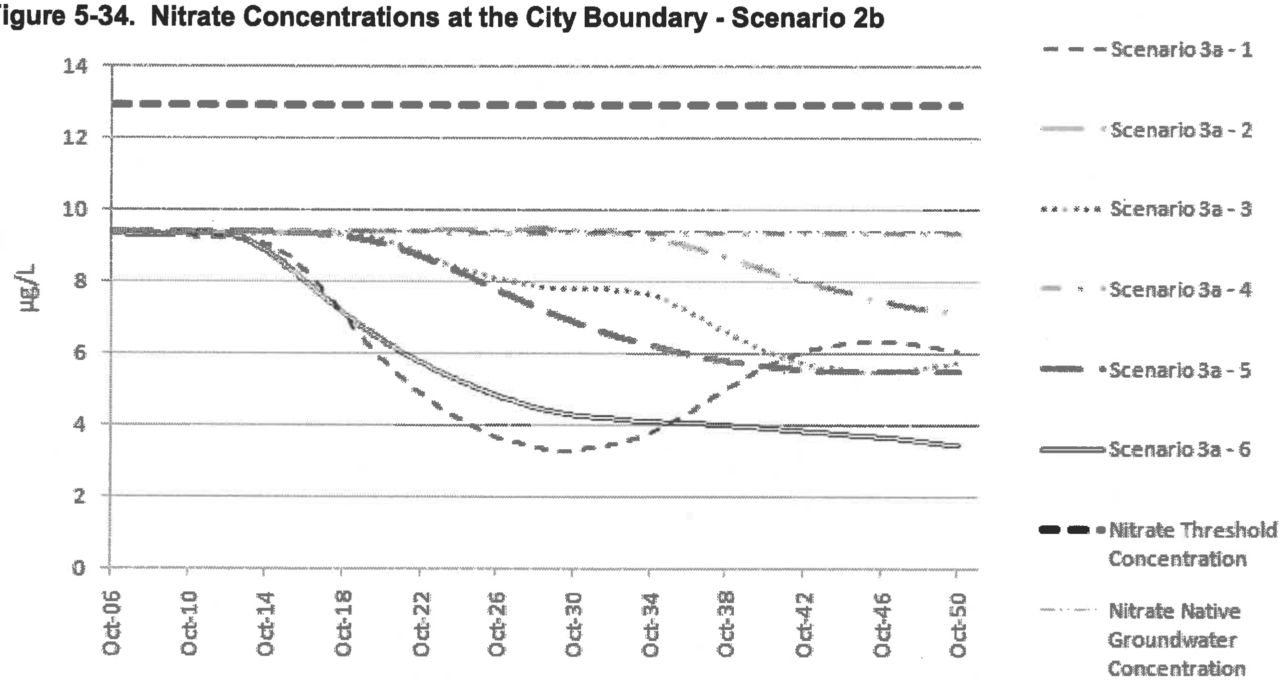

Figure 5-35. Nitrate Concentrations at the City Boundary - Scenario 3a

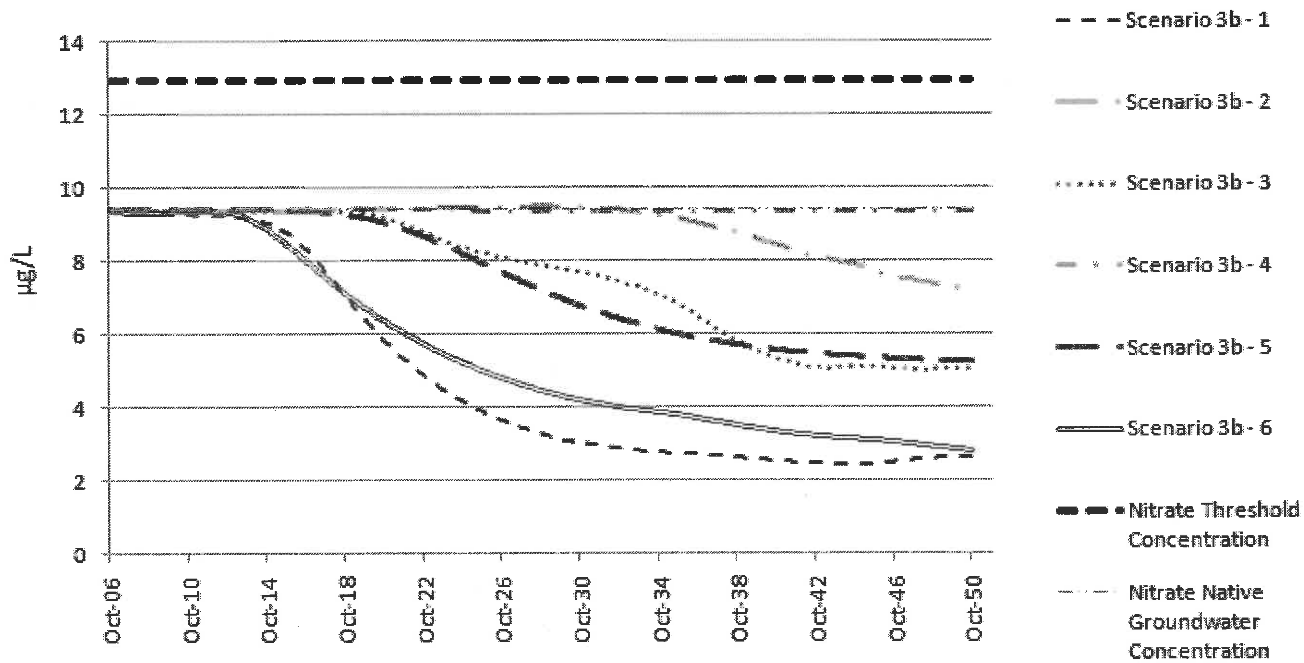

Figure 5-36. Nitrate Concentrations at the City Boundary – Scenario 3b

Because nitrate is not present in the injection water, concentrations of nitrate did not exceed the existing background concentration in any of the 6 scenarios. Nitrate concentrations resulting from the six simulated ASR operations improve the water quality of the native groundwater for both municipal and agricultural beneficial uses.

5.7.3. Disinfection Byproducts

Disinfection byproducts (DBPs) are formed when disinfectants (such as chlorine) react with organic matter naturally present in the water. Disinfectants are necessary to protect drinking water from pathogens such as bacteria, viruses, protozoa, and other organisms. These organic substances end up in the water during decomposition of plant materials.

The two most common types of DBPs in disinfected drinking water are THMs and HAAs (or HAA5). The regulated THMs consist of the following compounds: chloroform, bromodichloromethane, dibromochloromethane, and bromoform and the regulated haloacetic acids are: monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid. These DBPs are problematic because at high concentrations, they may pose health risks. As such, THMs and HAAs are regulated contaminants and their limits are regulated in drinking water. Both the federal and California drinking water standards set the limit for THMs at 80 µg/L and HAAs at 60 µg/L.

Since decomposition of plant materials occur on the surface, groundwater contains none or very little organic materials. Also, disinfectants are only added for disinfection procedures by anthropogenic activities, as such, DBPs are not naturally present in a groundwater aquifer.

Because the City's primary water source is surface water from Folsom Lake, small amounts of organic substances are naturally present. With the addition of chlorine to disinfect drinking water during treatment process, DBPs are form in the treated surface water. Roseville monitors concentrations of chlorine and DBPs in the water distribution system to ensure proper amounts of disinfectant are used to minimize the DBP formations while also protecting the water system against harmful pathogens. These compounds are not naturally present in the groundwater aquifer and are introduced into the aquifer by using the distribution system water as the source of injection in the proposed ASR project.

The regulatory guideline for Total THMs is the primary MCL. The primary MCL for Total THMs is 80 µg/L. Native groundwater in the North American subbasin contains Total THM concentrations at 0.59 µg/L. The assimilative capacity for Total THMs in the North American subbasin is 79.41 µg/L. The 10% available assimilative capacity is 8.53 µg/L and the 20% available assimilative capacity is 16.47 µg/L. Injection water was assigned 36.99 µg/L of Total THMs for the transport analyses based on distribution system data collected by the City.

The following is a summary of the results for Total THMs for each of the six predictive scenarios.

Scenario 1a. Total THMs

Figure 5-37 shows Total THM levels at the 10% available assimilative capacity in the upper portion of the Mehrten Formation for Scenario 1a in October 2030 and October 2050.

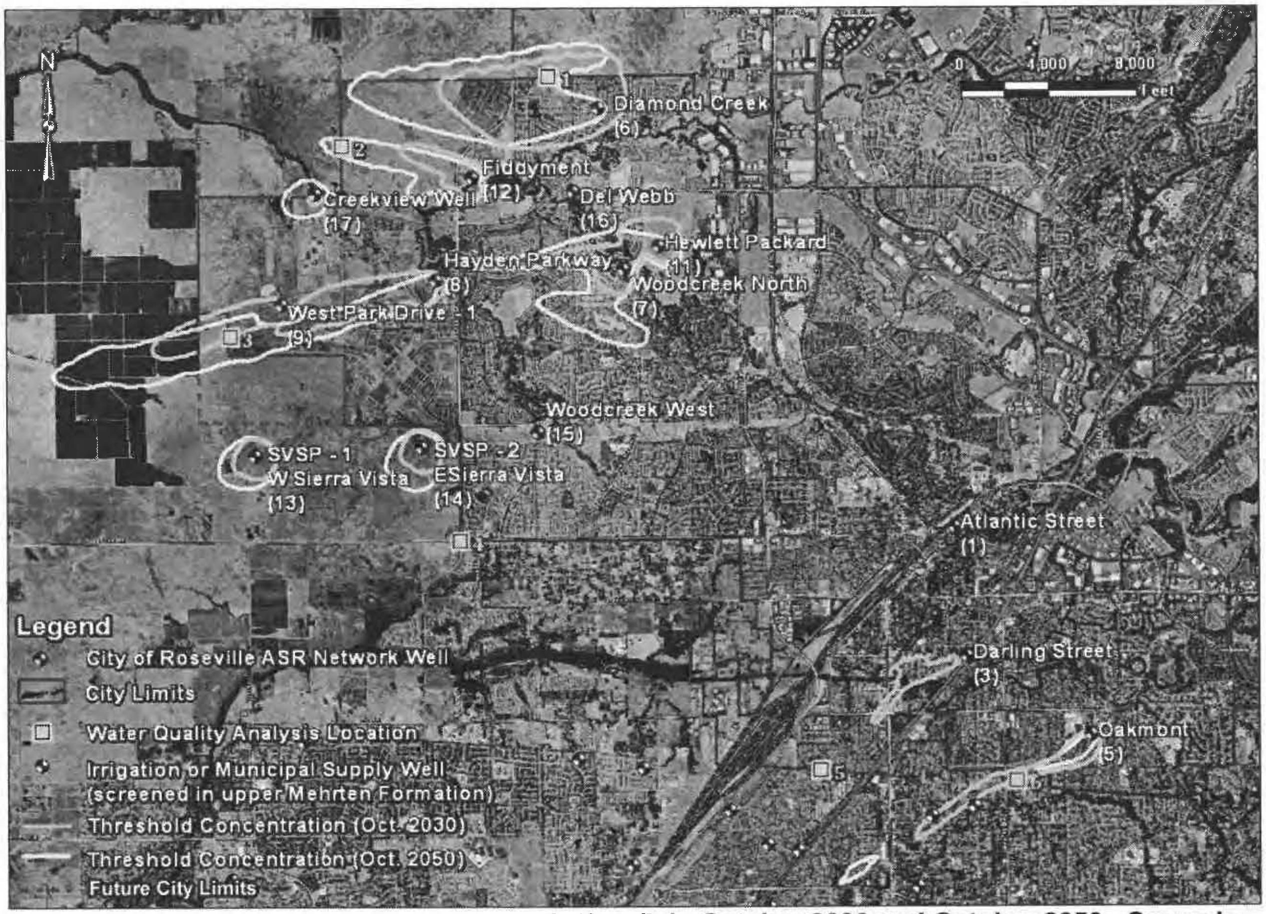

Figure 5-37. Total THM Concentrations at 8.53 µg/L in October 2030 and October 2050 - Scenario 1a

Total THM concentrations first exceed the 10% assimilative capacity availability in Scenario 1a beyond the City limits down gradient of the Diamond Creek well (Scenario 1a-1), Hayden Parkway/West Park well (Scenario 1a-3), and Oakmont well (Scenario 1a-6) in May 2015, November 2021, and June 2016, respectively, as shown in Figure 5-38. Total THM concentrations exceed the 20% assimilative capacity availability beyond the City limits down gradient of the Diamond Creek well (Scenario 1a-1), Hayden Parkway/West Park well (Scenario 1a-3), and Oakmont well (Scenario 1a-6) in January 2017, September 2037, and December 2021, respectively as shown in Figure 5-38.

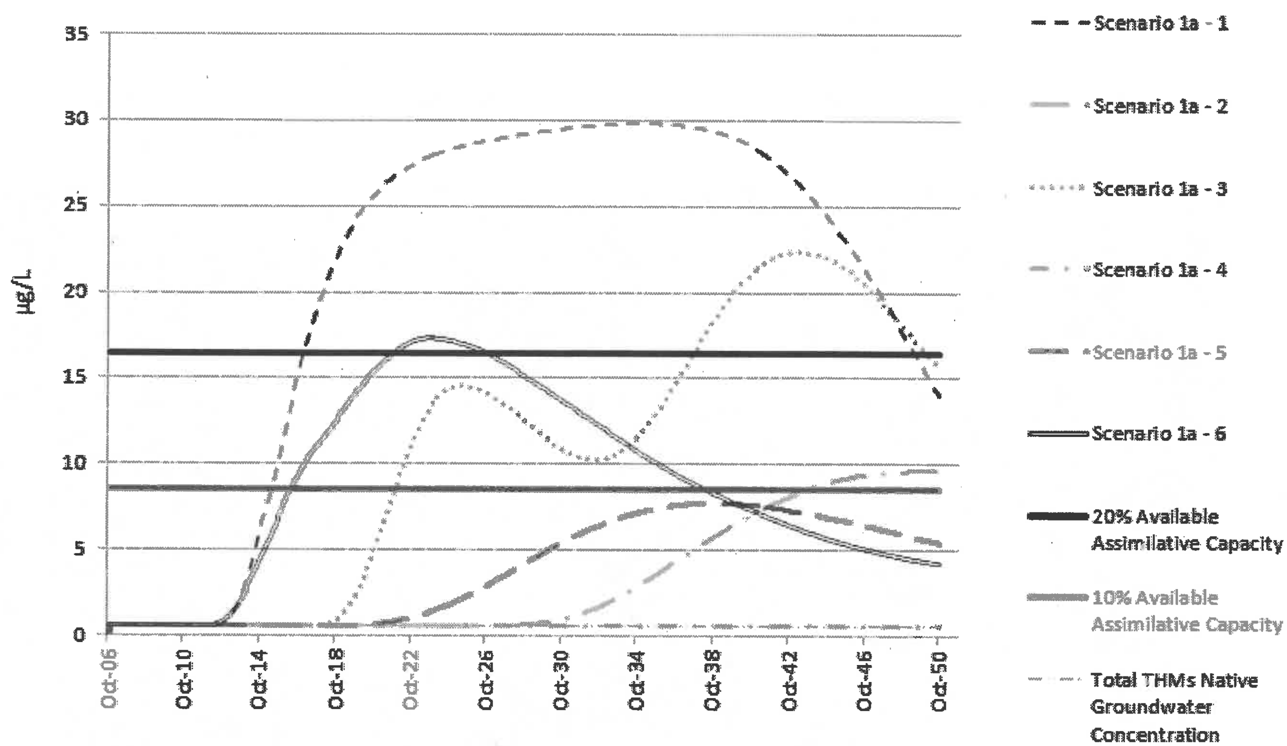

Figure 5-38. Total THM Concentrations at the City Boundary – Scenario 1a

In October 2030, Total THM concentrations exceed the 10% assimilative capacity available in the Turlock Lake Laguna Formation approximately 10,000 feet beyond the City limits, down gradient of the Oakmont well and approximately 1,000 feet down gradient of the Diamond Creek Well and Darling Street well. In 2050, Total THM concentrations exceed the 10% assimilative capacity available approximately 15,000 feet beyond the City limits, down gradient of the Oakmont well and approximately 1,000 feet down gradient of the Diamond Creek Well. Total THM concentrations do not exceed the 10% available assimilative capacity in the Valley Springs or Ione Formation beyond City limits through 2050.

There are public supply wells and/or irrigation wells in Citrus Heights Water District and California American Water Company's Lincoln Oaks service area down gradient of the Oakmont well where greater than 10% available assimilative capacity would be utilized from project operations in the Turlock Lake Laguna Formation and Mehrten Formation. These wells would be impacted by the City's proposed ASR operations. However, with the injected surface water, other water quality parameters are expected to be better. The elevated levels in these well are still within drinking water standards.

There are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within the area of impacted groundwater. The additional impacts resulting from Scenario 1a operations do not constitute a threat to the protection of groundwater's beneficial uses in the area.

Scenario 1b. Total THMs

Figure 5-39 shows Total THM levels at their threshold concentration in the upper portion of the Mehrten Formation for Scenario 1b in October 2030 and October 2050.

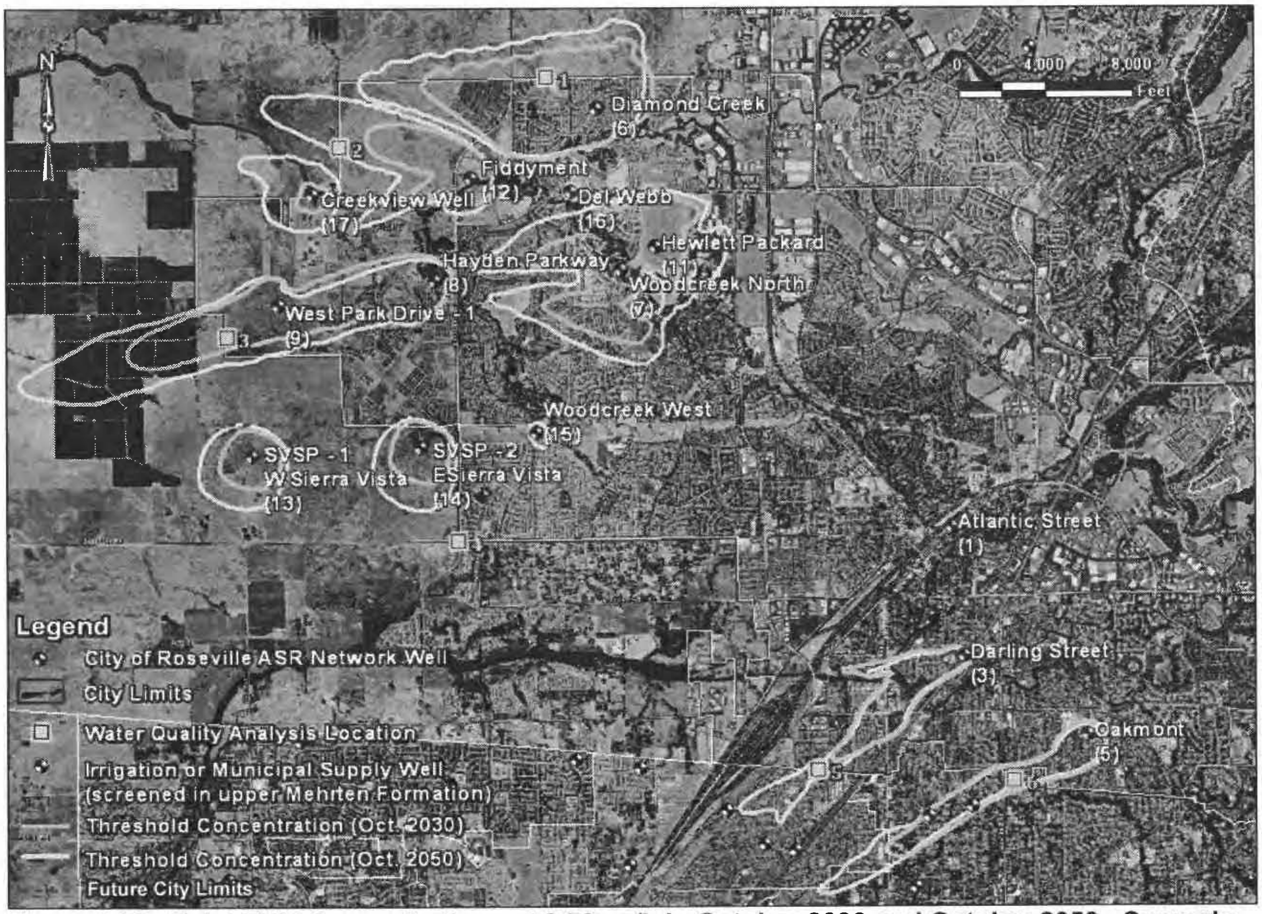

Figure 5-39. Total THM Concentrations at 8.53 µg/L in October 2030 and October 2050 - Scenario 1b

Total THM concentrations first exceed the threshold concentration in Scenario 1b beyond the City limits down gradient of the Diamond Creek well (Scenario 1b-1), Hayden Parkway (Scenario 1b-3), Darling Way (Scenario 1b-5), and Oakmont well (Scenario 1b-6) in April 2015, July 2021, August 2035, and April 2016, respectively, as shown in Figure 5-40.

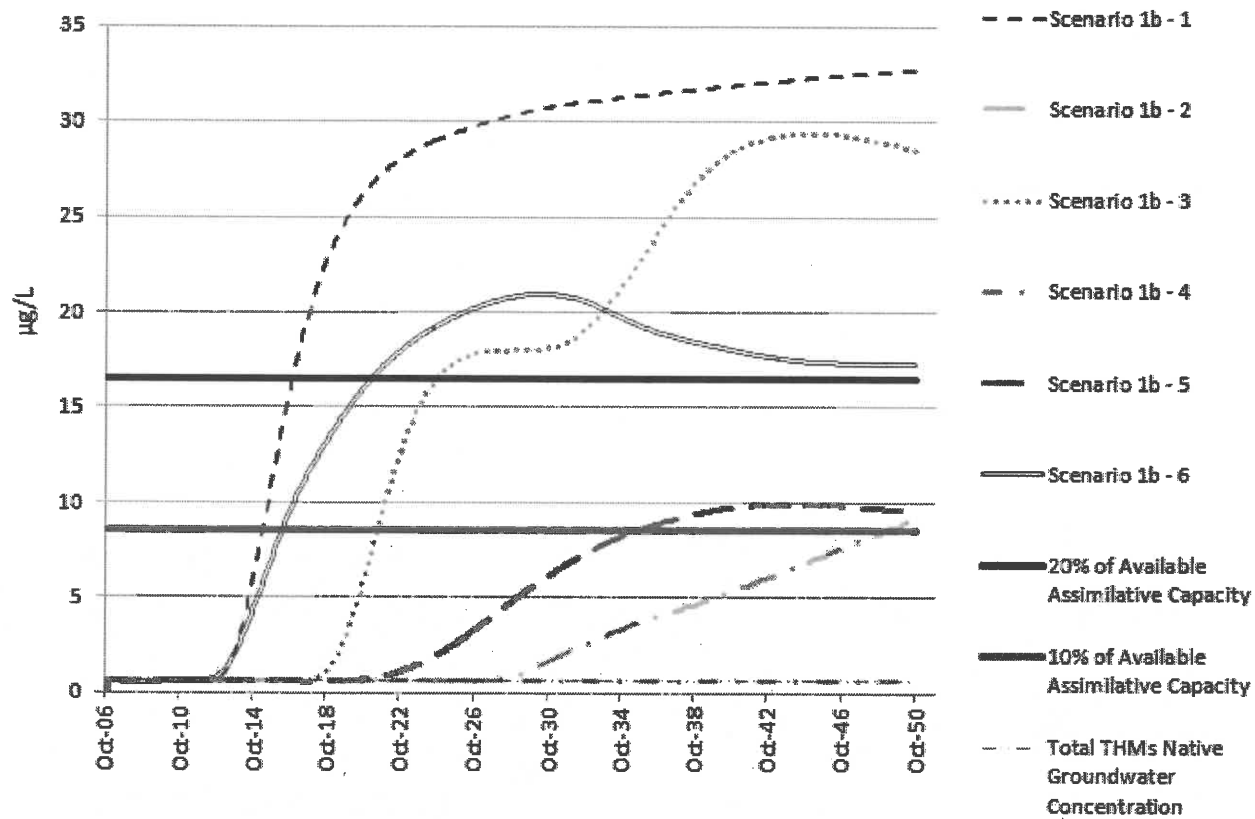

Figure 5-40. Total THM Concentrations at the City Boundary – Scenario 1b

In October 2030, Total THM concentrations exceed the 10% available assimilative capacity concentrations in the Turlock Lake Laguna Formation approximately 7,500 feet beyond the City limits, down gradient of the Oakmont well and approximately 1,000 feet down gradient of the Diamond Creek Well and Darling Street well. In 2050, Total THM concentrations exceed 10% available assimilative capacity approximately 15,000 feet beyond the City limits, down gradient of the Oakmont well, 10,000 feet down gradient of the Darling Street well, and approximately 1,000 feet down gradient of the Diamond Creek Well. Total THM concentrations exceed threshold concentrations in the Valley Springs approximately 500 feet and 1,000 feet down gradient of the Diamond Creek Well in 2030 and 2050, respectively. Total THM concentrations do not exceed threshold concentrations in the Ione Formation beyond City limits through 2050.

There are public supply wells and/or irrigation wells in Citrus Heights Water District and California American's Lincoln Oaks service area down gradient of the Oakmont well and Darling Street well where greater than 10% assimilative capacity has been utilized from project operations in the Turlock Lake Laguna Formation and Mehrten Formation. There are no known public supply wells, agricultural wells, or municipal wells in areas not already mentioned where greater than 10% assimilative capacity has been diminished from project operations. There are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within the area of impacted groundwater.

It should also be noted that both Scenarios 1a and 1b are for injection of treated drinking water into the ASR wells only, no extraction of the water is accounted for. This exercise is intended to show the worst case impacts to the groundwater aquifer based on the beneficial uses identified in the basin plan over a 50 year time period. Injection only operations has minimum probability of occurring as the City will be utilizing its surface water contracts at buildout and there is no need to expend City's limited resources to treat additional surface water for groundwater storage.

Scenario 2a. Total THMs

Figure 5-41 shows Total THM levels at their 10% available assimilative capacity in the upper portion of the Mehrten Formation for Scenario 2a in October 2030 and October 2050.

Figure 5-41. Total THM Concentrations at 8.53 µg/L in October 2030 and October 2050 - Scenario 2a

Total THM concentrations do not exceed the 10% available assimilative capacity in Scenario 2a beyond the City limits, as shown Figure 5-42.

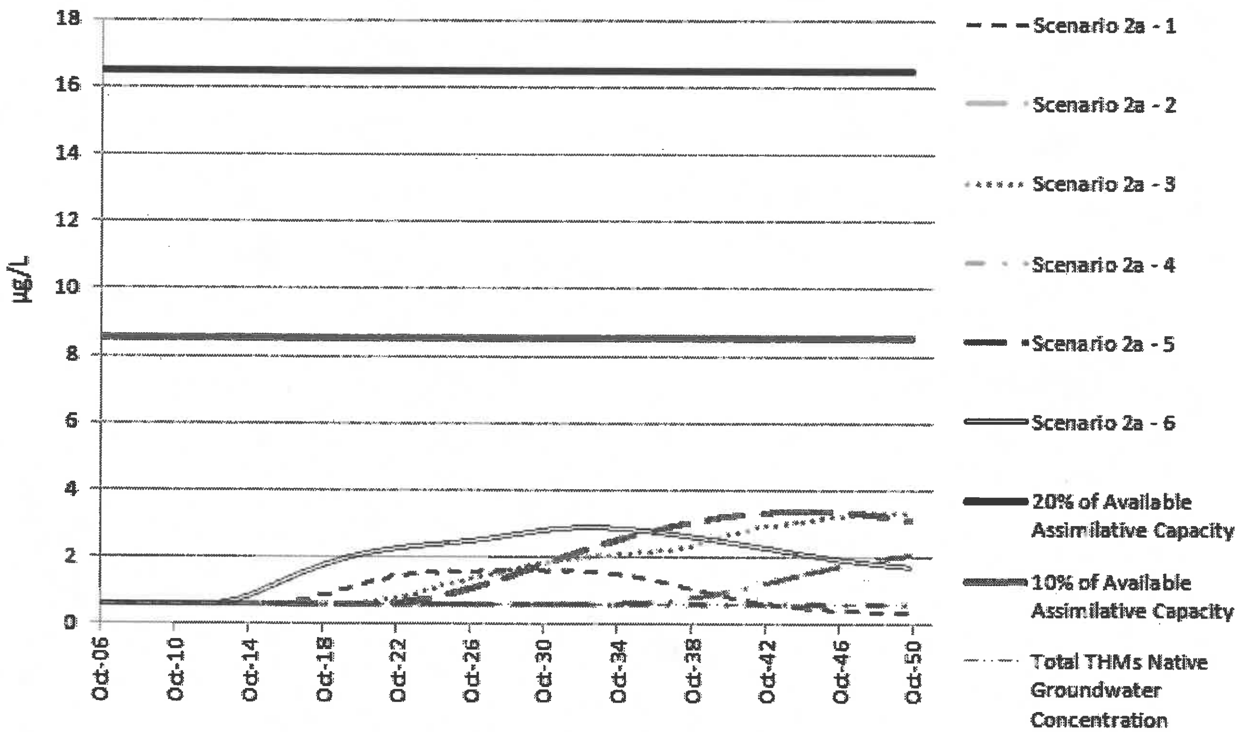

Figure 5-42. Total THM concentrations at the City Boundary – Scenario 2a

Total THM concentrations do not exceed the 10% available assimilative capacity in the Turlock Lake Laguna Formation, the Valley Springs Formation or the Ione Formation beyond City limits through 2050. There are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within the area of impacted groundwater. There are no known public supply wells, agricultural wells, or municipal wells in areas where greater than 10% assimilative capacity has been diminished from project operations.

Total THM concentrations resulting from Scenario 2a operations do not constitute a threat to the protection of groundwater's beneficial uses in the area.

Scenario 2b. Total THMs

Figure 5-43 shows Total THM levels at the 10% available assimilative capacity in the upper portion of the Mehrten Formation for Scenario 2b in October 2030 and October 2050.

Figure 5-43. Total THM Concentrations at 8.53 µg/L in October 2030 and October 2050 - Scenario 2b

Total THM concentrations do not exceed threshold concentrations in Scenario 2b beyond the City limits, as shown in Figure 5-44.

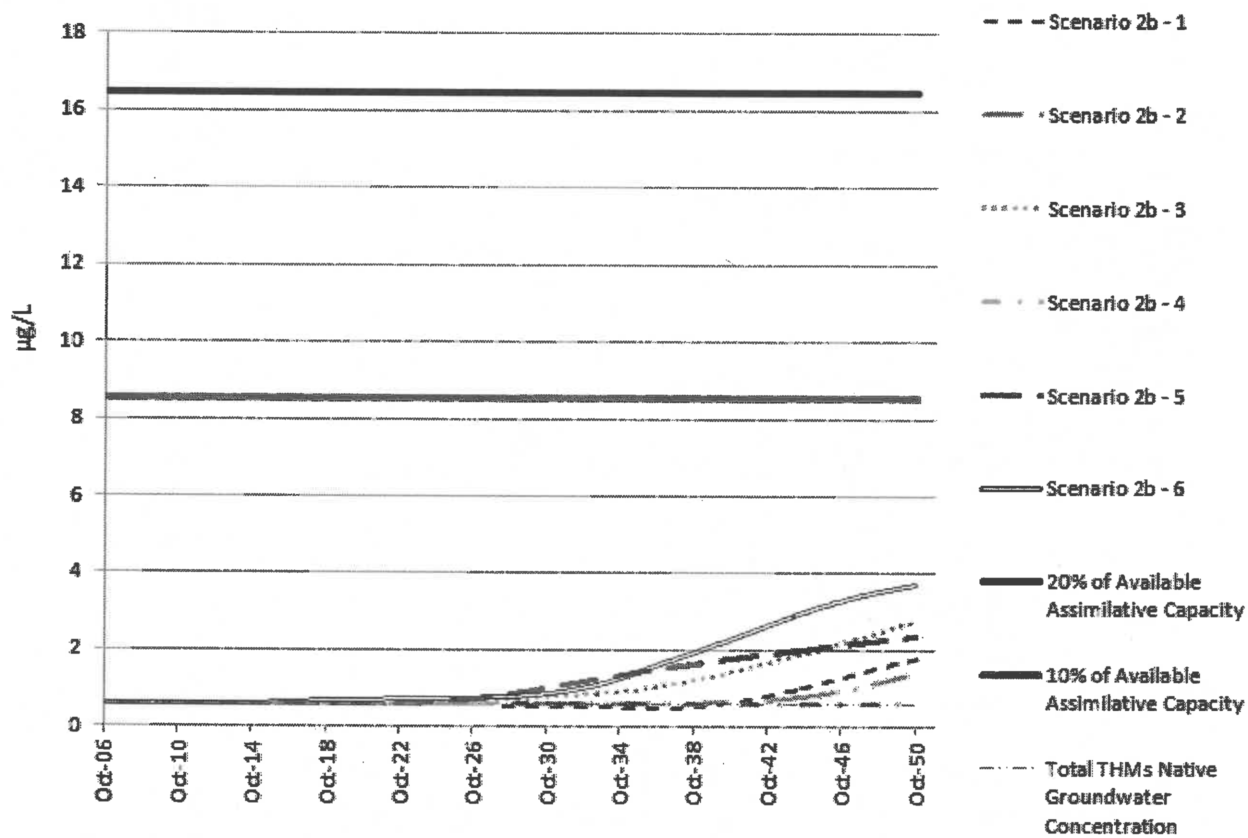

Figure 5-44. Total THM concentrations at the City Boundary – Scenario 2b

Total THM concentrations do not exceed 10% or 20% of available assimilative capacity in the Turlock Lake Laguna Formation, the Valley Springs Formation or the Ione Formation beyond City limits through 2050. There are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within the area of impacted groundwater. There are no known public supply wells, agricultural wells, or municipal wells in areas where greater than 10% assimilative capacity has been utilized from project operations.

Total THM concentrations resulting from Scenario 2b operations do not constitute a threat to the protection of groundwater's beneficial uses in the area.

Scenario 3a. Total THMs

Figure 5-45 shows Total THM levels at their 10% available assimilative capacity in the upper portion of the Mehrten Formation for Scenario 3a in October 2030 and October 2050.

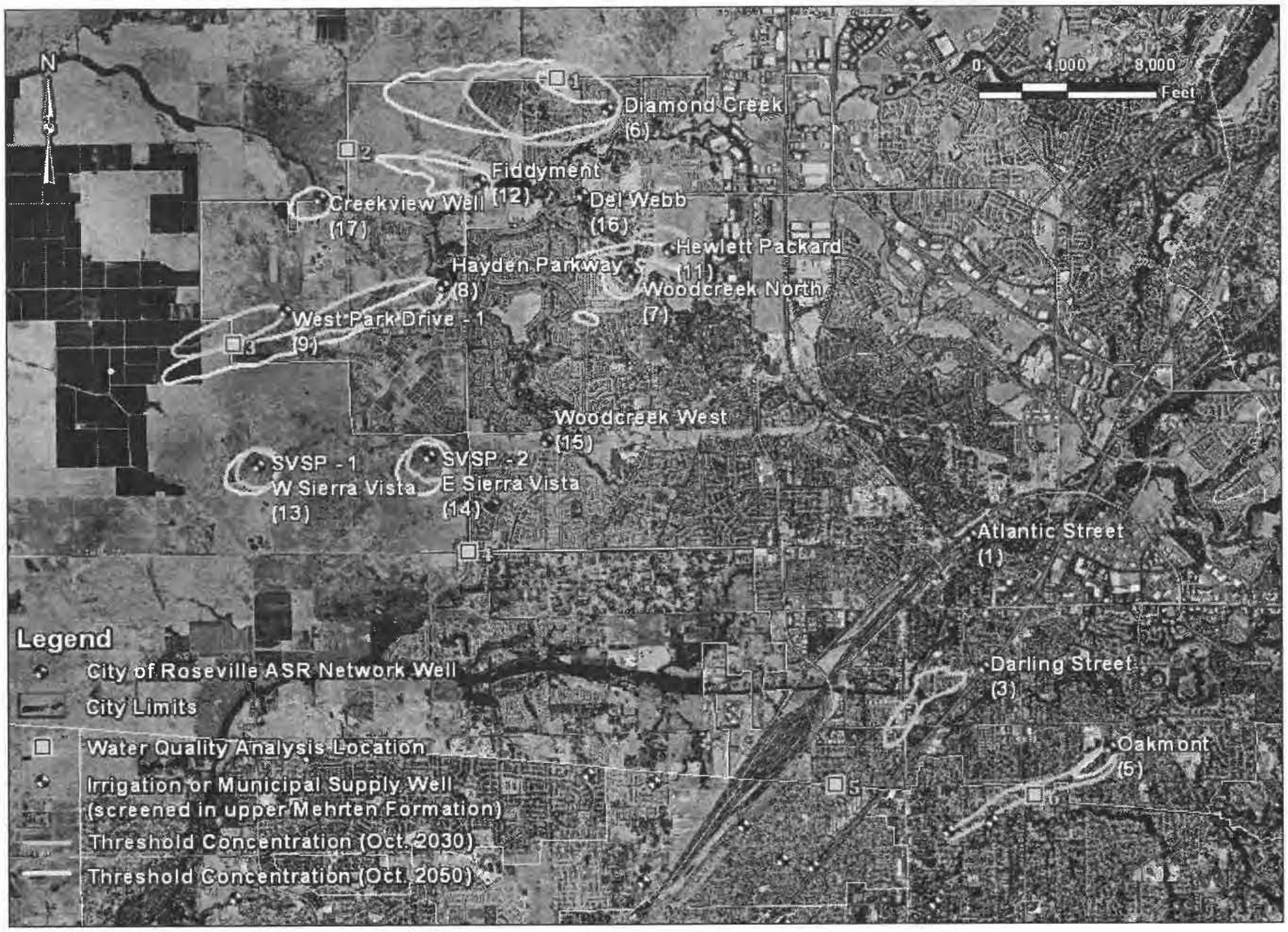

Figure 5-45. Total THM Concentrations at 8.53 µg/L in October 2030 and October 2050 - Scenario 3a

Total THM concentrations first exceed 8.53 µg/L in Scenario 3a beyond the City limits down gradient of the Diamond Creek well (Scenario 3a-1), Hayden Parkway well (Scenario 3a-3), and Oakmont well (Scenario 3a-6) in January 2019, September 2039 and February 2025, respectively, as shown in Figure 5-46. 20% of the available assimilative capacity was exceeded down gradient of the Diamond Creek Well in January 2023 as shown in Figure 5-46.

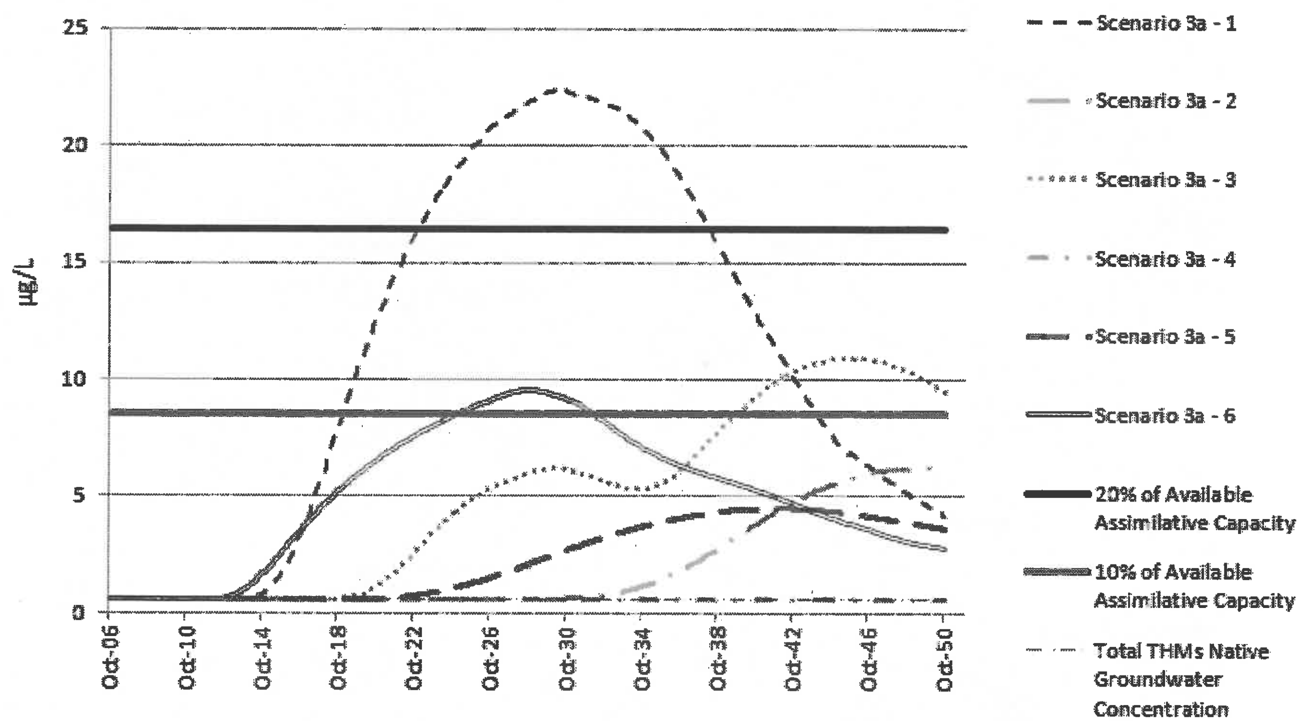

Figure 5-46. Total THM Concentrations at the City Boundary – Scenario 3a

In October 2030, Total THM concentrations exceed the 10% available assimilative capacity in the Turlock Lake Laguna Formation approximately 6,500 feet beyond the City limits, down gradient of the Oakmont well. However, by 2050, the Total THM concentrations beyond the City limits were below the 10% available assimilative capacity. Total THM concentrations do not exceed the 10% available assimilative capacity in the Valley Spring or Ione Formation beyond city limits through 2050.

There are public supply wells and/or irrigation wells in Citrus Heights Water District down gradient of the Oakmont well and Darling Street well where greater than 10% available assimilative has been utilized from project operations in the Turlock Lake Laguna Formation and Mehrten Formation. There are no known public supply wells, agricultural wells, or municipal wells in areas not already mentioned where greater than 10% assimilative capacity has been utilized from project operations. There are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within the area of impacted groundwater. The additional impacts resulting from Scenario 3a operations do not constitute a threat to the protection of groundwater's beneficial uses in the area.

Scenario 3b. Total THMs

Figure 5-47 shows Total THM levels at their 10% available assimilative capacity in the upper portion of the Mehrten Formation for Scenario 3b in October 2030 and October 2050.

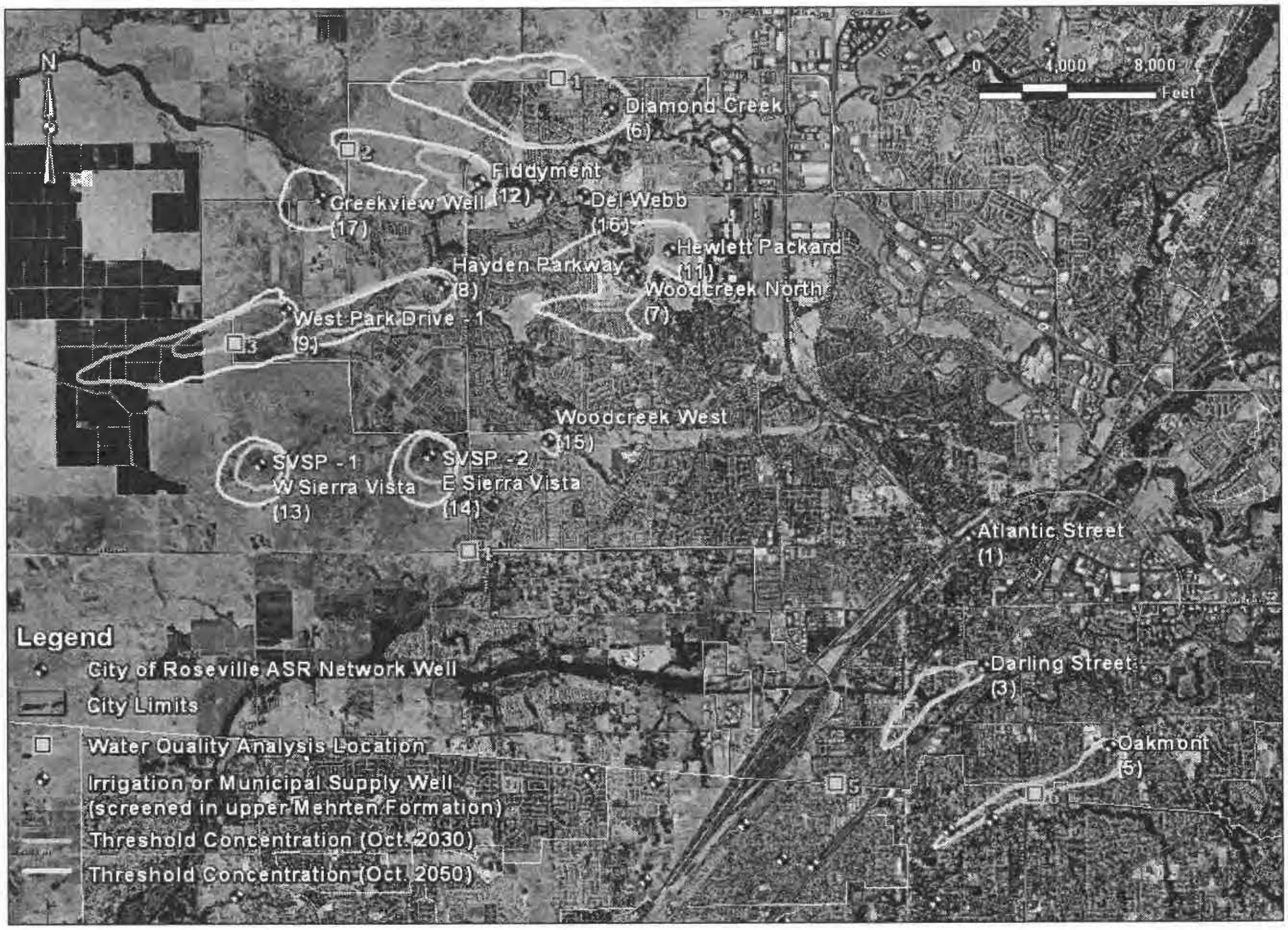

Figure 5-47. Total THM Concentrations at 8.53 µg/L in October 2030 and October 2050 - Scenario 3b

Total THM concentrations first exceed the 10% available assimilative capacity in Scenario 3b beyond the City limits down gradient of the Diamond Creek well (Scenario 3b-1), Hayden Parkway well (Scenario 3b-3), and Oakmont well (Scenario 3b-6) in January 2019, May 2036, and April 2025, respectively, as shown in Figure 5-48. 20% available assimilative capacity was only exceed beyond the City limits down gradient of the Diamond Creek well (Scenario 3b-1) in December 2022, as shown in Figure 5-48.

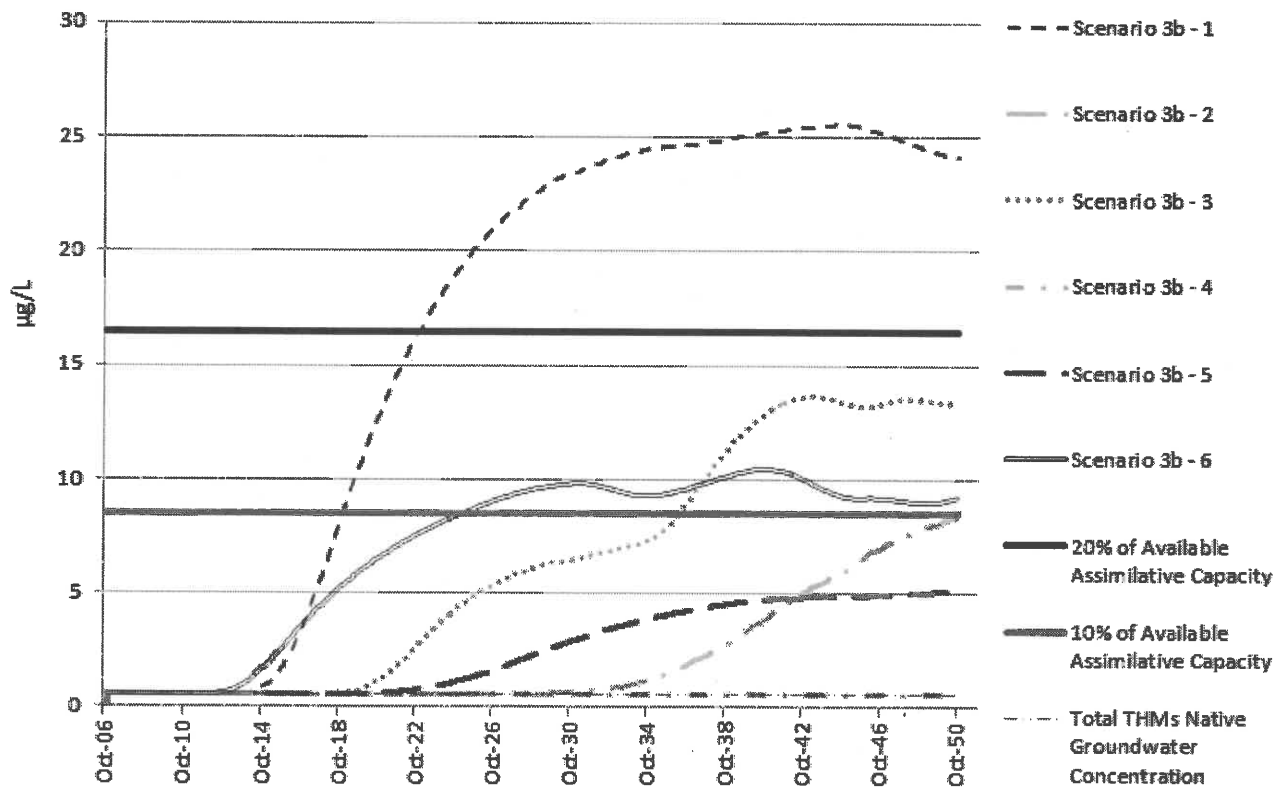

Figure 5-48. Total THM Concentrations at the City Boundary – Scenario 3b

In October 2030 and October 2050, Total THM concentrations exceed the 10% available assimilative capacity in the Turlock Lake Laguna Formation approximately 6,500 feet and 12,000 feet, respectively, beyond the City limits, down gradient of the Oakmont well. Total THM concentrations do not exceed the 10% available assimilative capacity in the Valley Spring or Ione Formation beyond city limits through 2050.

There are public supply wells and/or irrigation wells in Citrus Heights Water District and Lincoln Oaks, down gradient of the Oakmont well and Darling Street well, where greater than 10% assimilative capacity has been utilized from project operations in the Turlock Lake Laguna Formation and Mehrten Formation. There are no known public supply wells, agricultural wells, or municipal wells in areas not already mentioned where greater than 10% assimilative capacity has been utilized from project operations. There are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within the area of impacted groundwater. The additional impacts resulting from Scenario 3b operations do not constitute a threat to the protection of groundwater's beneficial uses in the area.

Chloroform

Native groundwater contains 0.17 µg/L of chloroform, approximately 28% of the background concentrations for Total THMs. Injection water was assigned 34.42 µg/L of chloroform for the transport analyses. In general, the chloroform concentrations increased to approximately 90% of the Total THMs in groundwater as injected water and native groundwater mixed. Figure 5-49 through Figure 5-54 shows the change in chloroform relative to Total THMs for the six predictive scenarios.

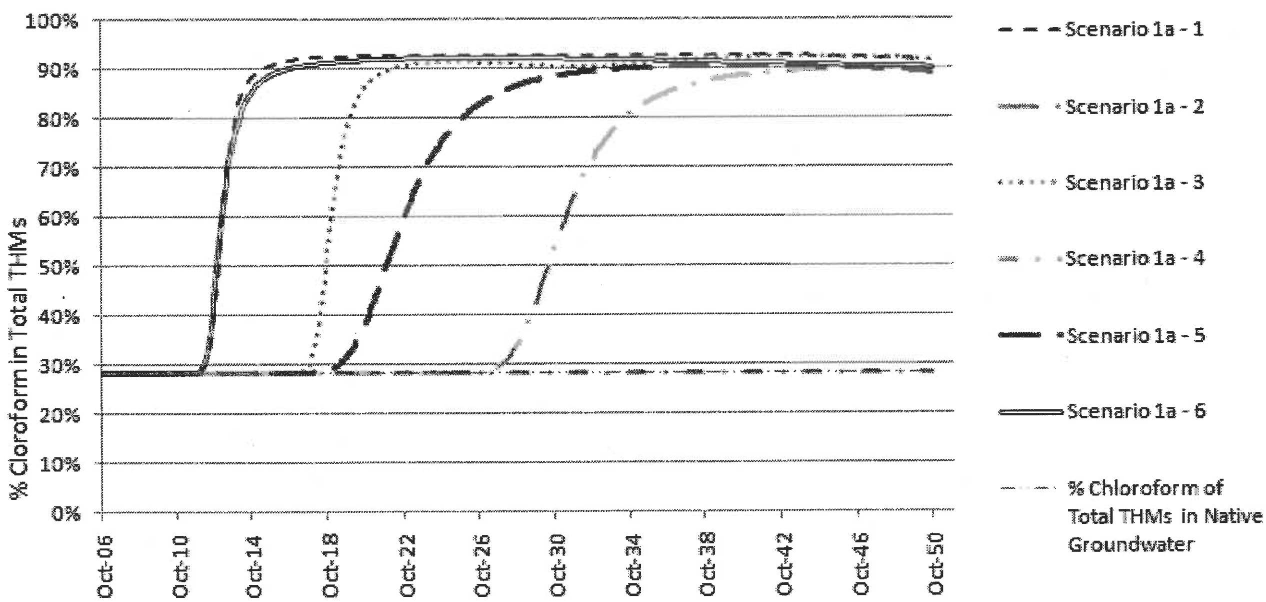

Figure 5-49. Percentage Chloroform of Total THMs at the City Boundary – Scenario 1a

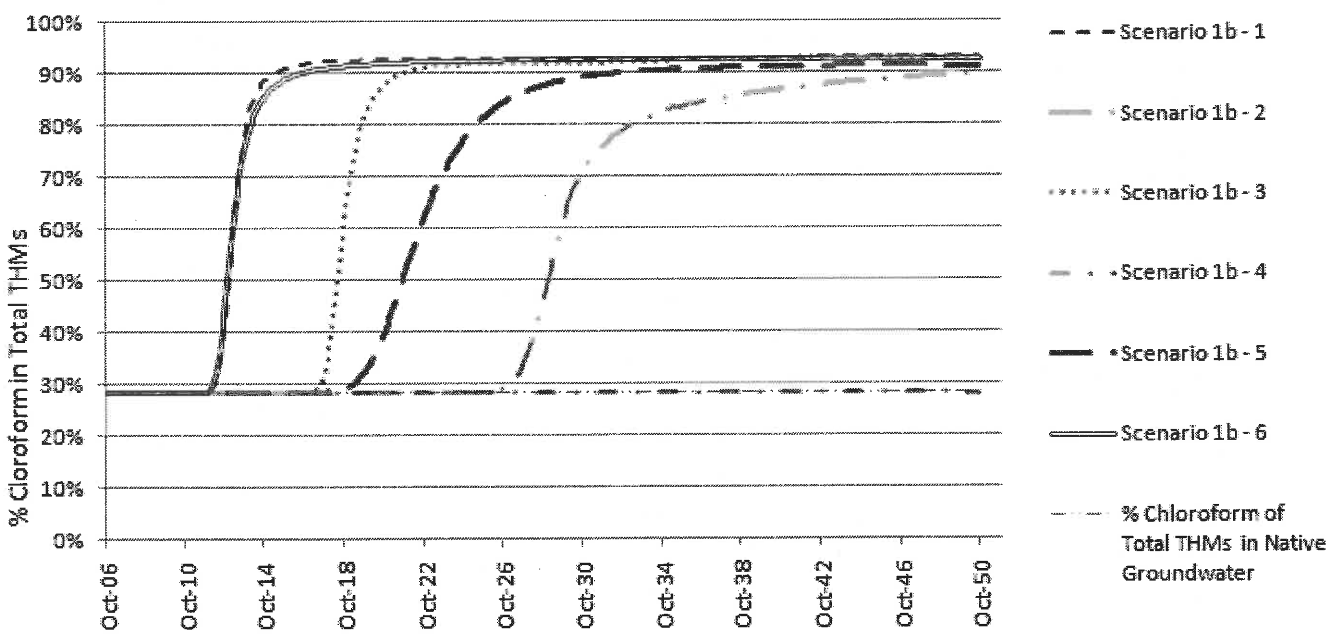

Figure 5-50. Percentage Chloroform of Total THMs at the City Boundary – Scenario 1b

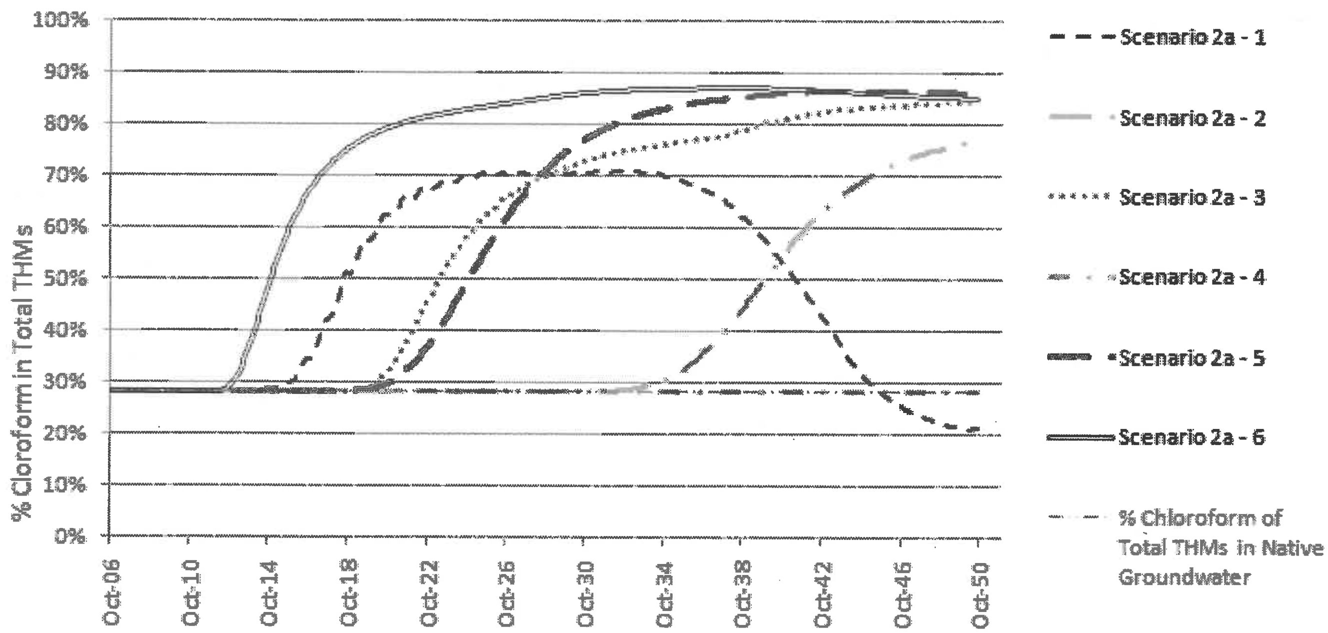

Figure 5-51. Percentage Chloroform of Total THMs at the City Boundary – Scenario 2a

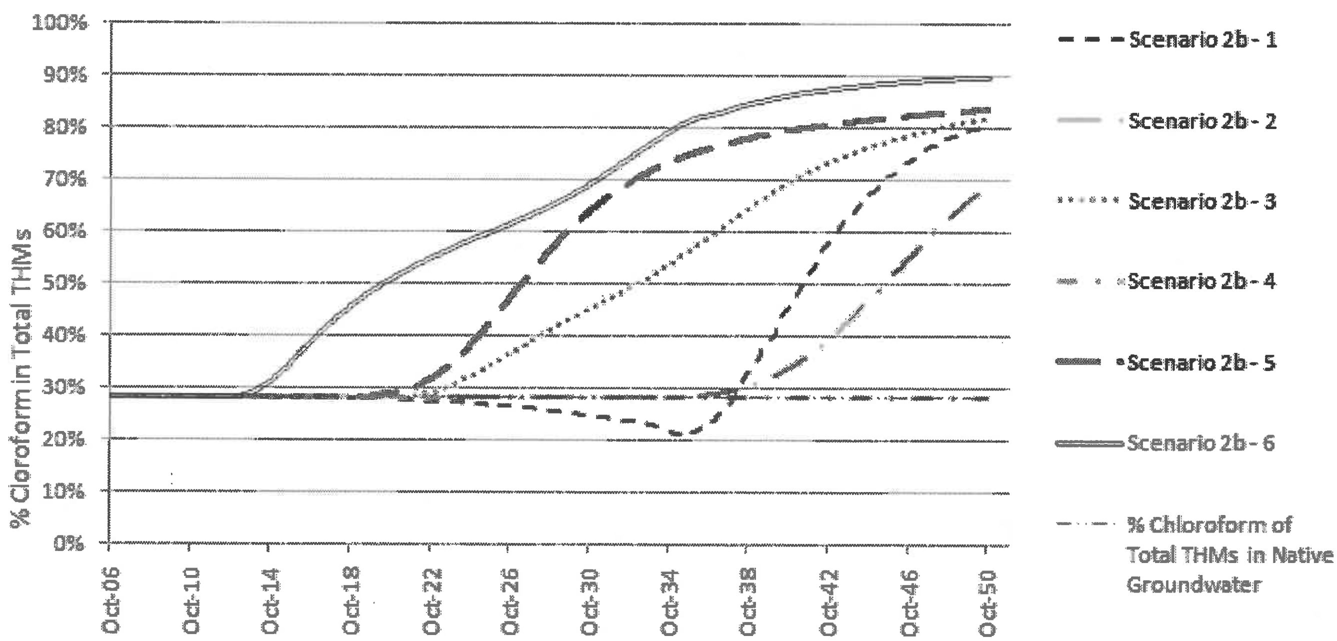

Figure 5-52. Percentage Chloroform of Total THMs at the City Boundary – Scenario 2b

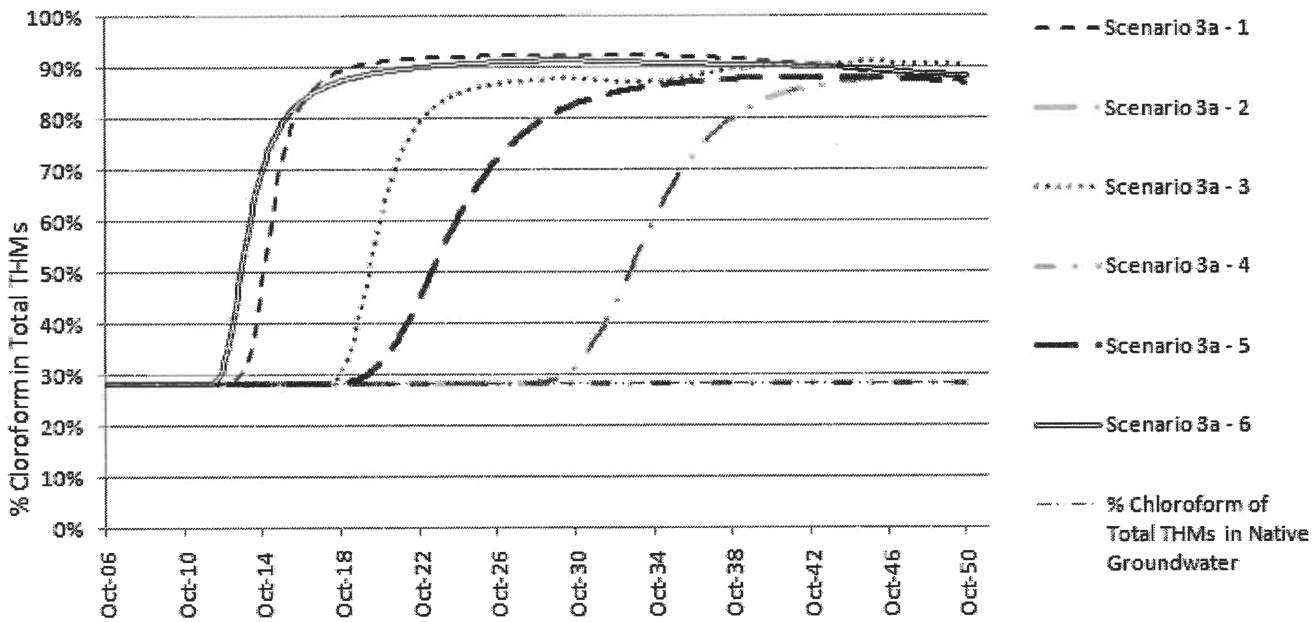

Figure 5-53. Percentage Chloroform of Total THMs at the City Boundary – Scenario 3a

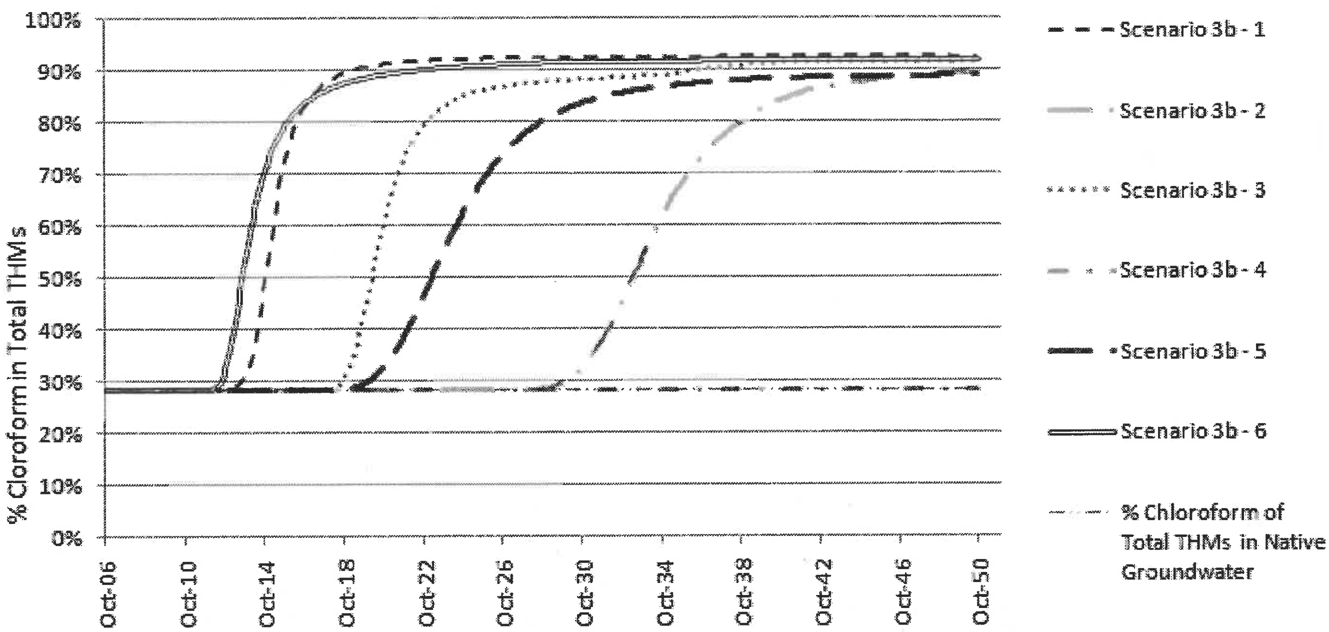

Figure 5-54. Percentage Chloroform of Total THMs at the City Boundary – Scenario 3b

Total HAAs – Scenario 1a

The regulatory guideline for Total HAAs is the primary MCL. The primary MCL for Total HAAs is 60 µg/L. Native groundwater in the North American subbasin contains Total HAAs concentrations at 3.25 µg/L. The assimilative capacity for Total HAAs in the North American subbasin is 56.75 µg/L. The 10% available assimilative capacity concentration is 8.93 µg/L and 20% available assimilative capacity concentration is 14.60 µg/L. Injection water was assigned 20.40 µg/L of Total HAAs for transport analyses based on water distribution system data from Roseville's monitoring program.

The following is a summary of the results for Total HAAs for each of the six predictive scenarios. These scenarios do not account for the natural degradation of Total HAAs in the groundwater system as observed in the City's previous pilot project. The results are presented as a conservative consideration.

Figure 5-55 shows Total HAAs levels at their threshold concentration in the upper portion of the Mehrten Formation for Scenario 1a in October 2030 and October 2050.

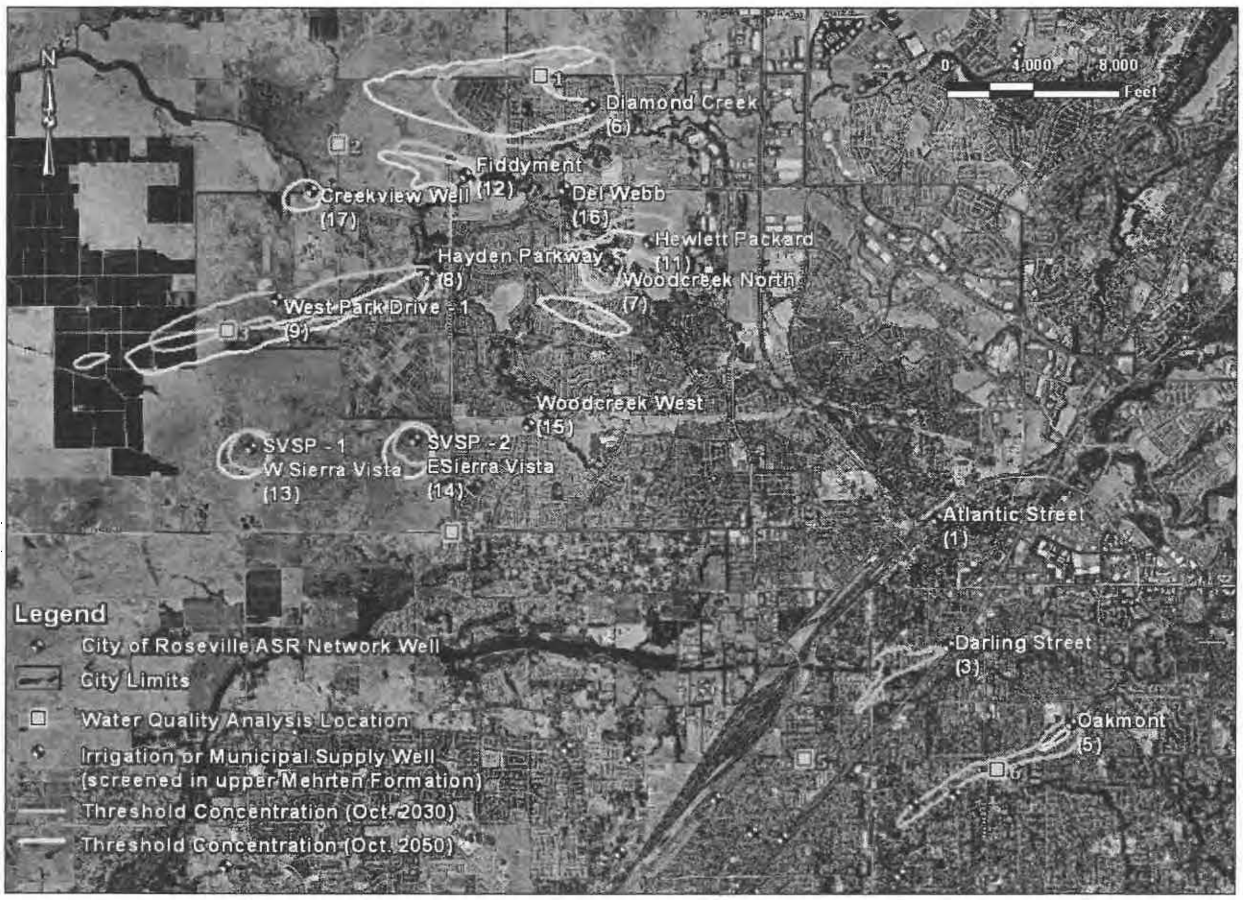

Figure 5-55. Total HAAs Concentrations at 8.93 µg/L in October 2030 and October 2050 - Scenario 1a

Total HAAs concentrations first exceed the 10% available assimilative capacity in Scenario 1a beyond the City limits down gradient of the Diamond Creek well (Scenario 1a-1), Hayden Parkway well (Scenario 1a-3), and Oakmont well (Scenario 1a-6) in April 2016, June 2023, and March 2019, respectively, as shown in Figure 5-56. The 20% available assimilative capacity was exceeded beyond the City limits down gradient of the Diamond Creek well (Scenario 1a-1) in April 2020, as shown in Figure 5-56.

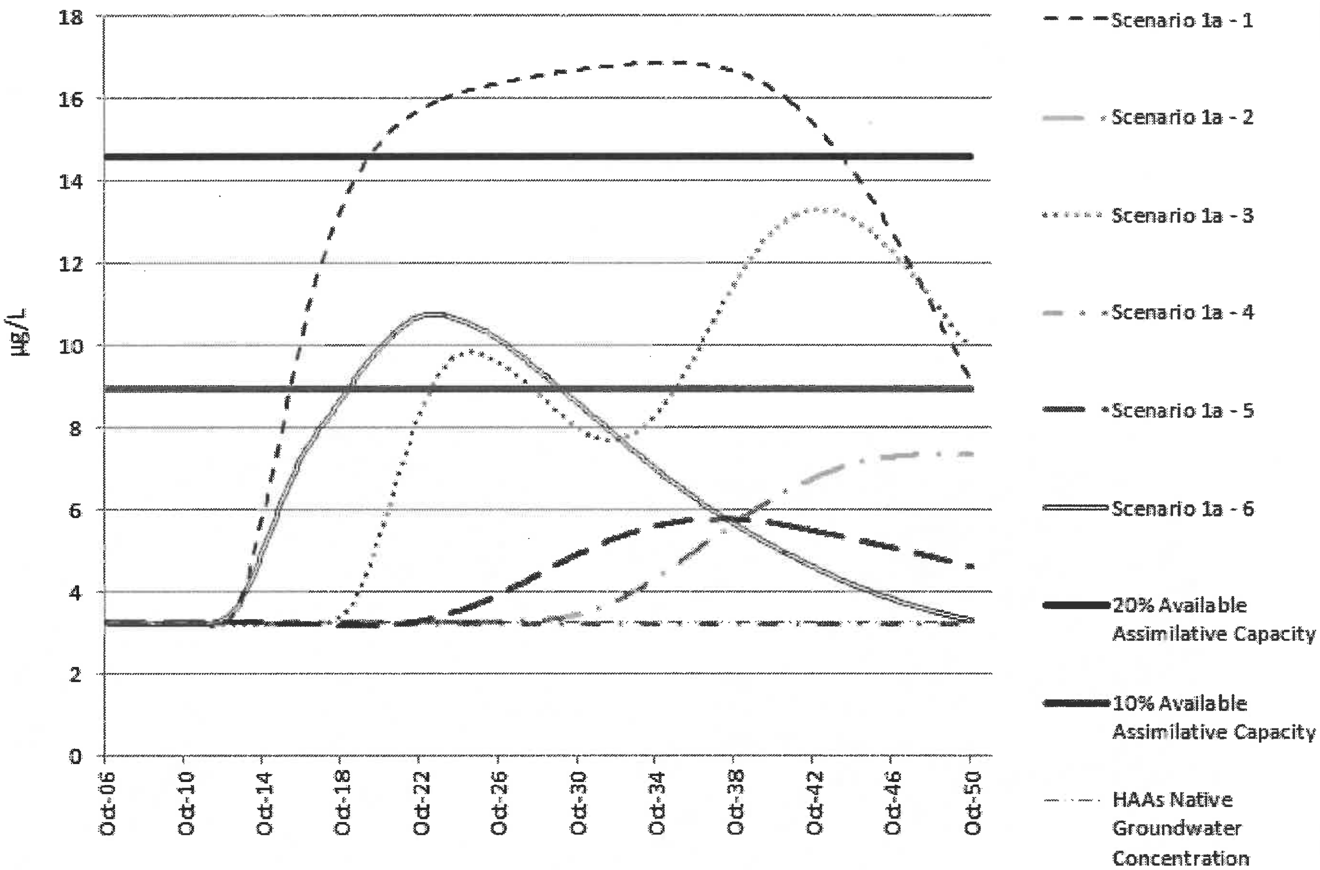

Figure 5-56. Total HAAs at the City Boundary – Scenario 1a

In October 2030, Total HAAs concentrations exceed 10% available assimilative capacity in the Turlock Lake Laguna Formation approximately 6,000 feet beyond the City limits, down gradient of the Oakmont well and in 2050, less than 1,000 feet down gradient of the Diamond Creek well. Total HAAs concentrations do not exceed 10% available assimilative capacity in the Valley Springs or Ione Formation beyond City limits through 2050.

There are public supply wells and/or irrigation wells in Citrus Heights Water District down gradient of the Oakmont well where greater than 10% available assimilative capacity has been utilized from project operations in the Turlock Lake Laguna Formation and Mehrten Formation. There are no known public supply wells, agricultural wells, or municipal wells in areas not already mentioned where greater than 10% available assimilative capacity has been utilized from project operations.

There are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within the area of impacted groundwater. The additional impacts resulting from Scenario 1a operations do not constitute a threat to the protection of groundwater's beneficial uses in the area because the groundwater still meet drinking water standards and agricultural water use standards.

Total HAAs – Scenario 1b

Figure 5-57 shows Total HAAs levels at their threshold concentration in the upper portion of the Mehrten Formation for Scenario 1b in October 2030 and October 2050.

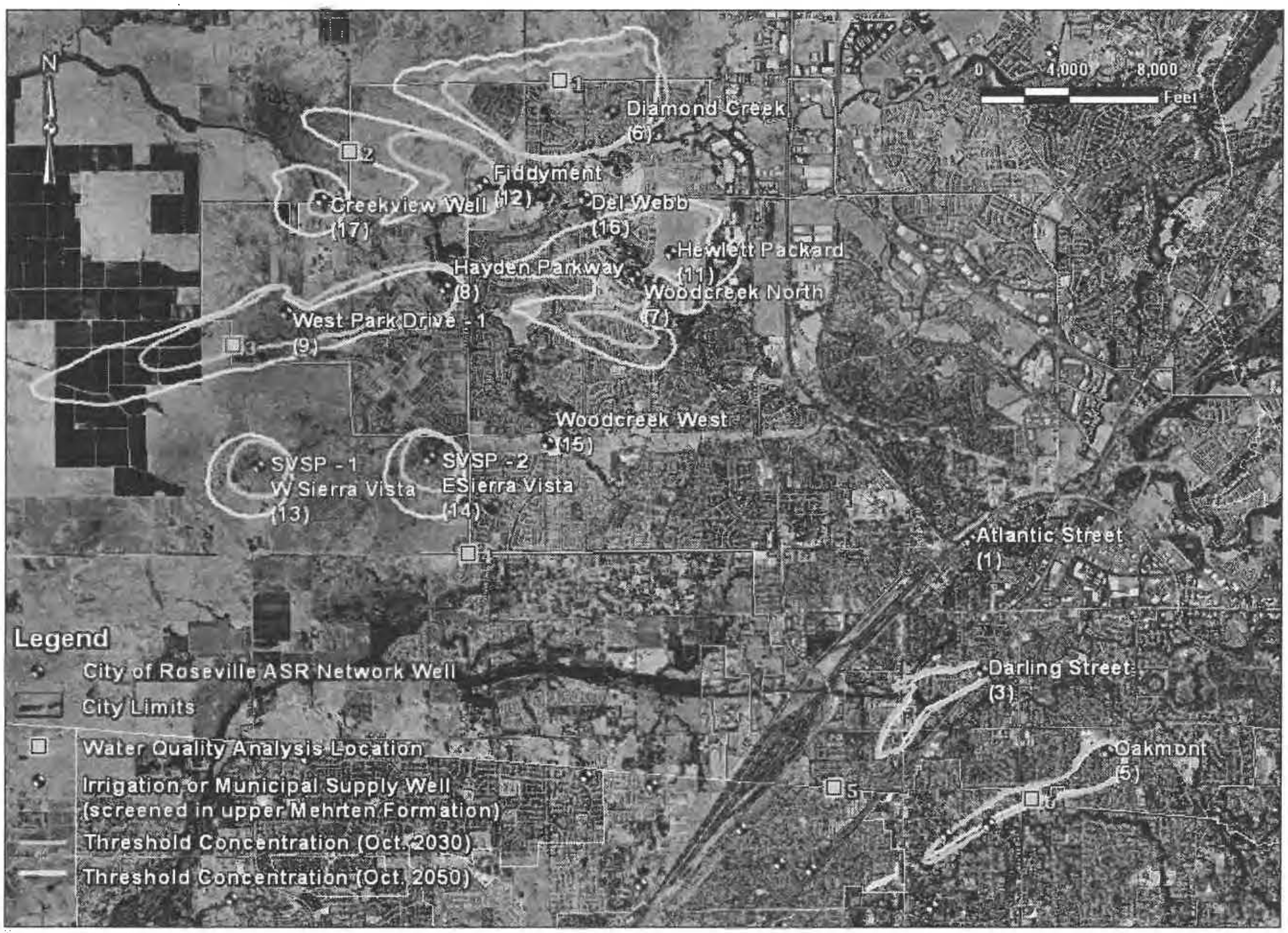

Figure 5-57. Total HAAs Concentrations at 8.93 µg/L in October 2030 and October 2050 - Scenario 1b

Total HAAs concentrations first exceed the 10% available assimilative capacity din Scenario 1b beyond the City limits down gradient of the Diamond Creek well (Scenario 1b-1), Hayden Parkway well (Scenario 1b-3), and Oakmont well (Scenario 1b-6) in February 2016, October 2022, and September 2018, respectively, as shown in Figure 5-58. Total HAAs concentrations first exceed the 20% available assimilative capacity in Scenario 1b beyond the City limits down gradient of the Diamond Creek well (Scenario 1b-1) and Hayden Parkway well (Scenario 1b-3) November 2019 and April 2037, respectively, as shown in Figure 5-58.

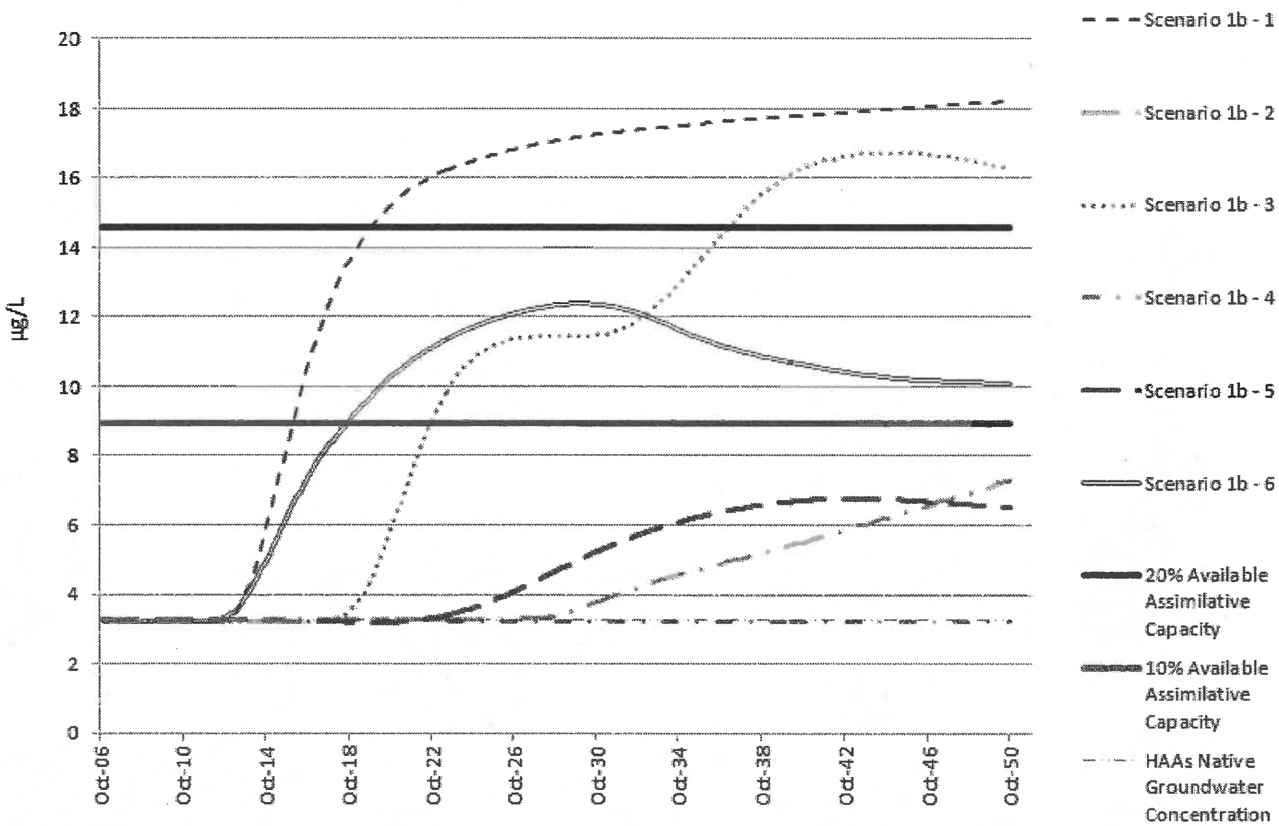

Figure 5-58. Total HAAs at the City Boundary – Scenario 1b

In October 2030, Total HAAs concentrations exceed 10% available assimilative capacity in the Turlock Lake Laguna Formation approximately 10,000 feet beyond the City limits, down gradient of the Oakmont well and in 2050, approximately 25,000 feet and 2,000 feet down gradient of the Oakmont and Diamond Creek wells, respectively. Total HAA concentrations exceed 10% available assimilative capacity beyond City limits in the Valley Springs Formation by approximately 1,000 feet and 3,000 feet down gradient of the Diamond Creek well in 2030 and 2050, respectively. Total HAAs concentrations do not exceed 10% available assimilative capacity in the Ione Formation beyond City limits through 2050.

There are public supply wells and/or irrigation wells in Citrus Heights Water District and California American Water Company's Lincoln Oaks service area down gradient of the Oakmont well where 10% available assimilative capacity has been utilized from project operations in the Turlock Lake Laguna Formation and Mehrten Formation. There are no known public supply wells, agricultural wells, or municipal wells in areas not already mentioned where greater than 10% assimilative capacity has been utilized from project operations. There are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within the area of impacted groundwater. The additional impacts resulting from Scenario 1b operations do not constitute a threat to the protection of groundwater's beneficial uses in the area because the groundwater still meet drinking water standards and agricultural water use standards.

It should also be noted that both Scenarios 1a and 1b are for injection of treated drinking water into the ASR wells only, no extraction of the water is accounted for. This exercise is intended to show the worst case impacts to the groundwater aquifer based on the beneficial uses identified in the basin plan over a 50 year time period. Injection only operations has minimum probability of occurring as the City will be utilizing its surface water contracts at buildout and there is no need to expend City's limited resources to treat additional surface water for groundwater storage.

Total HAAs – Scenario 2a

Figure 5-59 shows Total HAAs levels at their 10% available assimilative capacity in the upper portion of the Mehrten Formation for Scenario 2a in October 2030 and October 2050.

Figure 5-59. Total HAAs Concentrations at 8.93 µg/L in October 2030 and October 2050 - Scenario 2a

Total HAAs concentrations do not exceed the 10% or 20% available assimilative capacity in Scenario 2a beyond the City limits, as shown in Figure 5-60.

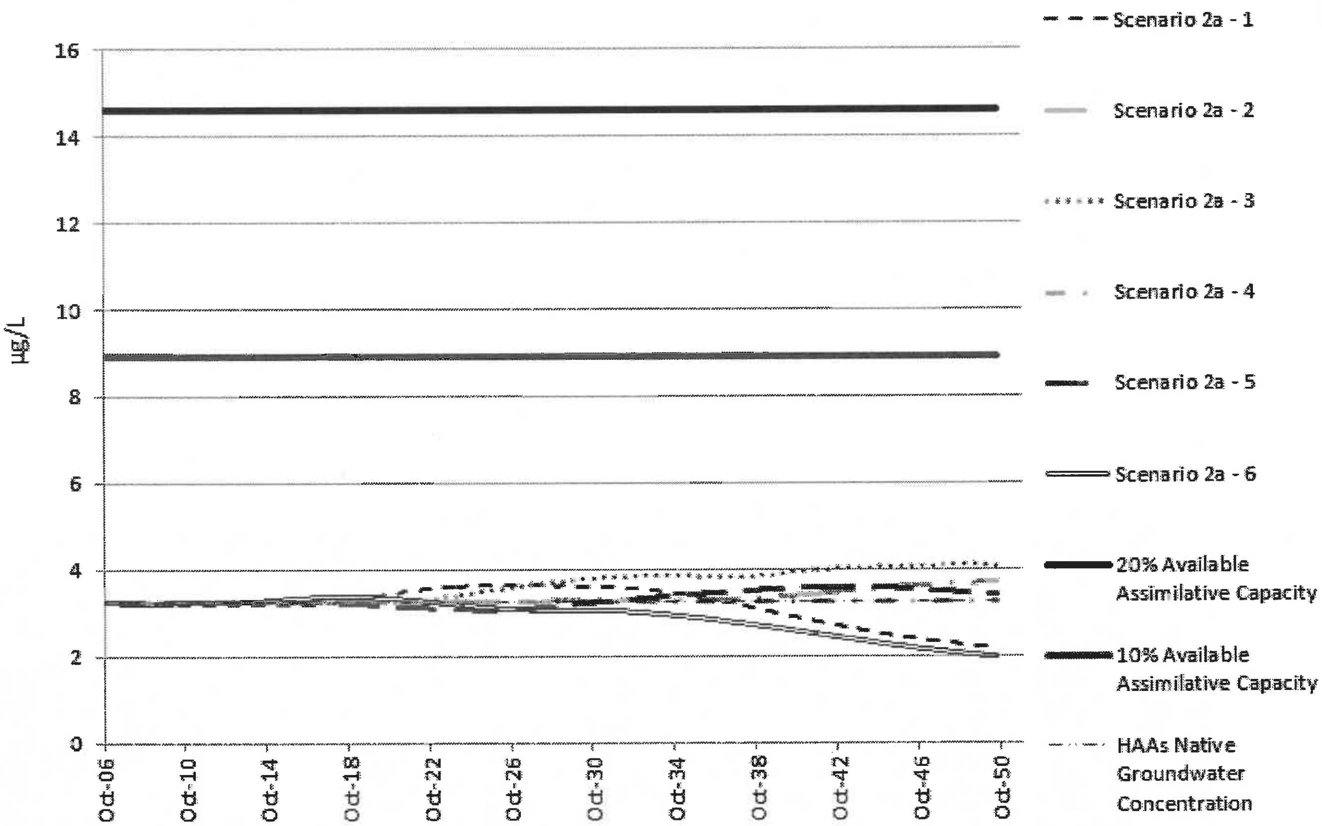

Figure 5-60. Total HAAs at the City Boundary – Scenario 2a

Total HAAs concentrations do not exceed 10% or 20% available assimilative capacity in the Turlock Lake Laguna Formation, the Valley Springs Formation or the Ione Formation beyond City limits through 2050. There are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within the area of impacted groundwater. There are no known public supply wells, agricultural wells, or municipal wells in areas where greater than 10% or 20% assimilative capacity has been utilized project operations. Total HAAs concentrations resulting from Scenario 2b operations do not constitute a threat to the protection of groundwater's beneficial uses in the area because the groundwater still meet drinking water standards and agricultural water use standards.

Total HAAs – Scenario 2b

Figure 5-61 shows Total HAAs levels at their 10% available assimilative capacity in the upper portion of the Mehrten Formation for Scenario 2b in October 2030 and October 2050.

Figure 5-61. Total HAAs Concentrations at 8.93 µg/L in October 2030 and October 2050 - Scenario 2b

Total HAAs concentrations do not exceed the 10% or 20% available assimilative capacity in Scenario 2b beyond the City limits, as shown in Figure 5-62.

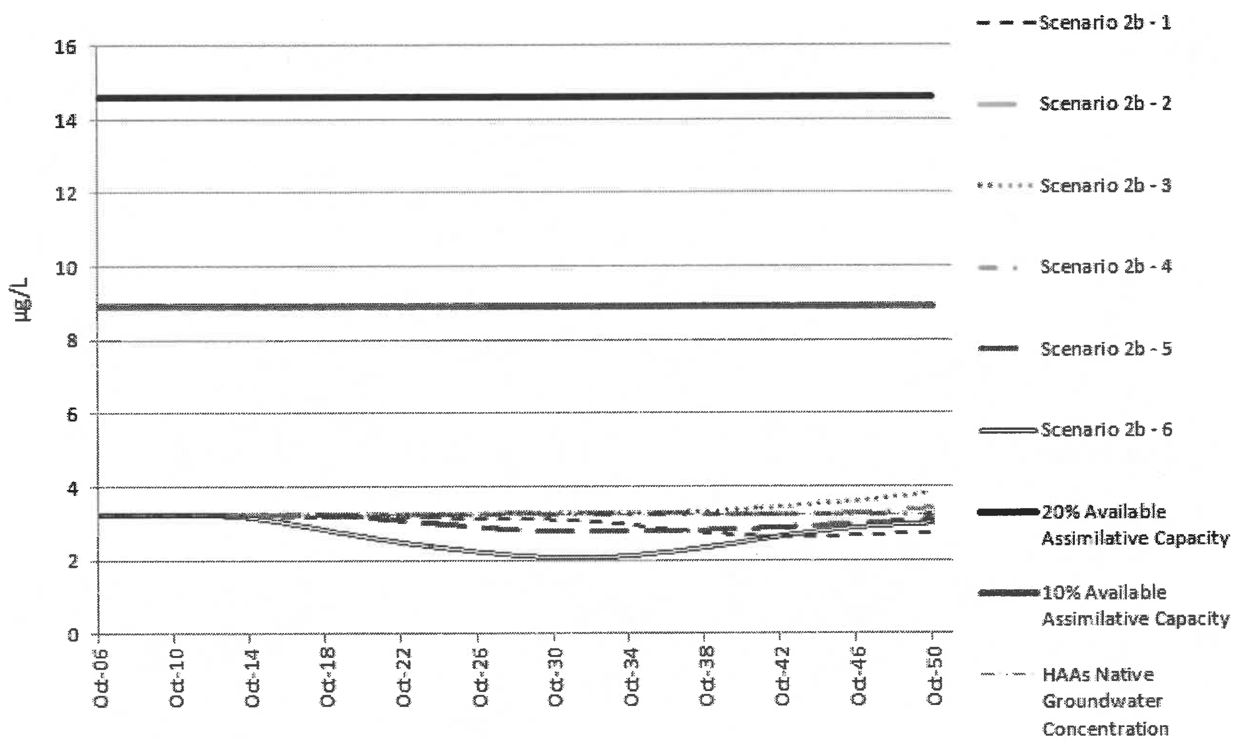

Figure 5-62. Total HAAs at the City Boundary – Scenario 2b

Total HAAs concentrations do not exceed 10% or 20% available assimilative capacity in the Turlock Lake Laguna Formation, the Valley Springs Formation or the Ione Formation beyond City limits through 2050. There are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within the area of impacted groundwater. There are no known public supply wells, agricultural wells, or municipal wells in areas where greater than 10% assimilative capacity has been diminished from project operations. Total HAAs concentrations resulting from Scenario 2b operations do not constitute a threat to the protection of groundwater's beneficial uses in the area because the groundwater still meet drinking water standards and agricultural water use standards.

Total HAAs – Scenario 3a

Figure 5-63 shows Total HAAs levels at their 10% available assimilative capacity in the upper portion of the Mehrten Formation for Scenario 3a in October 2030 and October 2050.

Figure 5-63. Total HAAs Concentrations at 8.93 µg/L in October 2030 and October 2050 - Scenario 3a

Total HAAs concentrations first exceed the 10% available assimilative capacity in Scenario 3a beyond the City limits, down gradient of the Diamond Creek well (Scenario 3a-1) in January 2021, as shown in Figure 5-64. At no time in the transport modeling for the 59 year simulation was the 20% available assimilative capacity exceed in Scenario 3a

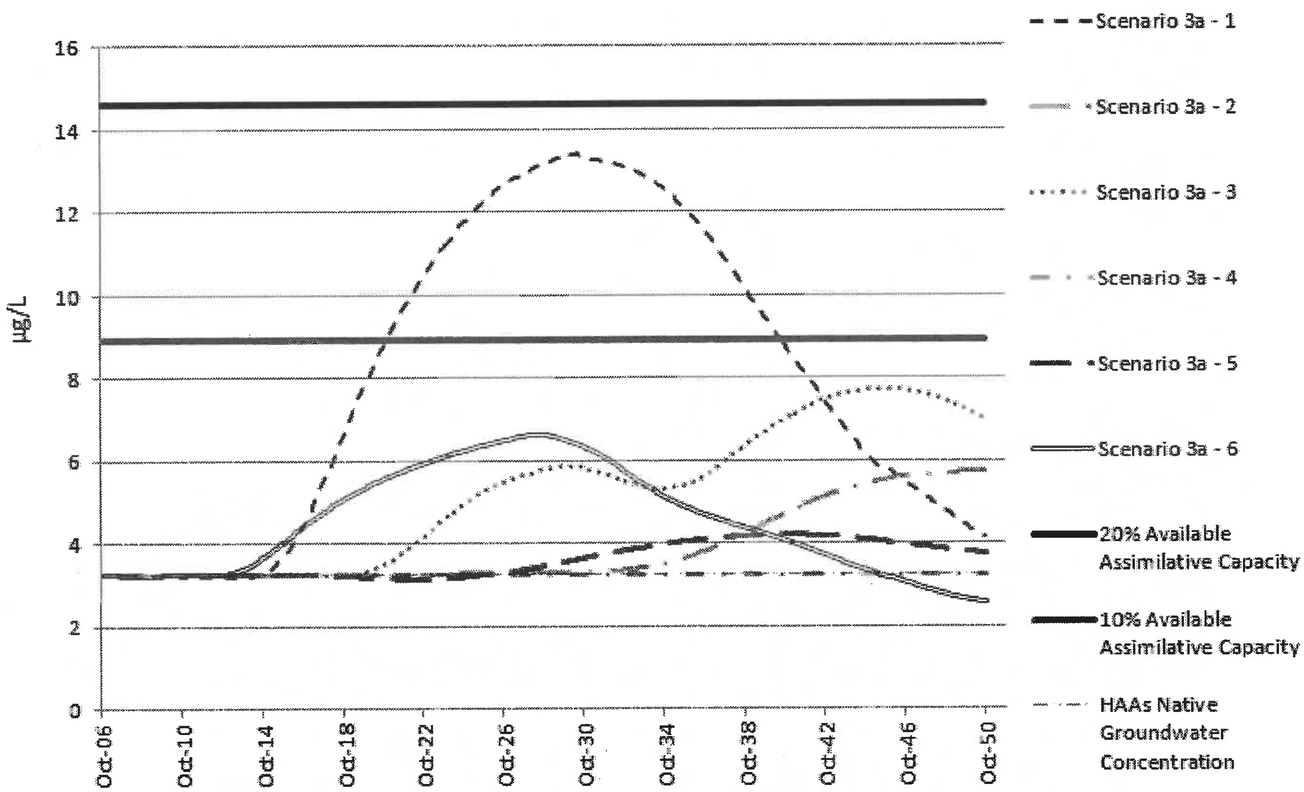

Figure 5-64. Total HAAs at the City Boundary – Scenario 3a

Total HAAs concentrations do not exceed threshold concentrations in the Turlock Lake Laguna Formation, the Valley Springs Formation or the Ione Formation beyond City limits through 2050. There are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within the area of impacted groundwater. There are no known public supply wells, agricultural wells, or municipal wells in areas where greater than 10% assimilative capacity has been diminished from project operations.

Total HAAs concentrations resulting from Scenario 3a operations do not constitute a threat to the protection of groundwater's beneficial uses in the area.

Total HAAs – Scenario 3b

Figure 5-65 shows Total HAAs levels at their threshold concentration in the upper portion of the Mehrten Formation for Scenario 3b in October 2030 and October 2050.

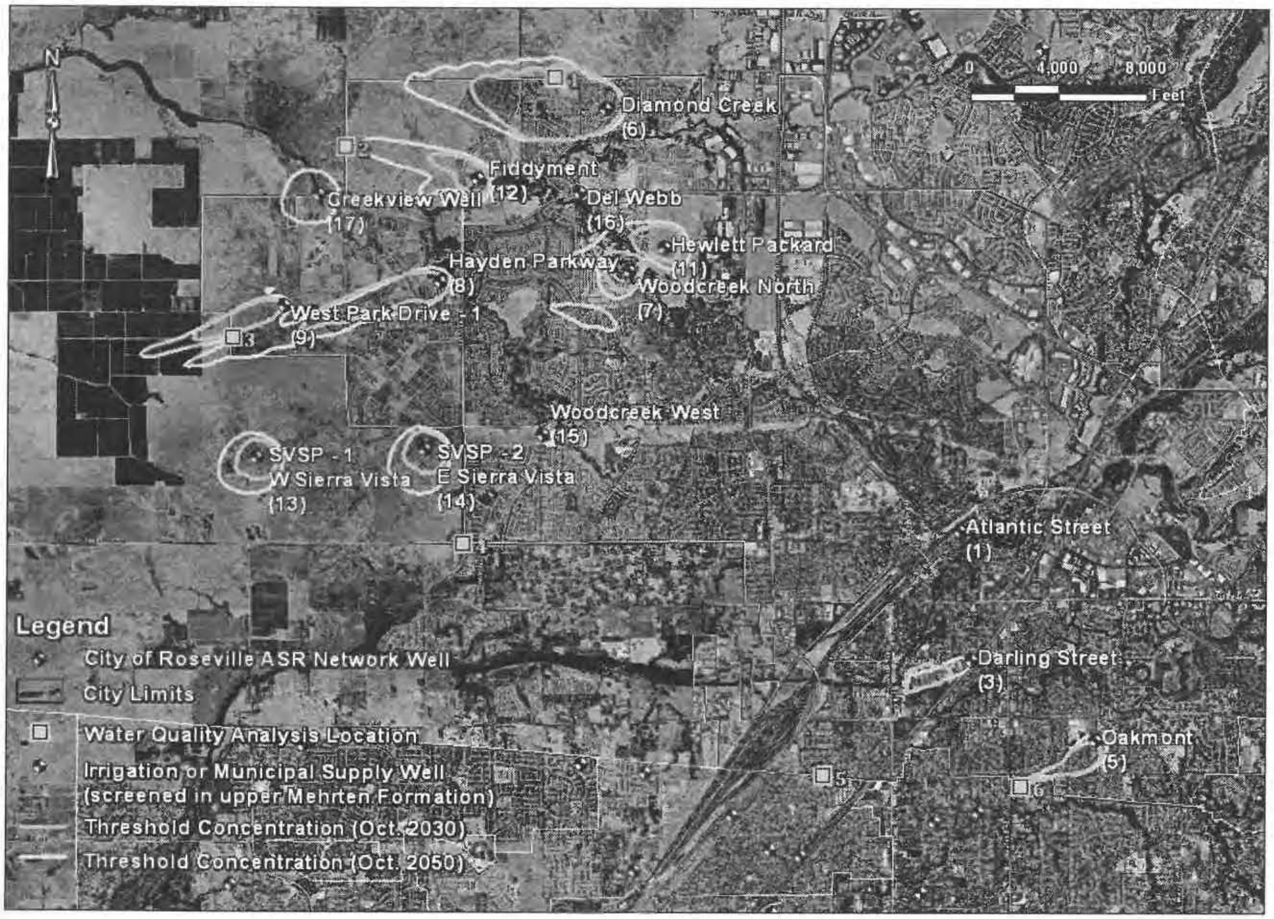

Figure 5-65. Total HAAs Concentrations at 8.93 µg/L in October 2030 and October 2050 - Scenario 3b

Total HAAs concentrations first exceed the 10% available assimilative capacity in Scenario 3b beyond the City limits, down gradient of the Diamond Creek well (Scenario 3b-1) and Hayden Parkway/West Park wells (Scenario 3b-3) in December 2020 and July 2041, respectively, as shown in Figure 5-66. The highest concentration observed from the transport analysis for Hayden Parkway/West Park wells is 9.09 2 µg/L. 20% available assimilative capacity was only exceed beyond the City limits down gradient of the Diamond Creek well in March 2039 with the highest concentration being 14.86 µg/L as shown in Figure 5-66.

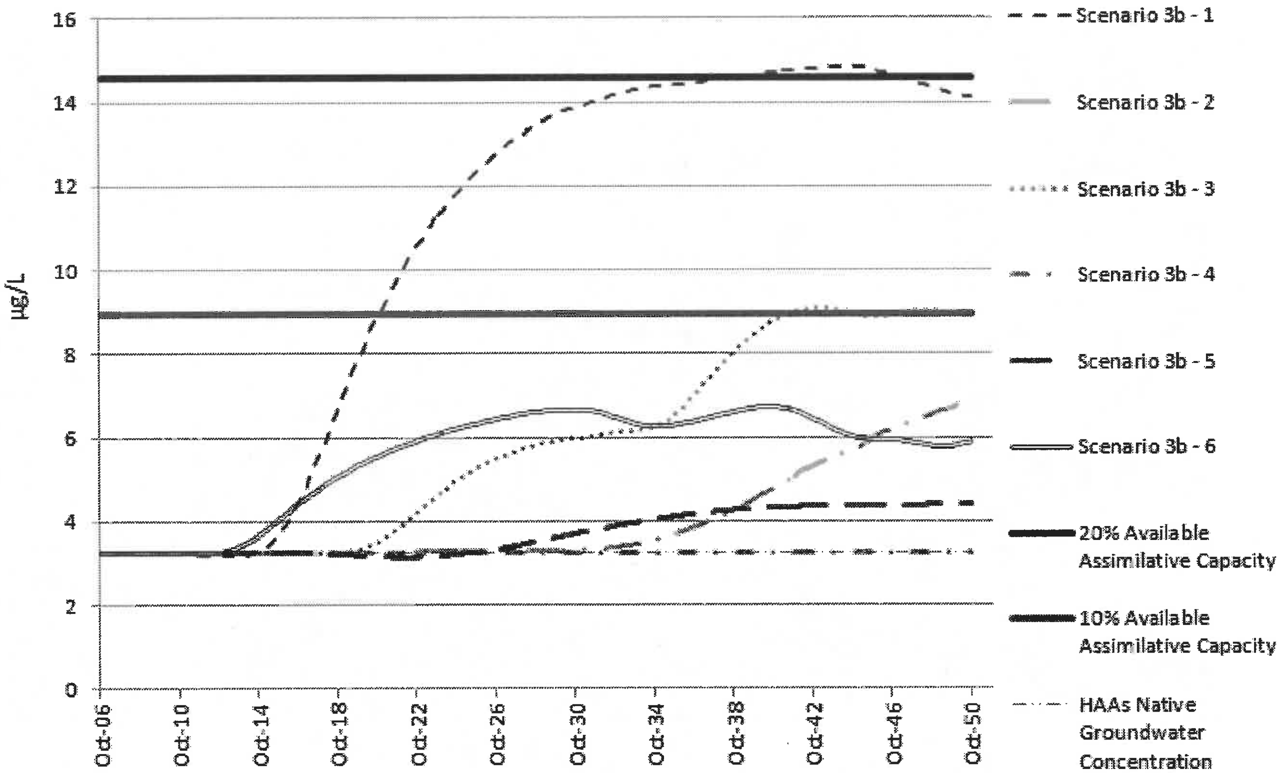

Figure 5-66. Total HAAs at the City Boundary – Scenario 3b

Total HAAs concentrations do not exceed the 10% available assimilative capacity in the Turlock Lake Laguna Formation, the Valley Springs Formation or the Ione Formation beyond City limits through 2050. There are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within the area of impacted groundwater. There are no known public supply wells, agricultural wells, or municipal wells in areas where greater than 10% assimilative capacity has been diminished from project operations.

Total HAAs concentrations resulting from Scenario 3b operations do not constitute a threat to the protection of groundwater's beneficial uses in the area.

5.7.4. Chloride

Chloride is an element found in most common salts, such as road salt, table salt, and water-softener salt. The regulatory guideline for chloride is the secondary MCL (SMCL). The SMCL for chloride is 250 mg/L. This limit was established because water with chloride concentrations greater than 250 mg/L tastes salty to most people. Chloride can be a remnant of seawater present at the time the rocks were formed or may originate from septic tank leachate, as a result of water softening or other activities in the household (USGS. 2004).

Native groundwater in the North American subbasin contains chloride concentrations at 29.76 mg/L. The assimilative capacity for chloride in the North American subbasin is 220.24 mg/L. The threshold concentration is 51.79 mg/L. Injection water contained 1.8 mg/L of chloride for the transport analyses.

Chloride concentrations in the groundwater decreased in the vicinity of the ASR pumping wells as a result of the ASR operations. The simulated results at the six water quality analysis locations from each of the six predictive simulations are presented in (Figure 5-67 through Figure 5-72).

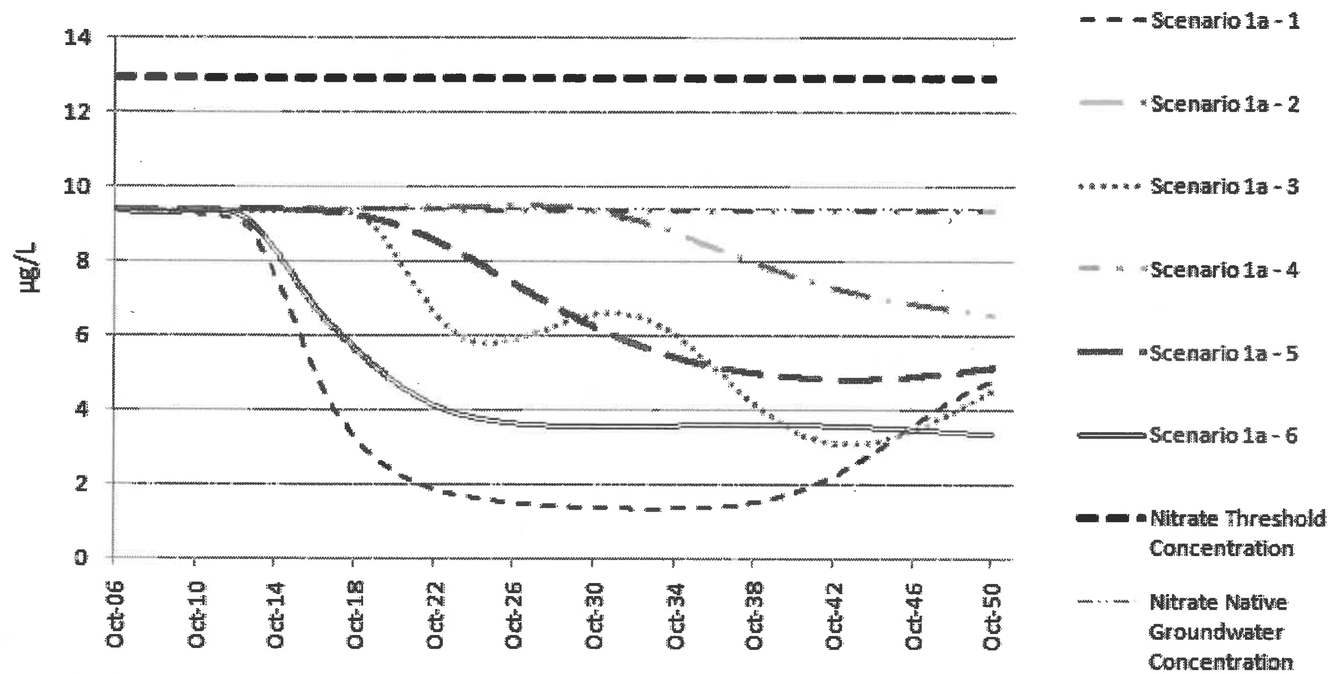

Figure 5-67. Chloride Concentrations at the City Boundary – Scenario 1a

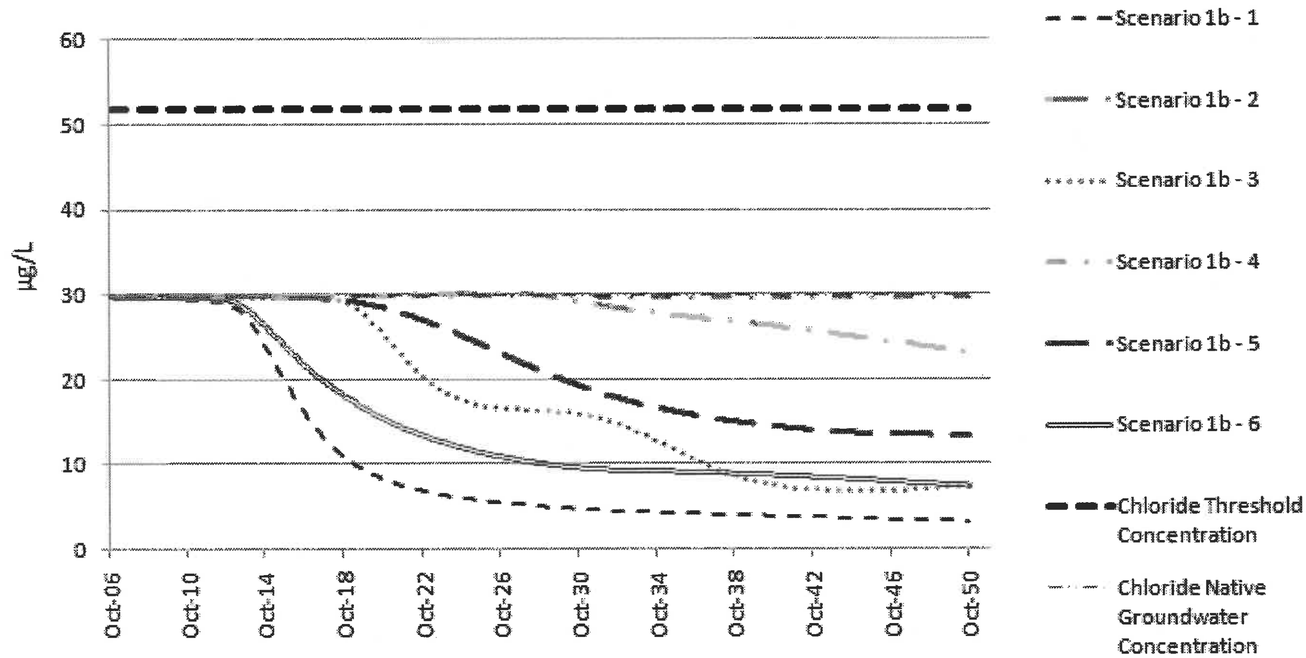

Figure 5-68. Chloride Concentrations at the City Boundary - Scenario 1b

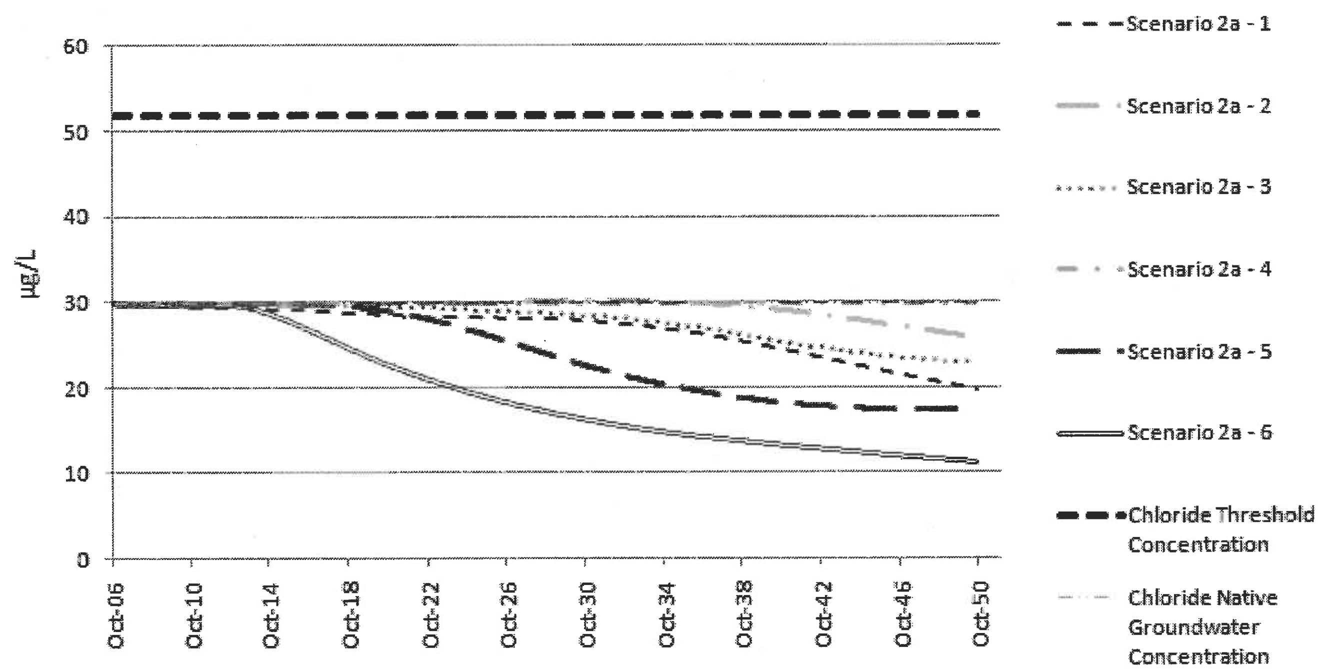

Figure 5-69. Chloride Concentrations at the City Boundary - Scenario 2a

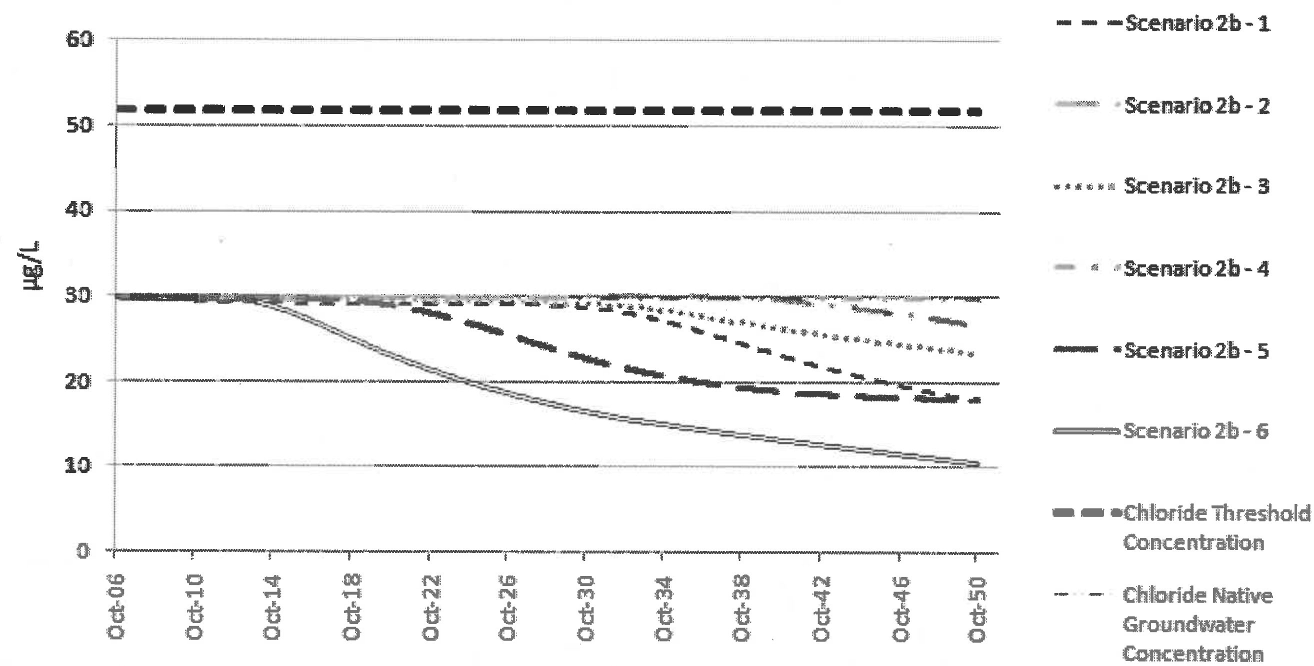

Figure 5-70. Chloride Concentrations at the City Boundary - Scenario 2b

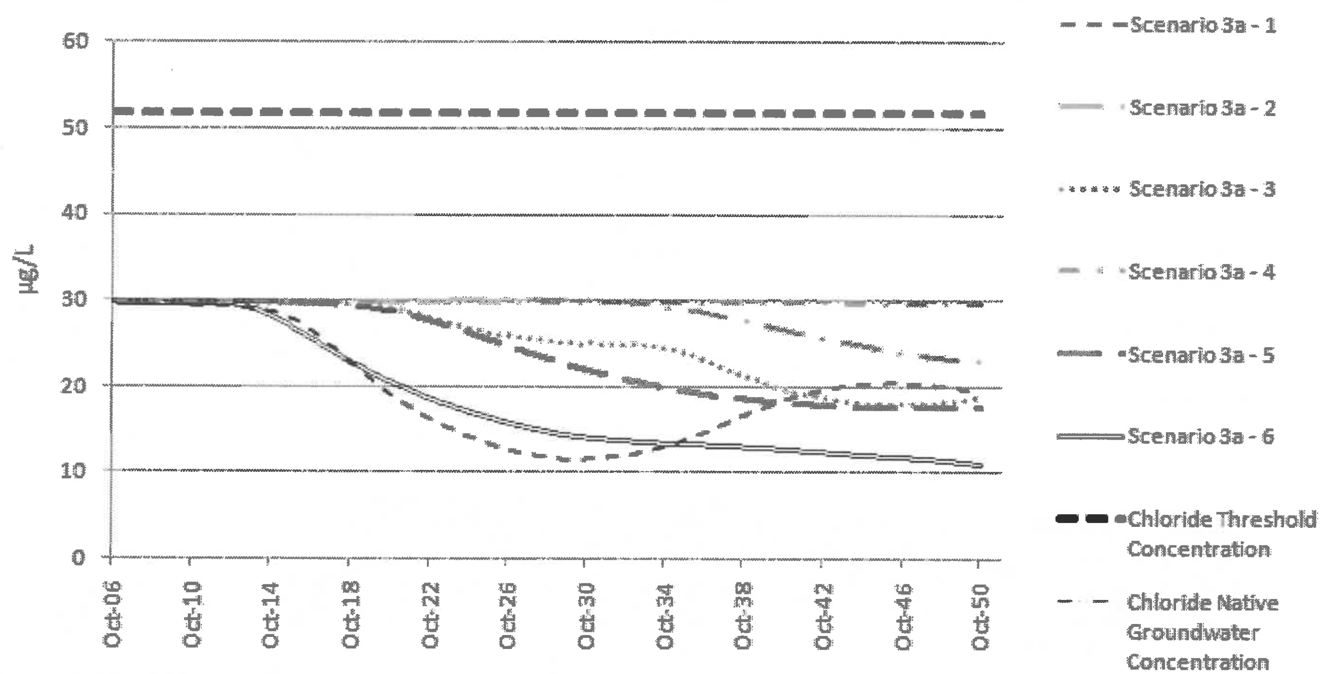

Figure 5-71. Chloride Concentrations at the City Boundary - Scenario 3a

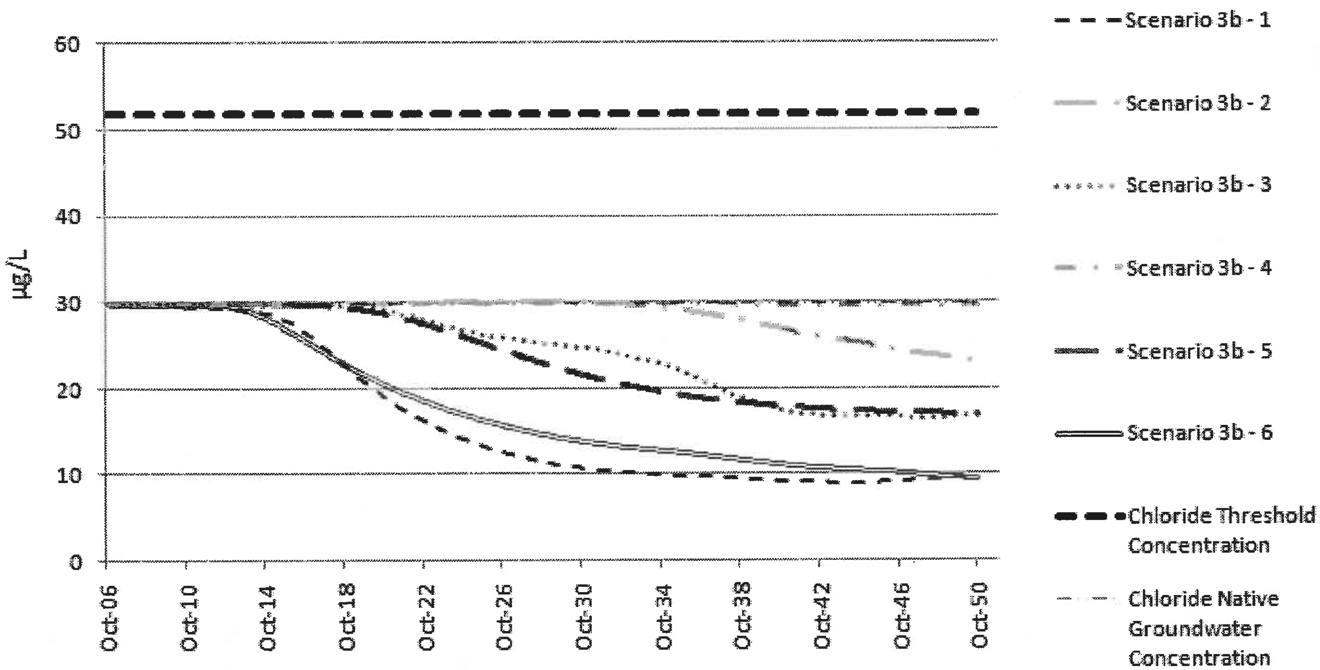

Figure 5-72. Chloride Concentrations at the City Boundary - Scenario 3b

Chloride concentrations resulting from the six simulated ASR operations improve the aesthetic quality of the water and do not constitute a threat to the protection of groundwater's beneficial uses in the area.

5.7.5. Water Hardness as $CaCO_3$ and TDS

Groundwater is typically harder than surface water because as water moves through soil and rocks, it dissolves small amounts of the naturally occurring minerals such as calcium and magnesium and carries them into the groundwater aquifer. Hard water does not pose a health risk but can be aesthetically unpleasing due to the mineral buildup or spotting on plumbing fixtures, shower doors, dishes, and glasses. It can also have undesirable odor and taste. Hardness is not a regulatory parameter but it can be classified based on the concentration of TDS or $CaCO_3$. Water hardness classifications are shown in Table 5-5 and Table 5-6 based on TDS and $CaCO_3$, respectively.

Table 5-5. Water Hardness Classifications Based on TDS

Grains per gallon	Milligrams per liter (mg/L) or Parts per million (ppm)	Classification
Less than 1.0	Less than 17.1	Soft
1.0 – 3.5	17.1 – 60	Slightly Hard
3.5 – 7.0	60 – 120	Moderately Hard
7.0 – 10.5	120 – 180	Hard
Over 10.5	Over 180	Very Hard

Table 5-6. Water Hardness Classification Based on $CaCO_3$

Milligrams per liter (mg/L) or Parts per million (ppm)	Classification
0-60	Soft
61-120	Moderately Hard
121-180	Hard
Over 180	Very Hard

There are no regulatory guidelines for $CaCO_3$. Native groundwater in the North American subbasin contains $CaCO_3$ concentrations at 115.31mg/L. Injection water contained 22 mg/L of $CaCO_3$ for the transport analyses. In general, $CaCO_3$ concentrations decreased as a result of ASR operations for all six scenarios, as shown in Figure 5-73 through Figure 5-78.

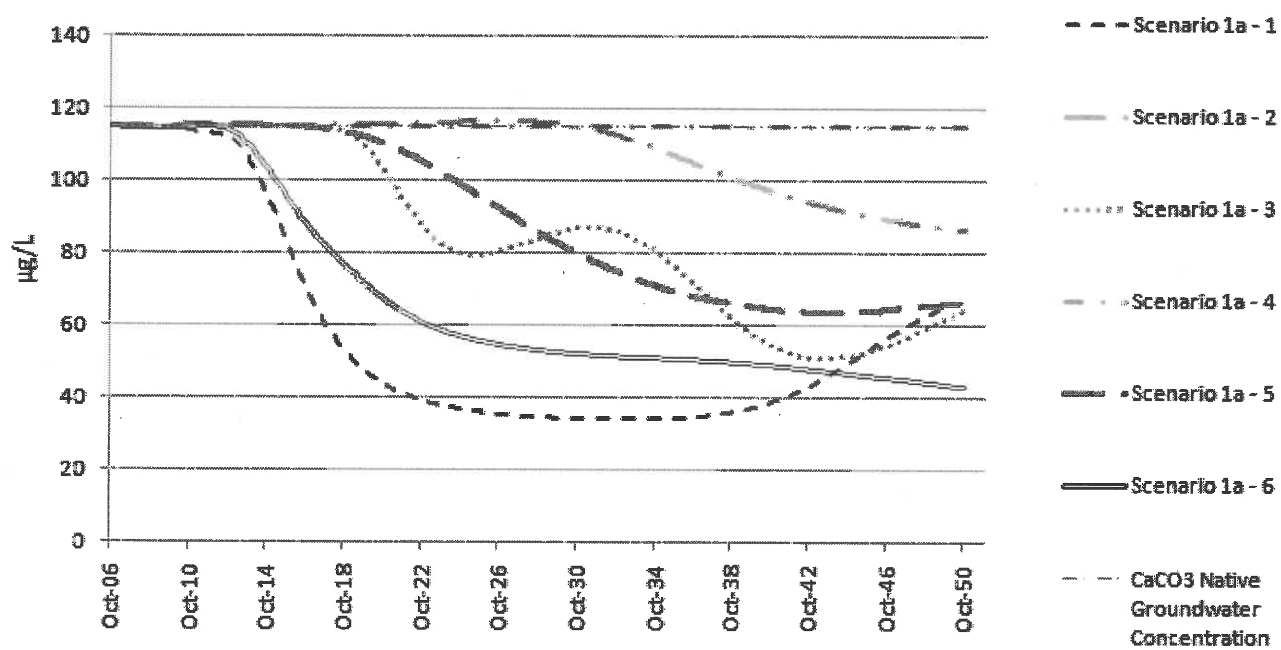

Figure 5-73. $CaCO_3$ Concentrations at the City Boundary - Scenario 1a

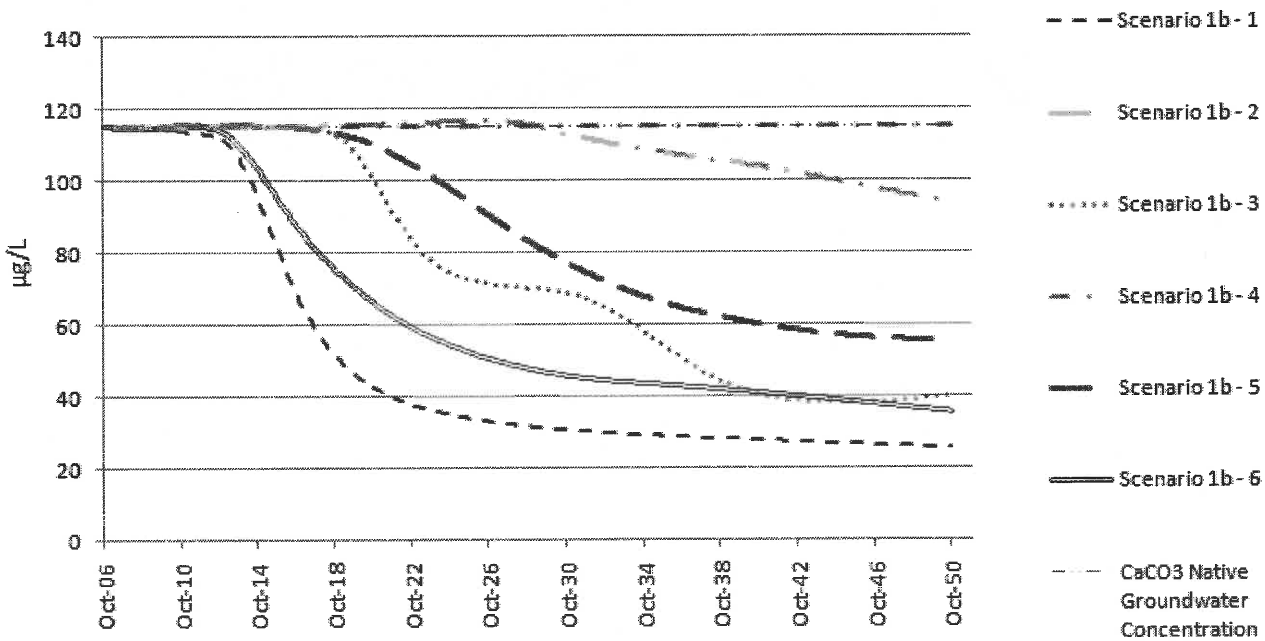

Figure 5-74. $CaCO_3$ Concentrations at the City Boundary - Scenario 1b

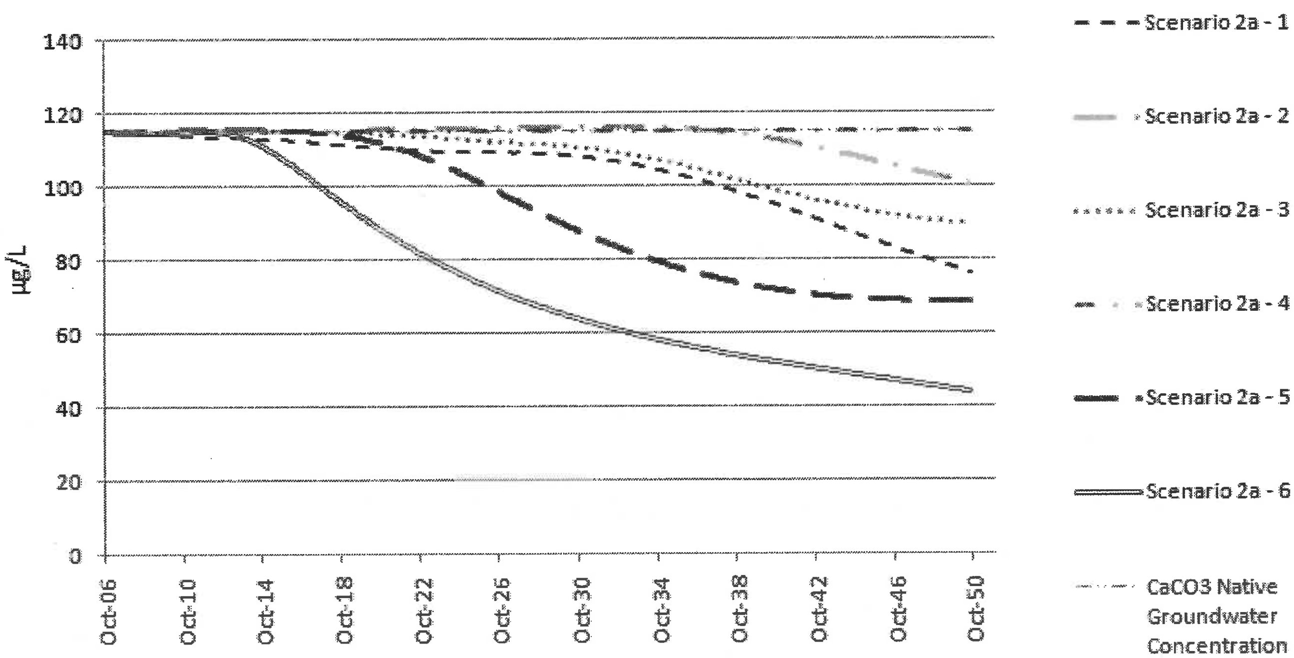

Figure 5-75. $CaCO_3$ Concentrations at the City Boundary - Scenario 2a

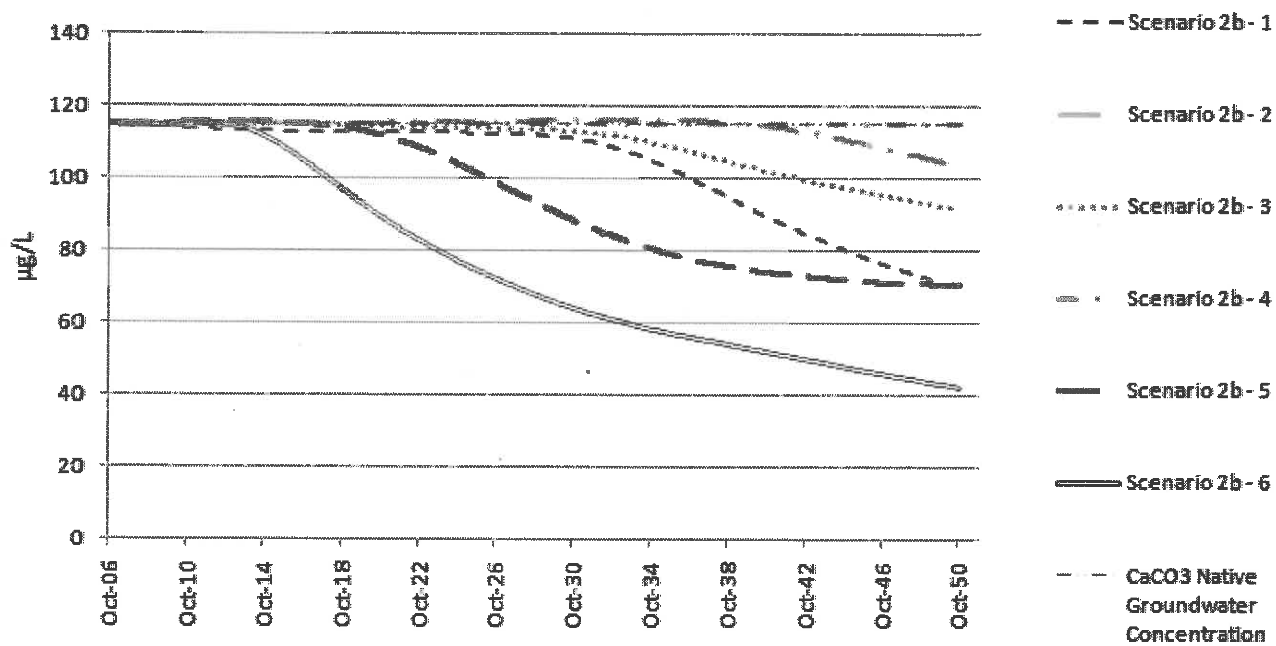

Figure 5-76. $CaCO_3$ Concentrations at the City Boundary - Scenario 2b

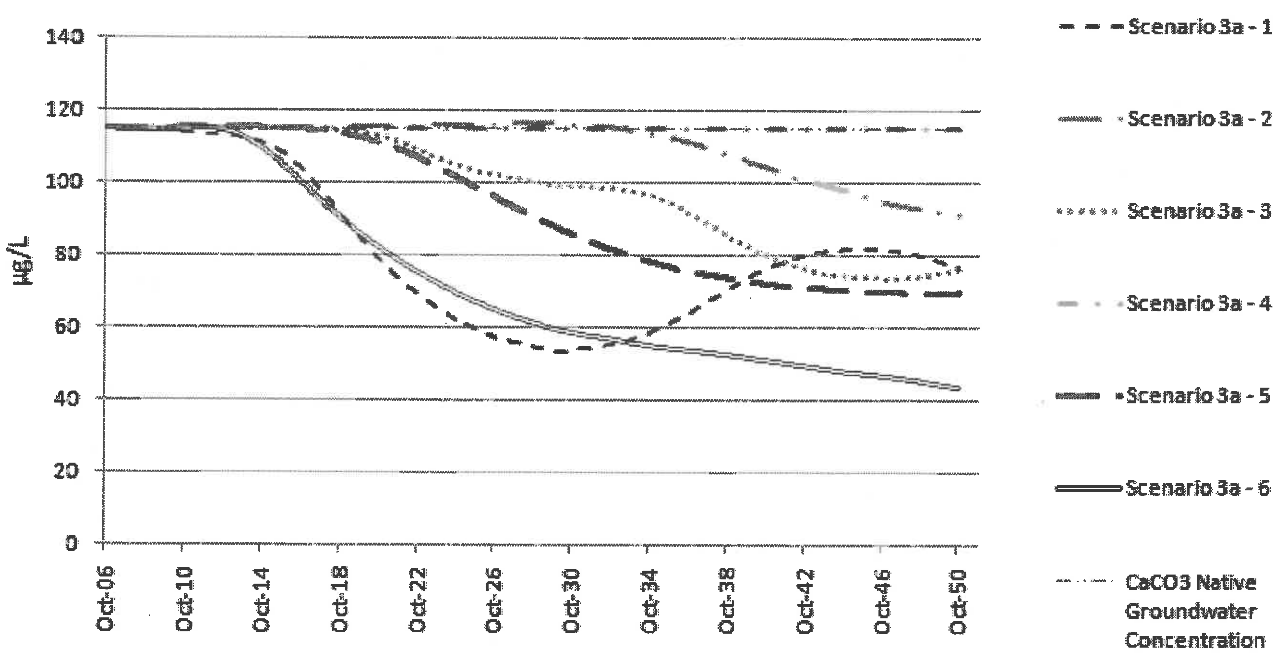

Figure 5-77. $CaCO_3$ Concentrations at the City Boundary - Scenario 3a

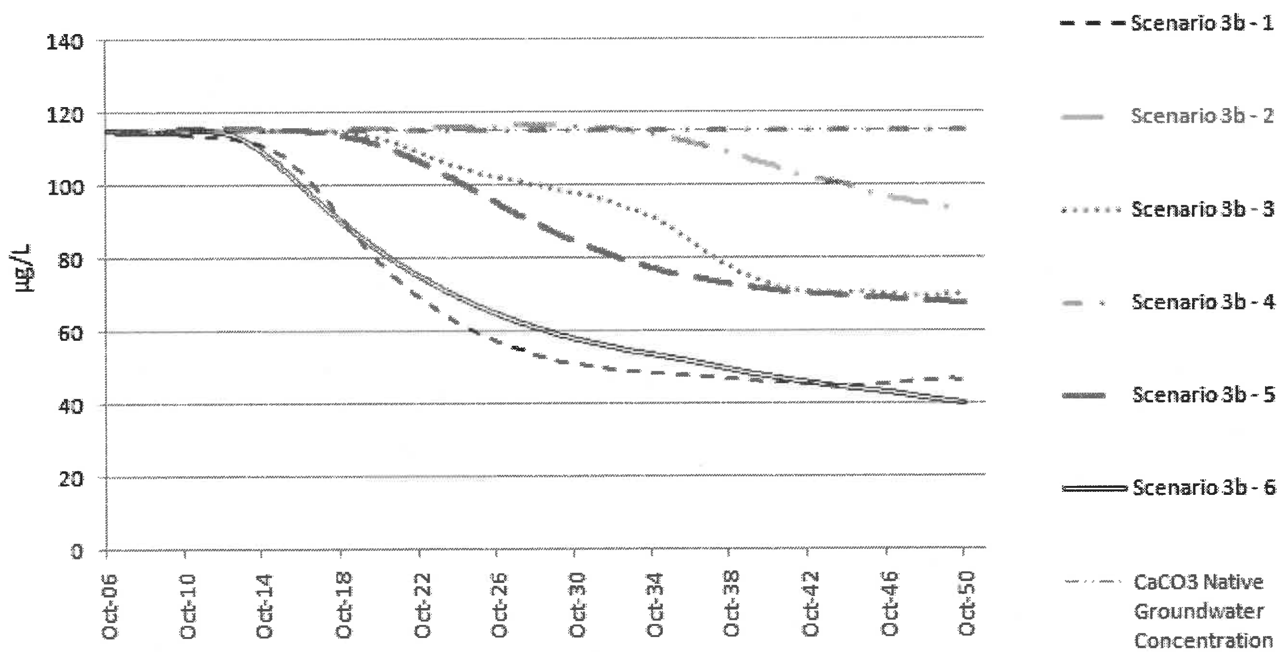

Figure 5-78. $CaCO_3$ Concentrations at the City Boundary - Scenario 3b

The regulatory guideline for TDS is the SMCL. The SMCL for TDS is 500 mg/L. Native groundwater in the North American subbasin contains TDS concentrations at 29.76 mg/L. The assimilative capacity for TDS in the North American subbasin is 224.95 mg/L. The threshold concentration is 297.55 mg/L. Injection water contained 42 mg/L of TDS for the transport analyses.

TDS concentrations in the groundwater decreased in the vicinity of the ASR pumping wells as a result of the ASR operations. The simulated results at the six water quality analysis locations from each of the six predictive simulations are presented in (Figure 5-79 through Figure 5-84).

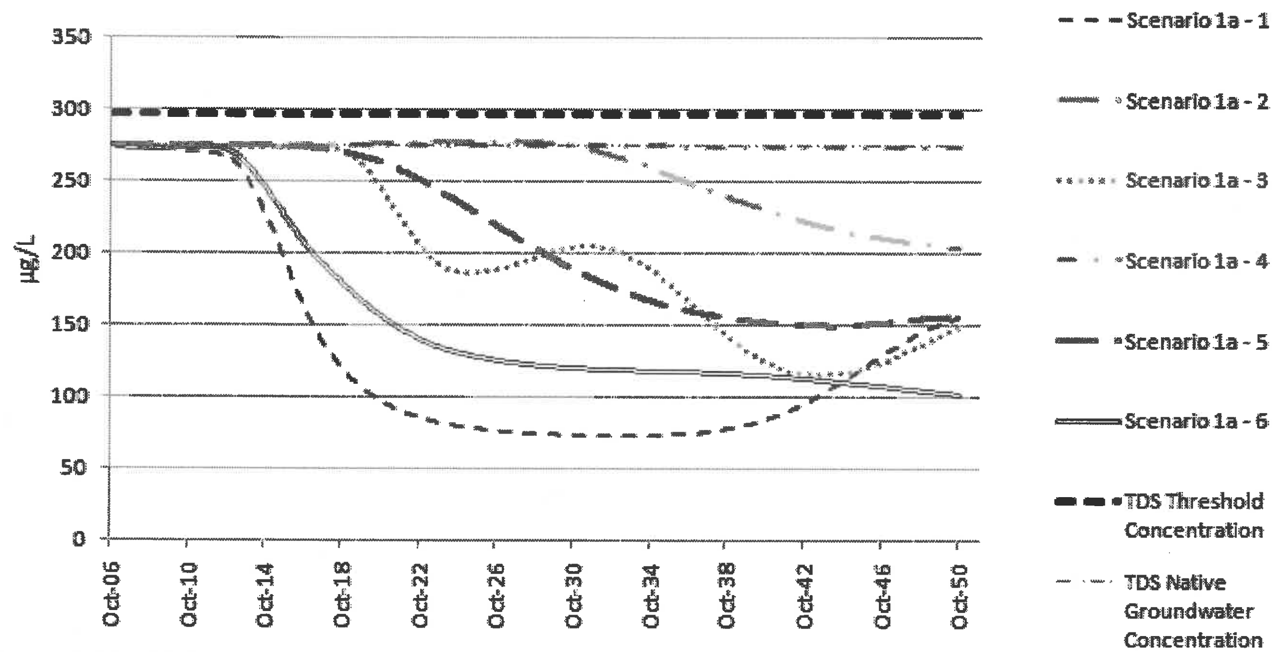

Figure 5-79. TDS Concentrations at the City Boundary - Scenario 1a

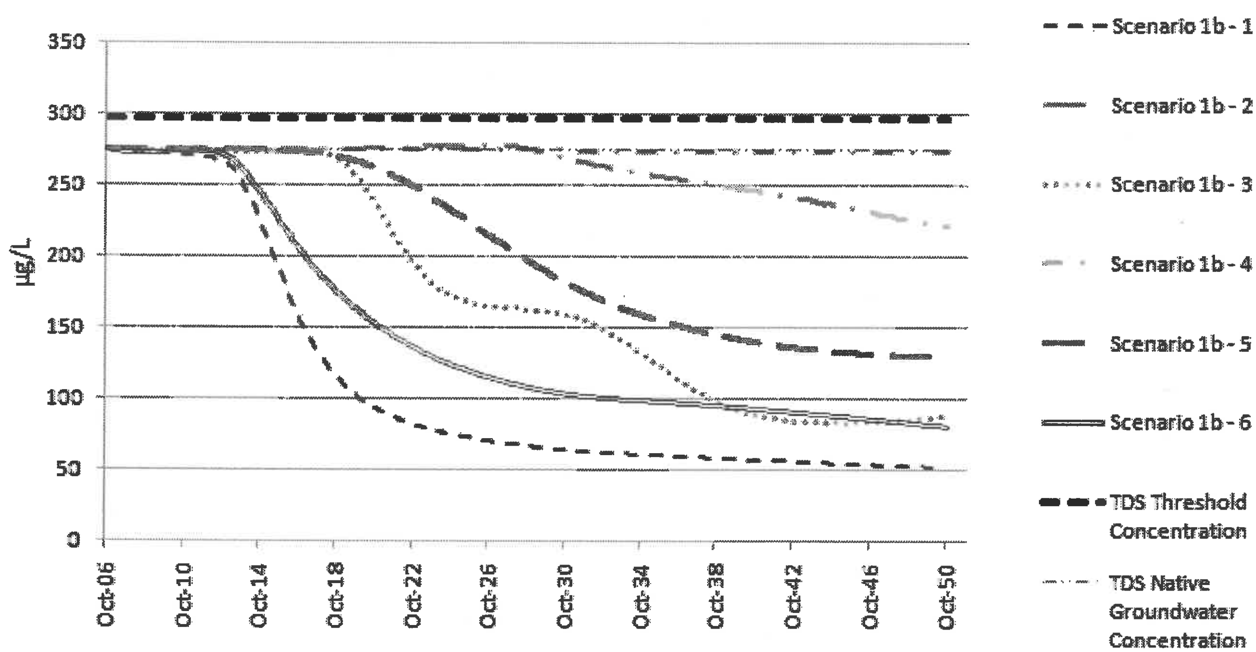

Figure 5-80. TDS Concentrations at the City Boundary - Scenario 1b

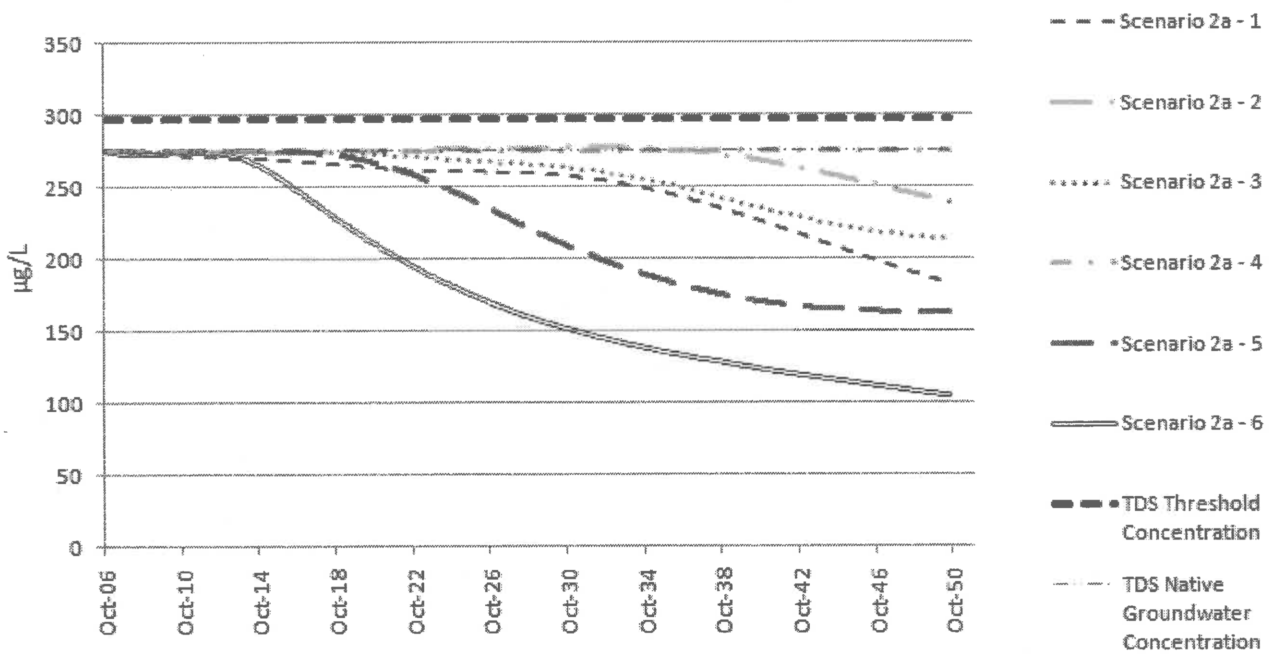

Figure 5-81. TDS Concentrations at the City Boundary - Scenario 2a

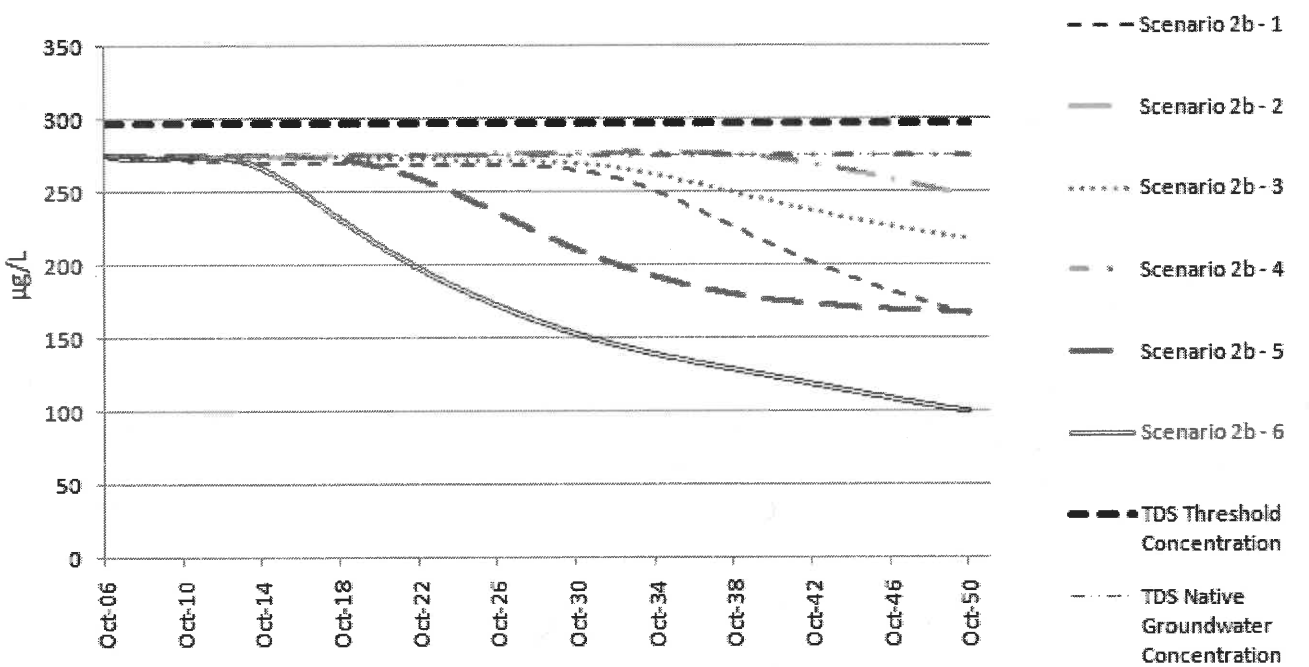

Figure 5-82. TDS Concentrations at the City Boundary - Scenario 2b

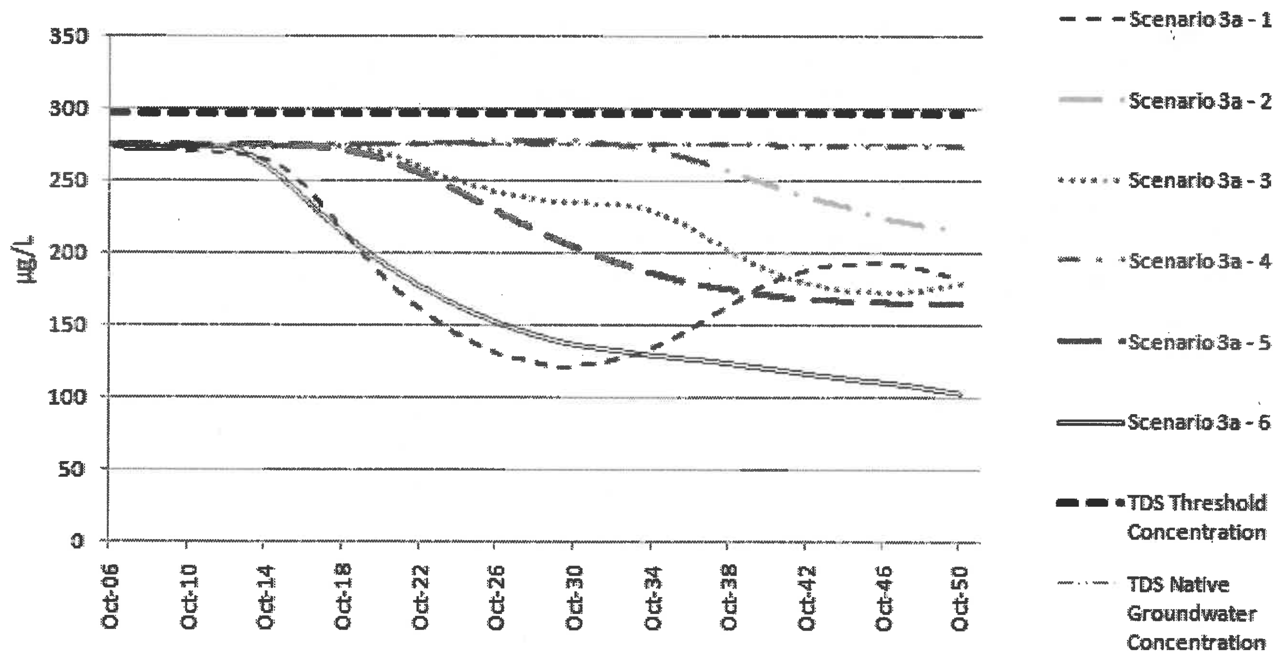

Figure 5-83. TDS Concentrations at the City Boundary - Scenario 3a

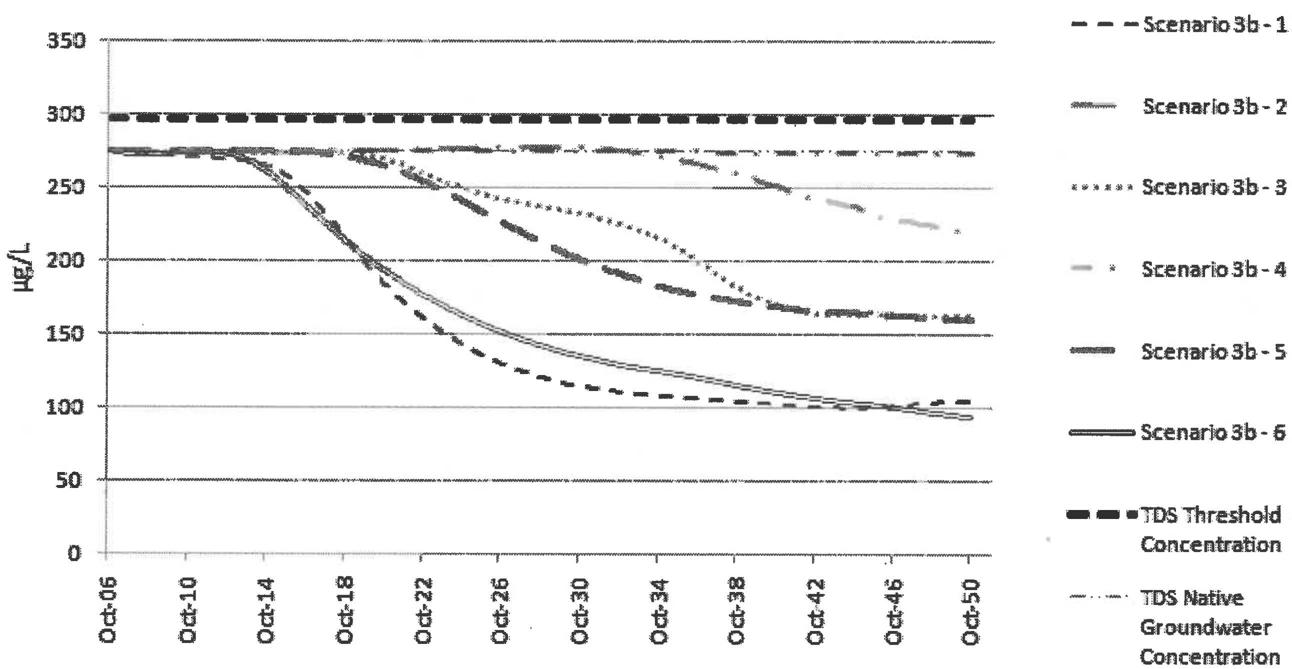

Figure 5-84. TDS Concentrations at the City Boundary - Scenario 3b

Total $CaCO_3$ and TDS concentrations resulting from the six simulated ASR operations improve the aesthetic quality of the water and do not constitute a threat to the protection of groundwater's beneficial uses in the area.

5.7.6. Sodium

During the Notice of Preparation scoping meetings convened for this analysis, the potential for health risks associated with sodium levels in groundwater was identified as an issue of concern. In order to accurately address this issue, the City of Roseville included sodium as part of this analysis.

There are no regulatory guidelines for sodium. Native groundwater in the North American subbasin contains sodium concentrations at 22.54 mg/L. Injection water contained 3 mg/L of sodium for the transport analyses. In general, sodium concentrations decreased as a result of ASR operations for all six scenarios, as shown in Figure 5-85 through Figure 5-90 .

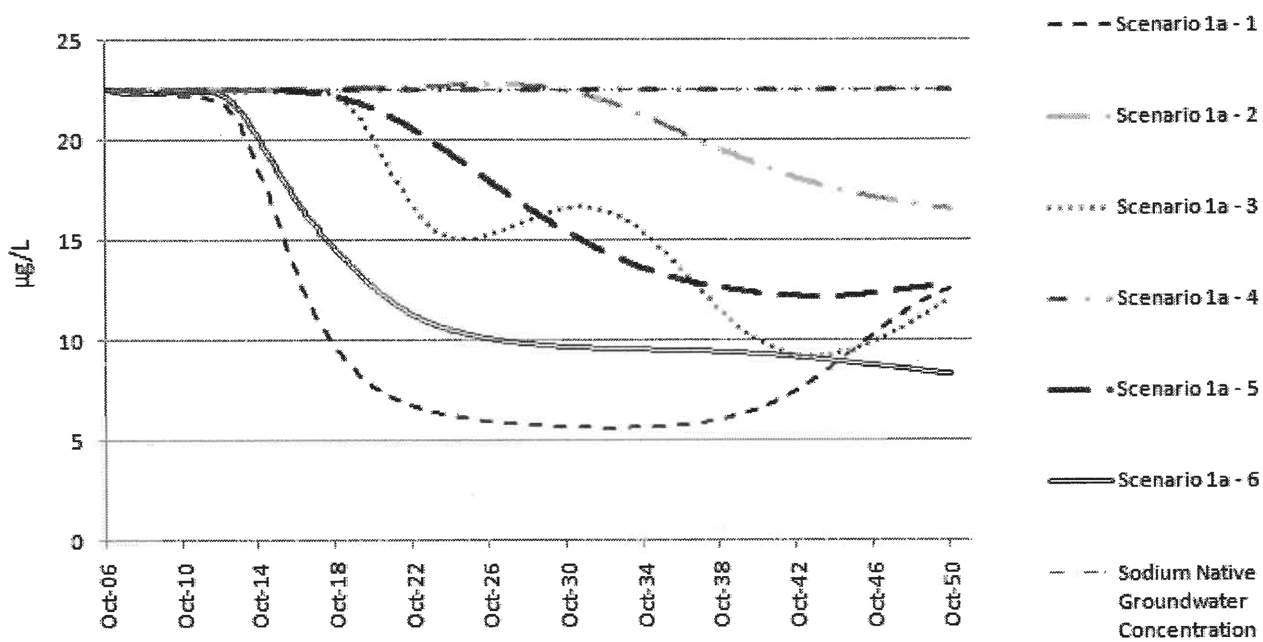

Figure 5-85. Sodium Concentrations at the City Boundary - Scenario 1a

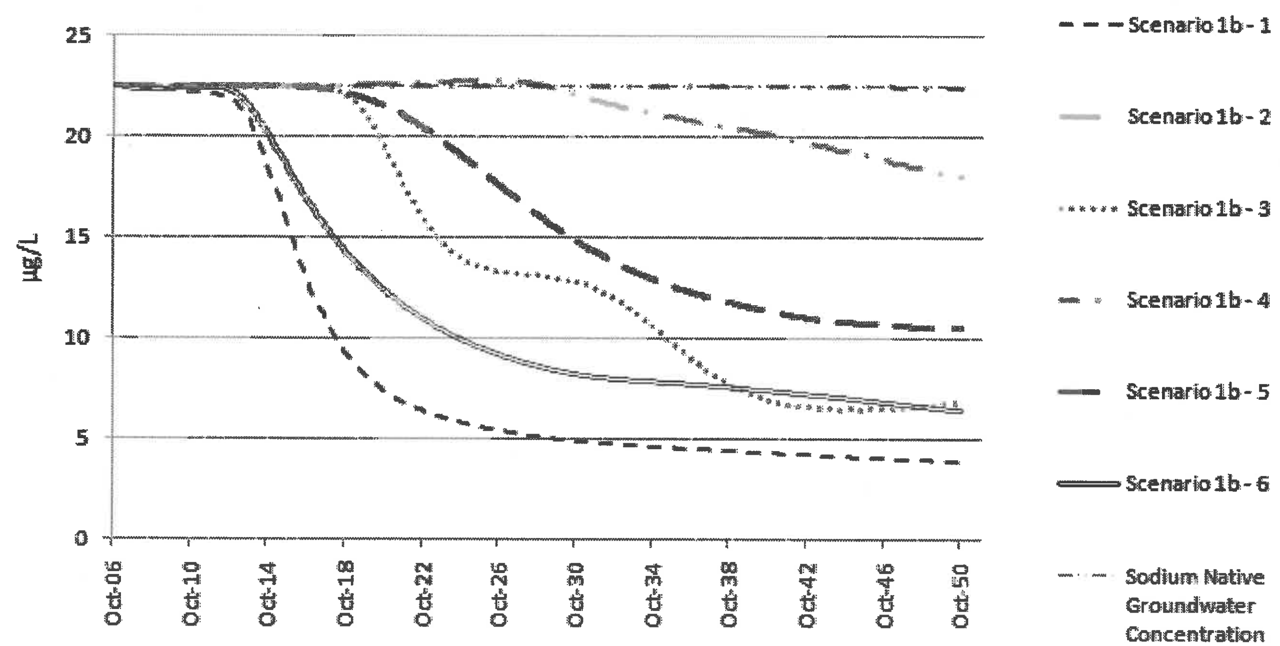

Figure 5-86. Sodium Concentrations at the City Boundary - Scenario 1b

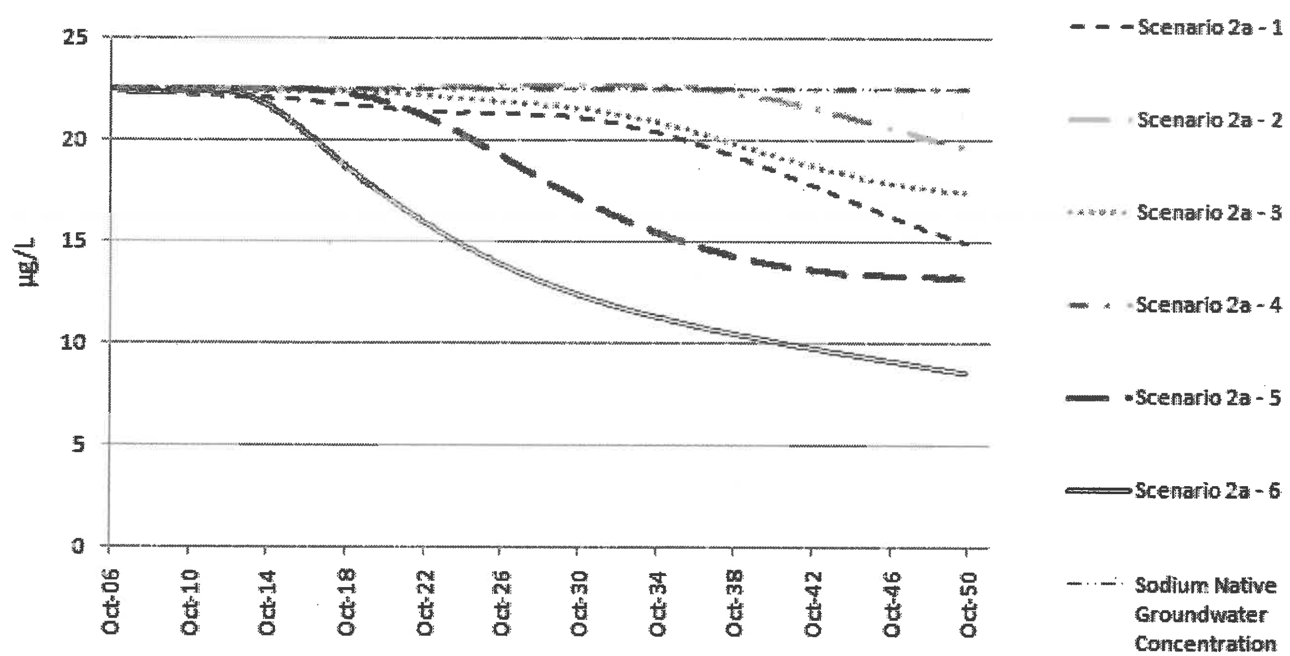

Figure 5-87. Sodium Concentrations at the City Boundary - Scenario 2a

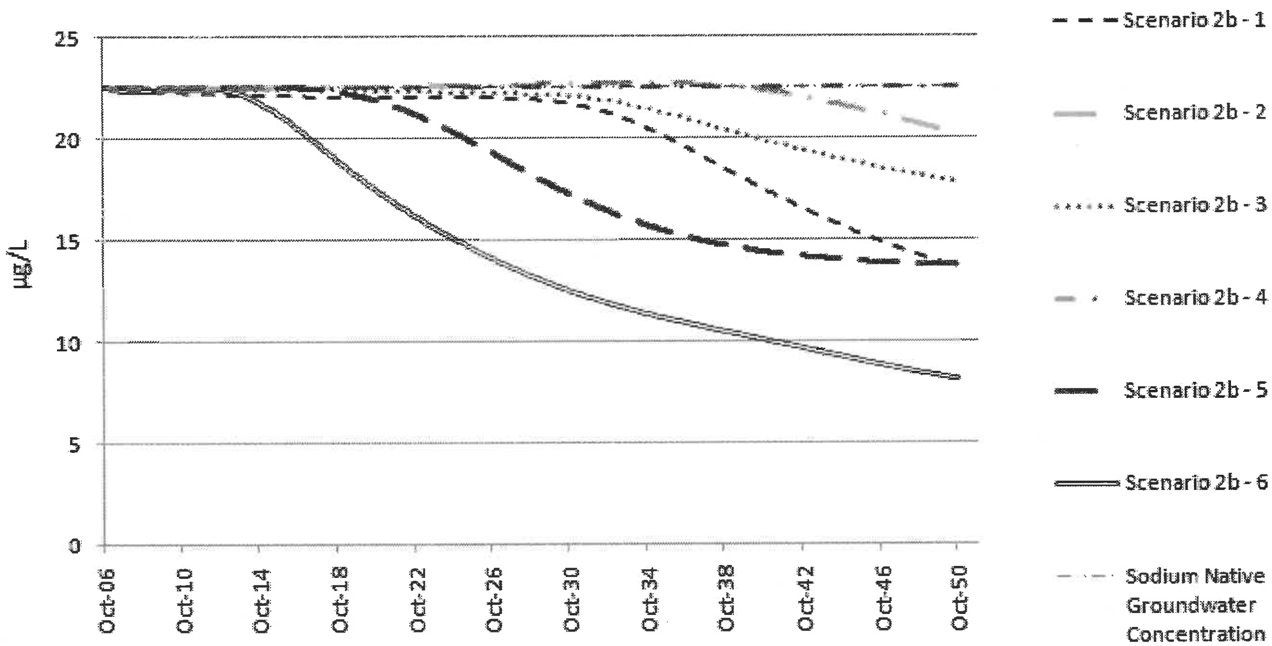

Figure 5-88. Sodium Concentrations at the City Boundary - Scenario 2b

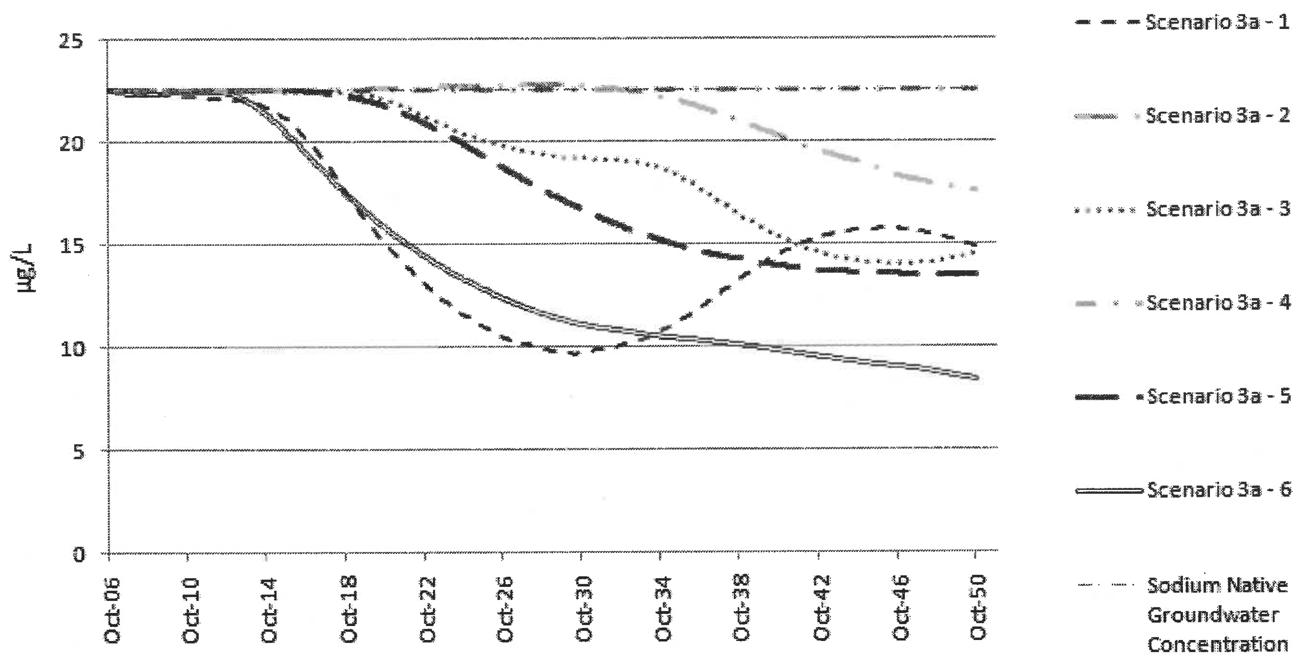

Figure 5-89. Sodium Concentrations at the City Boundary - Scenario 3a

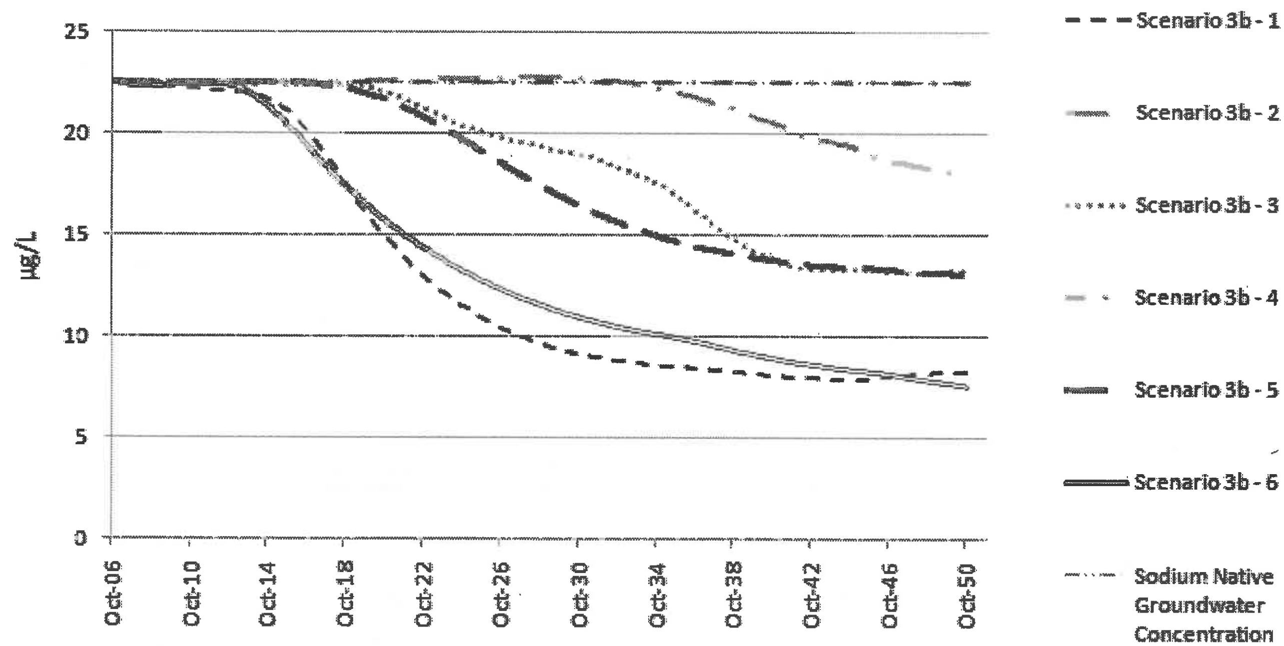

Figure 5-90. Sodium Concentrations at the City Boundary - Scenario 3b

Sodium concentrations resulting from the six simulated ASR operations improve the aesthetic quality of the groundwater and do not constitute a threat to the protection of groundwater's beneficial uses in the area.

5.7.7. Sulfate

The concentration of sulfate is not very critical for domestic or irrigation uses or for many industrial processes. Sulfate in groundwater is derived chiefly from the solution of gypsum and the oxidization of pyrite. Sulfate in groundwater can result from the oxidization of small amounts of pyrite disseminated through the limestones, shales, and sandstones through which the water percolates.

The regulatory guideline for sulfate is the SMCL. The SMCL for sulfate is 250 mg/L. Native groundwater in the North American subbasin contains sulfate concentrations at 7.87 mg/L. Injection water contained 2.2 mg/L of sulfate for the transport analyses. In general, sulfate concentrations decreased as a result of ASR operations for all six scenarios, as shown in Figure 5-91 through Figure 5-96.

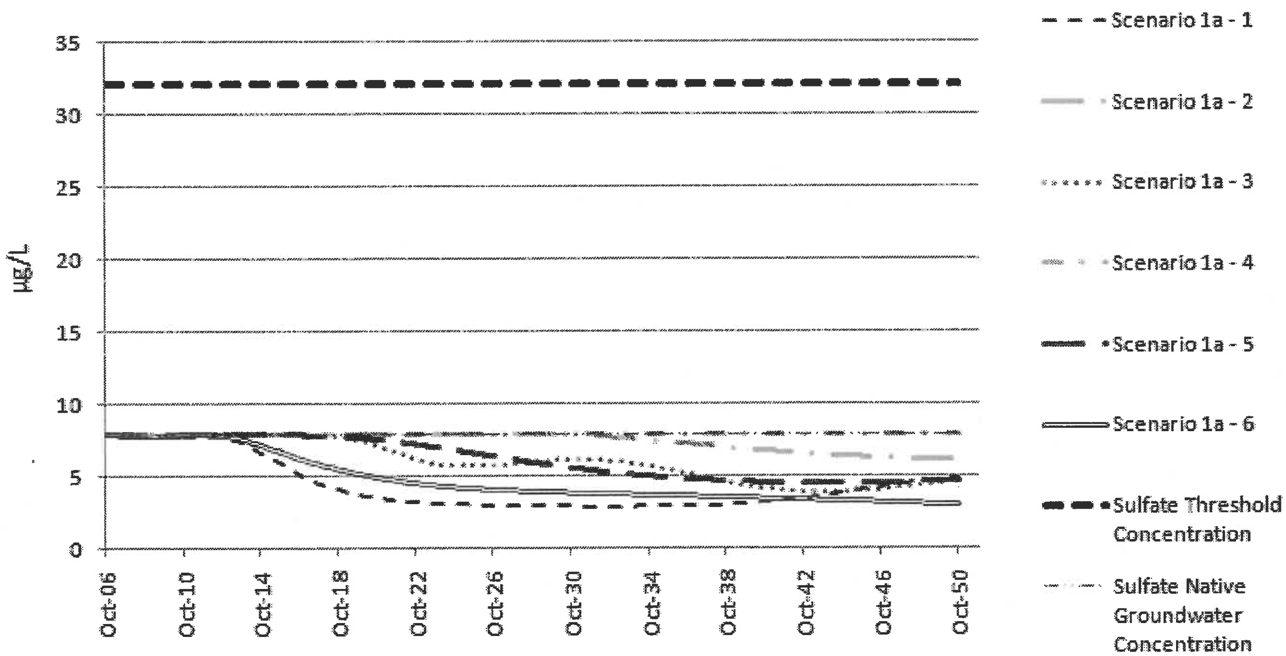

Figure 5-91. Sulfate Concentrations at the City Boundary - Scenario 1a

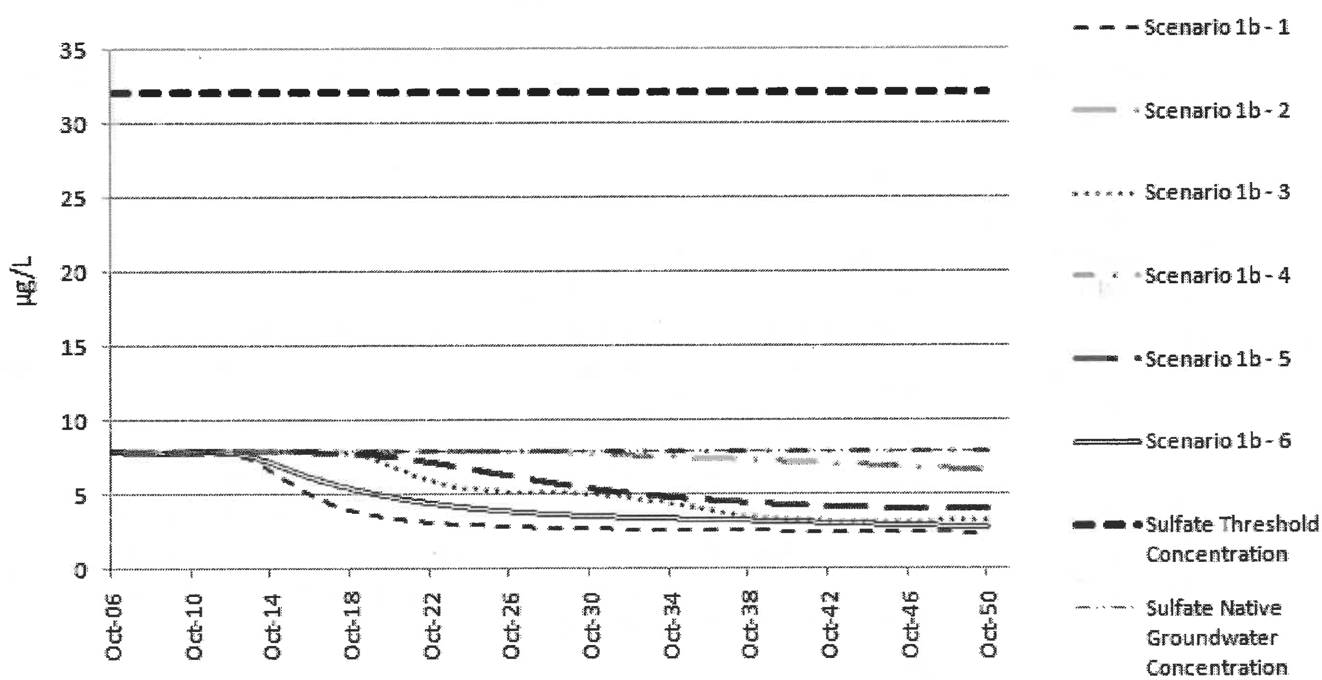

Figure 5-92. Sulfate Concentrations at the City Boundary - Scenario 1b

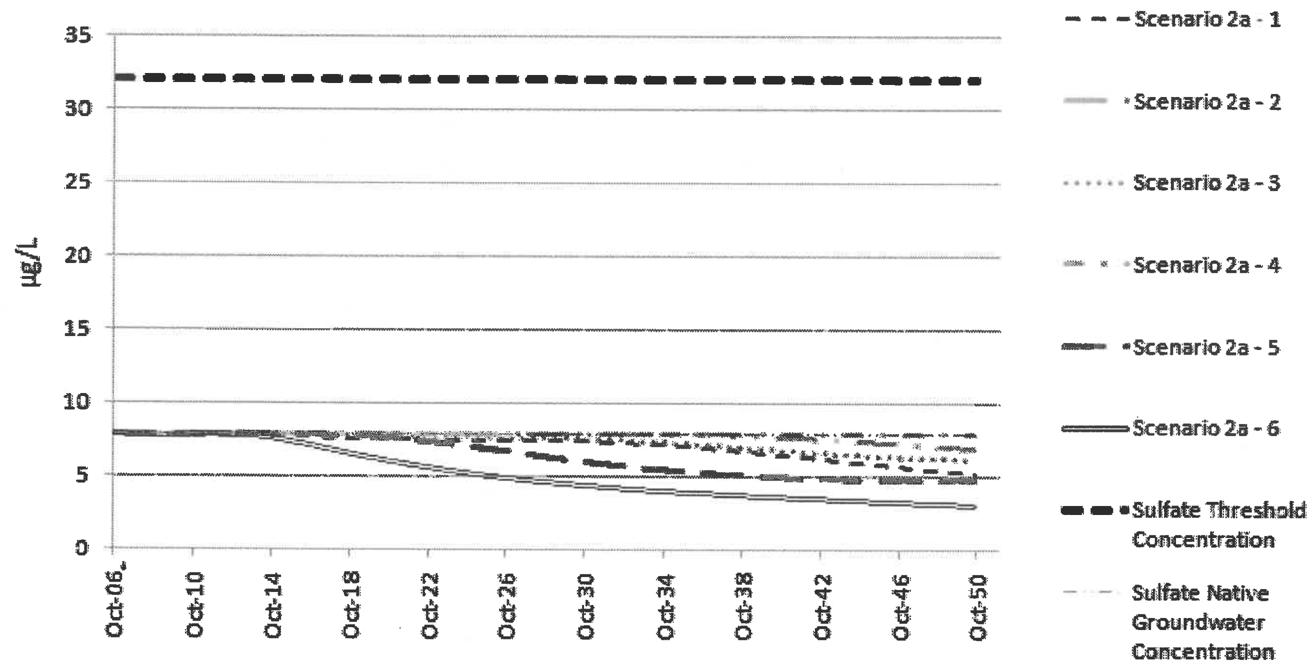

Figure 5-93. Sulfate Concentrations at the City Boundary - Scenario 2a

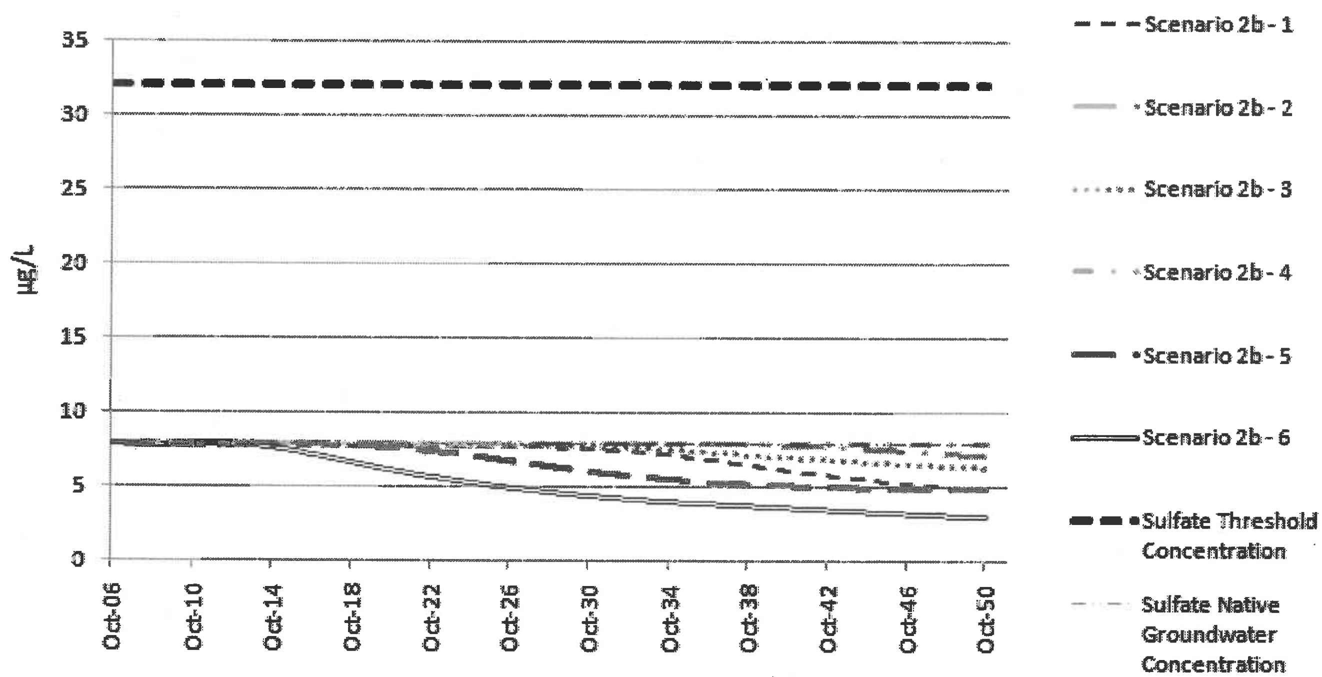

Figure 5-94. Sulfate Concentrations at the City Boundary - Scenario 2b

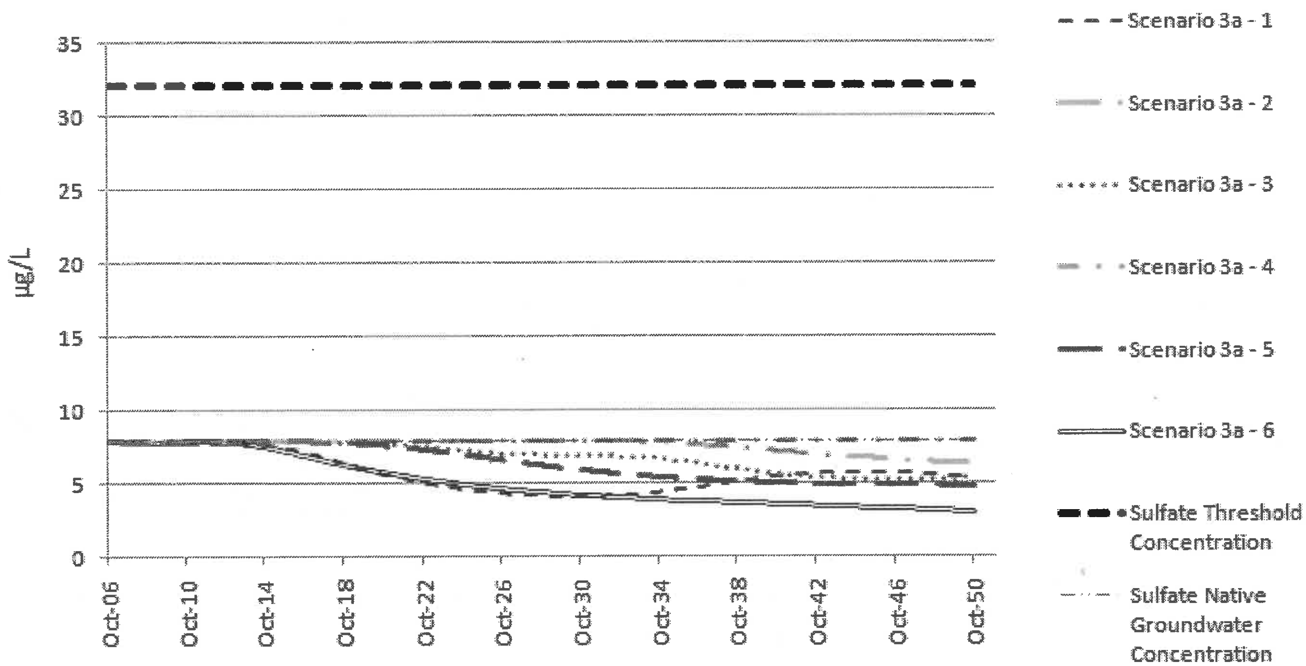

Figure 5-95. Sulfate Concentrations at the City Boundary - Scenario 3a

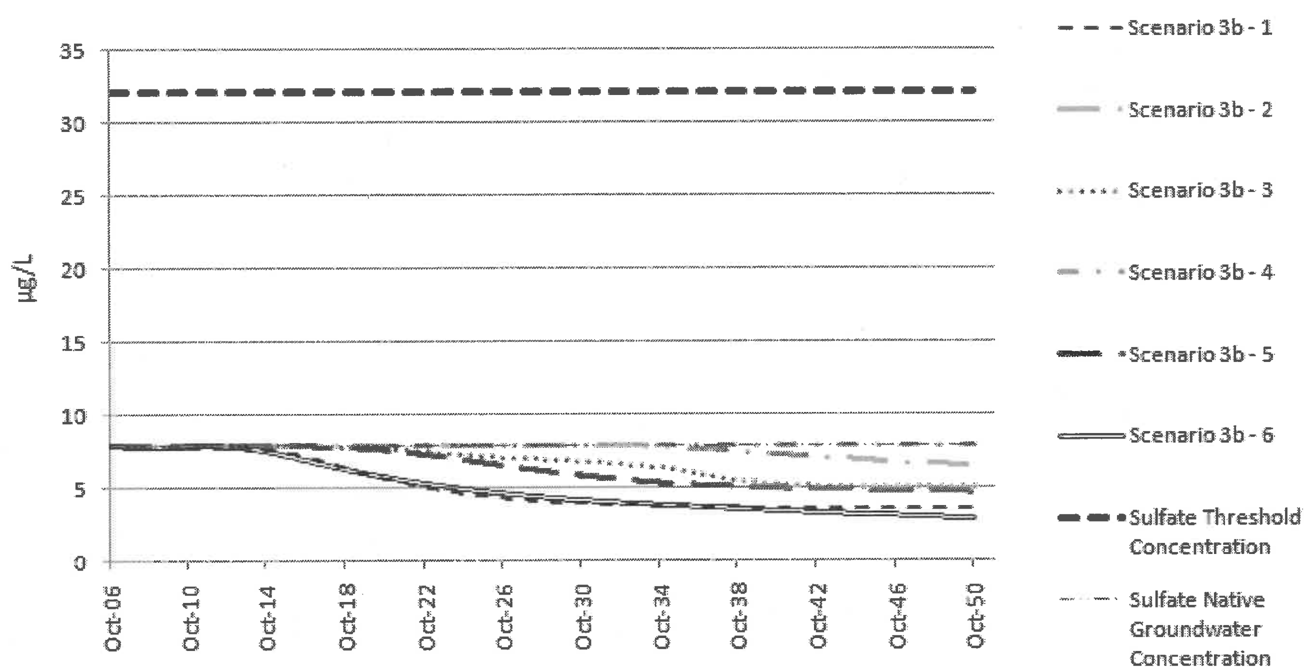

Figure 5-96. Sulfate Concentrations at the City Boundary - Scenario 3b

Sulfate concentrations resulting from the six simulated ASR operations improve the aesthetic quality of the groundwater and do not constitute a threat to the protection of groundwater's beneficial uses in the area.

5.8. Summery and Evaluation

Six ASR operational scenarios were simulated using numerical groundwater flow and transport models to quantify the degree of water quality changes from mixing groundwater and treated surface water from the City's water distribution system for the proposed ASR implementation, and to determine the movement of treated drinking water during injection, storage, and extraction operations for selected constituents.

As stated in Resolution 68.16, in order to satisfy water quality objectives, the water quality standards of the subbasin must be maintained as closely to the background levels as possible. This is considered protective of groundwater's beneficial uses. The beneficial uses for the subbasin around Roseville are predominately municipal use with some agricultural use. Following the natural groundwater flow direction (downstream of the subbasin) going towards the edge of the basin, the only beneficial use is municipal supplies as the area has been urbanized and there are no agricultural uses. As a result, drinking water standards, developed by the California Department of Public Health and the US EPA, should be used as a protective measure for the water quality in the basin for the beneficial uses.

Water quality impacts were analyzed based on time and distance from proposed ASR well locations, at the City boundary, and at a distance down gradient of an injection well in October 2030 and October 2050 at five locations along the City boundary that are down gradient of an ASR well, and one location away from the influence of the ASR wells. Impacts to existing streams, creeks, irrigation wells and public supply wells were addressed for all constituents analyzed.

The results of the transport simulations were summarized for ten water quality parameters in this analysis, including: two regulated inorganic compounds, fluoride and nitrate (as NO_3), five unregulated inorganic compounds, chloride, hardness (total as $CaCO_3$), sodium, sulfate, and TDS, and DBPs, including Total THMs and Total HAAs, as well as chloroform. In general, the chloroform concentrations increased from approximately 28% (background) as part of Total THM to approximately 90% of the Total THMs. This increase in chloroform resembles the make up in injection water as it mixes with native groundwater.

Based on the results of the transport analyses, groundwater concentrations did not extend beyond the city limits for Scenario 2a or Scenario 2b for all of the water quality parameters analyzed. Nitrate, chloride, hardness, sodium, sulfate and TDS concentrations decreased as a result of the proposed ASR operations, improving the aesthetic quality of the water

The results of the transport simulations show that fluoride, Total THM, and Total HAAs reached the 20% available assimilative capacity of the background concentration beyond the city limits for Scenario 1a, Scenario 1b, Scenario 3a, and Scenario 3b down gradient of the Diamond Creek well, Hayden Parkway/West Park Drive wells, and the Oakmont well. As stated in the previous sections, both Scenarios 1a and 1b are for injection of treated drinking water into the ASR wells only, no extraction of the water is accounted for. This exercise is intended to show the worst case impacts to the groundwater aquifer based on the beneficial uses identified in the basin plan over a 50 year time period. Injection only operations has minimum probability of occurring as the City will be utilizing its surface water contracts at buildout and there is no need to expend City's limited resources to treat additional surface water for groundwater storage.

Between Scenarios 3a and 3b, the latter is more conservative in regards to more available water for injection. The highest level of concentrations for fluoride, Total THM, and Total HAAs are 0.53 mg/L, 25.57 µg/L, and 14.85 µg/L, respectively. At these levels, the values are far below the agricultural level for fluoride and the drinking water MCL levels for Total THM and Total HAAs. As stated previously with regards to fluoride, the areas for potential impact for fluoride have considered and/or approved by the governing body for urban development. The agricultural impact will be minimized. For Total HAAS, the groundwater modeling scenarios do not account for the natural degradation of Total HAAs in the groundwater system as observed in the City's previous pilot project. The actual impact from Total HAAs should be less than presented.

There are public supply wells and/or irrigation wells in Citrus Heights Water District and California American Water Company's Lincoln Oaks service area down gradient of the Oakmont well and Darling Street well where greater than 10% and 20% of the available assimilative capacity have been reached from project operations in the Turlock Lake Laguna Formation and Mehrten Formation. The elevated concentrations of fluoride, Total THMs, Total HAAs and chloroform do not pose a potential threat to existing public supply as they are below the drinking water MCL.

The remaining impacts from the proposed ASR operations do not constitute a threat to the protection of groundwater's beneficial uses in the area. Furthermore, there are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within all areas of impacted groundwater.

6. EVALUATION OF BEST PRACTICAL TREATMENT OR CONTROL AND SOCIO-ECONOMIC CONSIDERATIONS

The term "best practical treatment or control" (BPTC) appears in the State's antidegradation policy (Resolution No. 68-16):

> *"Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the state will be maintained."*

However, a review of federal and state laws, regulations, or polices does not direct effluent quality or treatment processes. Furthermore, BPTC refers to production and treatment of waste or of waste origins. The storage of treated drinking water in aquifers underground for later retrieval and use does not correspond to waste production or treatment.

Because:

1) City's treated drinking water meets all federal and state drinking water standards;
2) City's treated drinking water is considered to be soft and low in salinity which will help reduce the salinity of existing groundwater quality;
3) the current developed water supply will not be able to meet all of the future water demands from agricultural, urban, and environmental uses in dry years;
4) Department of Water Resources (DWR) cites groundwater storage as a primary means to develop additional water supply capability in the near term, second only to urban water use efficiency; and,
5) Legislature has declared that groundwater is a valuable resource (Senate Bill 1938, 2002) and should be managed to ensure its safe production and its quality, the public benefit resulting from storage of treated drinking water in underground aquifers, is an important consideration in this anti-degradation analysis.

6.1. Approach

As stated in APU 90-004, the following factors need to be considered in determining whether lowering water quality from a proposed project is necessary to accommodate economic or social development and is consistent with maximum public benefit.

- Economic costs and benefits of maintaining existing water quality;
- Feasibility of alternative control measures in reducing, eliminating; or compensating for negative impacts for the project; and,
- Balance of economic considerations with environmental benefit achieved by alternative control measures.

Water quality analysis identified two constituents, chloroform and fluoride, that may potentially lower water quality in the groundwater basin. This anti-degradation analysis will consider alternatives to reduce or remove chloroform and fluoride from injection water below the existing water quality criteria.

6.2. **Alternatives**

Four alternatives were considered that would reduce or remove chloroform and fluoride from entering into the groundwater aquifer from the City's injection of treated surface water. These alternatives are:

1) Onsite (well head) treatment to remove chloroform and fluoride prior to injection;
2) Separate pipeline using filtered but not disinfected water from WTP;
3) Upgrade WTP to UV or ozone disinfection system; and,
4) Eliminate fluoridation.

Each alternative was assessed for implementation feasibility and effectiveness to prevent low water quality.

6.2.1. Well head treatment to remove chloroform and fluoride

The onsite (well head) treatment alternative would entail installation of treatment facilities at ASR wells to remove chloroform and fluoride from the injection water. Treatment process to remove chloroform include aeration, adsorption to activated carbon based materials, ozonation, and membrane filtration. Treatment process to remove fluoride include membrane filtration and adsorption to alumina/aluminum based materials, clays and soils, calcium based minerals, synthetic compounds, and carbon based materials (Water Research Foundation, 2011). Based on EPA's information about fluoride in drinking water, it recommends distillation and reverse osmosis. Of the available options, only reverse osmosis would be an effective alternative due to the low concentrations of chloroform (less than 1.1 ug/L) and fluoride (less than 0.2 mg/L) that needed to be maintained in the injection water.

In 2008, the City investigated the cost for a RO system to treat groundwater for taste and aesthetic issues because some City customers expressed dissatisfaction with the groundwater's naturally "hard water" characteristics due to high TDS compare to treated surface water. The analysis is based on Diamond Creek Well with a production rate of 4 MGD. The estimated capital cost for RO treatment would be $37.2 million while the cost for annual operation and maintenance would be $3.9 million dollars a year.

Although the injection rate for all ASR wells would not be at such a high rate, the injection rate at any well site would most likely be at 1.2 MGD. However, there are over 13 wells proposed for this ASR project and the combined cost to include an RO treatment system at each well site could be over $100 million with an annual cost over $20 million. This cost does not include acquisition of land or right of way. Actual costs would be substantially higher when land acquisition and permitting costs are considered.

Treatment benefits provided would need removal efficiency to full offset even minimal water quality impacts due to increased discharge of chloroform and fluoride into the groundwater basin. However, the potential impacts from RO generating a significant level of concern due to energy demand and other interrelated impacts. Pollutants are concentrated in the waste streams and transferred to waste solids, air, and other media.

Based on the criteria set forth in APU 90-004, utilizing RO treatment to remove low concentrations of chloroform and fluoride has no benefits as existing water quality can be maintained through ASR injection operations and extractions. Furthermore, RO treatment does not reduce or eliminate the negative impacts from the project. In fact, it may create more impacts as disposal of RO wastes could contaminate other media and the cost of energy consumption (energy generation and carbon footprint) greatly exceed that of the proposed project.

6.2.2. Separate Pipelines

The Separate Pipelines Alternative would involve conveying filtered but not yet disinfected surface water directly from the Barton Road WTP via a different pipeline system to ASR wells for injection. Since disinfection residual is required by Surface Water Treatment Rule, this pipeline system would not be used as drinking water transmission line and would not be connected to the City's existing distribution system. Taking filtered water directly from the water treatment plant for injection to the ASR wells injection would eliminate the addition of disinfection byproducts and fluoride to the groundwater aquifer. The main transmission pipeline would be approximately 12 inches in size and would follow the existing water transmission lines, where applicable, or be in the existing right of way, to avoid additional cost of land and easement procurement. The pipeline would extend from the WTP in Granite Bay to the City via Barton Road to Roseville Parkway to Washington Blvd and then to Blue Oaks Blvd. From Blue Oaks Blvd, the main water line would split into smaller 6-inch diameter pipes to convey the water to different ASR wells for injection.

The cost to install a 6-inch pipeline is about \$60 per foot while installing a 12-inch pipeline is \$120 per foot. The pipeline routing described above would require a 12-inch water line from Barton Road WTP to Blue Oaks Blvd, approximately 11 miles and several 6-inch water lines from Blue Oaks Blvd to the ASR wells for injection. The total cost to construct the separate pipeline system would be about \$15 to \$20 million dollars. There would also be ongoing costs associated with maintaining the pipelines.

Water quality is the primary environmental impact of the Separate Pipeline Alternative in that the filtered surface water from Folsom Lake is not fully treated to meet existing drinking water standards. Without disinfection, bacteria, viruses, protozoa, and other potential harmful organisms would re-grow in the conveying pipelines systems and possibly the groundwater aquifer, causing bio-fouling. Since the groundwater aquifer is a source of water supply for the greater Sacramento and Placer county region, the California Department of Public Health would most likely not permit injection of filtered, but not disinfected, surface water into this water supply.

There are relatively few infrastructure improvements required to begin implementation of the ASR Program. The basic infrastructure is currently in place, including a treatment and distribution system that allows transmission of surface water from the source of supply at Folsom Lake to existing and planned ASR Wells. However, to construct a separate injection pipeline system to take filtered water for injection to all the ASR well sites, the start-up cost would increase considerably making the project financially impractical.

Because injecting partially treated surface water into the groundwater would potentially contaminate portions of the aquifer with surface water contaminants and, therefore, will not be allowed by CDPH.

6.2.3. WTP UV/Ozone Upgrade

Technologies to control DBPs include use alternative disinfection products/technologies or remove DBP precursors. Since the total organic carbon (TOC) levels in the City's WTP influent is low, normally between 1.0 mg/L – 1.5 mg/L, and treated effluent is less than 1.0 mg/L, DBP precursor removal would not be feasible. Other disinfectants such as chloramines and chlorine dioxides all produce DBPs which may have greater adverse health effects. To further reduce DBP formation, UV and/or ozone could be utilized as majority of the DBPs are formed when chlorine is added for disinfection.

The WTP UV/ozone upgrade entails disinfecting filtered water with UV or ozone to minimize the formation of disinfection byproducts including chloroform. The process would include demolishing existing chlorination equipment and replace them with UV reactors or ozone injectors. Similar to existing water treatment process, raw water from Folsom Lake would undergo coagulation, flocculation, sedimentation, and filtration unit process prior to reaching the disinfection process. Change out chlorine in the disinfection process with UV or ozone would minimize the creation of THMs.

As pointed out by USEPA (2006) and Singer (1999), UV and ozone systems do not carry a disinfection residual which is required by both federal and state surface water treatment rules. As such, a secondary disinfection product still needs to be used to ensure the integrity of the distribution system and UV and ozone cannot entirely replace chemical disinfectant. Since minor amounts of TOC are still present in the filtered water (<1.0 mg/L), the secondary chemical disinfectant, would continue to react with these natural organic material creating DBPs not naturally present in the groundwater system.

Similar to the separate pipeline alternative above, a disinfection system consists of UV or ozone without the addition of chlorination prior to introduction into the distribution system would not be approved by CDPH. With a secondary disinfectant that could maintain a residual, other DBPs would still be formed and would not meet the water quality goals established by the RWQCB.

With respect to APU 90-004, implementation of UV or ozone would not have a benefit in terms of reducing or eliminating chloroform, would be maintain existing water quality in the distribution system, and would not compensate for the impacts from the proposed project as chloroform would still be formed from secondary disinfectant.

6.2.4. Eliminate Fluoridation

Currently the City adds additional fluoride up to 0.7 mg/L to achieve optimal dental health. This level is below the current California drinking water standard of 2 m/L and federal standard of 4 mg/L. Fluoridation of public water system supplies has been implemented in the U.S. for more than 60 years as an acceptable practice of protecting public health. The last five Surgeons Generals and the Center for Disease Control and Prevention (CDC) support and encourage water fluoridation. California's fluoridated drinking water act, Assembly Bill (AB) 733, became law in 1995, authorizing water systems with 10,000 or more service connections to fluoridate once money from an outside source is provided. As a result, if financial assistance to add fluoride is available to a public water system then this must be incorporated into the water system permit will be an operating condition to include fluoride in the process.

The City has been fluoridating since the 1950's. When the new water treatment plant was designed and constructed in the later 1960's, the decision was made to continue this practice. Since the City has been fluoridating, the water system permit from CDPH contains the condition to continue to add fluoride. By discontinuing this addition, the City would be in violation of its permit and subject to penalties as a result.

The City also conducted a customer satisfaction survey in 2010. This statistical valid survey included 400 customers, proportionally representative of water customers in general. 81% of all respondents were aware the City fluoridates its drinking water and 84% felt that it is important that the water is fluoridated.

Since 1) fluoridation is seen to have a public health benefit based on socio-economic considerations by experts in the dental and public health professions, 2) fluoridation is mandated by the City's Public Water Supply Permit, 3) potential areas for agricultural impacts have submitted requests for development to commercial, industrial, and residential uses, and 4) agricultural supplies would not be impacted at the City's existing fluoridation levels, the effect of adding additional fluoride from the proposed ASR is consistent with maximum public benefit.

6.3. Benefits of Proposed Project

ASR project would allow excess surface water to be stored in the aquifer at a minimal expense and then retrieved later in time of need. This storage and retrieval system can be implemented and activated anytime during a prolonged drought, for short term emergencies, and for peak hour supplies. This program increases the City's water system's reliability with benefits to the City's customers as well as other water systems with interconnections to the City.

With much of the basin downstream of City of Roseville suffered from decades of continually declined groundwater levels, ASR project would allow the City to utilize stored injected water, rather than and prior to the native groundwater. Any excess storage would only flow towards known areas of depression with water qualities meeting the drinking water standards as well as other beneficial uses in the basin. Noting that the majority of the constituents being better than the existing groundwater constituents.

ASR is also a planning tool for California's increasing water crisis. Groundwater conjunctive use and ASR have been specifically pointed out in DWR's Bulletin 160, California Water Plan, as options for meeting future water needs in many areas including the Sacramento Region.

Table 6-1. Comparison of ASR Project Benefits

Benefits of ASR	Benefits to Roseville	Benefits to the Region and the State of California
Increase water reliability	✓	✓
Drought reserve	✓	✓
Seasonal storage of available space	✓	✓
Emergency system	✓	✓
Peak hour and maximum day flexibility	✓	
Increase yield of groundwater basin	✓	✓
Balance use and timing of surface water supply	✓	✓
Stabilize/Improvement of specific water quality problems	✓	✓
Avoid fishery/ecosystem impact		✓
Improvement of salt balance		✓

In addition to the benefits listed above, ASR can also be used for prevent and mitigate sea water intrusion and contaminate transport.

6.4. Environmental Considerations

With the City's proposed ASR project, it is anticipated that the concentrations of fluoride, Total THMs, and Total HAAs may increase above the background concentrations, it is anticipated that the effects would be localized. Concentrations over a 50 year groundwater modeling simulation indicate that the values are still significantly below the agricultural beneficial use or drinking water beneficial use guidelines and regulations. Moreover, many of the potential agricultural impact areas have requested and/or been approved for development into urbanized setting. ASR is another water reliability approach to ensure adequate water supply is available during varying demand situations. This offsets acquiring or developing other water resources which than can be used for other environmental purposes or downstream uses. Installation of advanced treatment systems designed to eliminate all incremental changes in the background water quality would be very costly, and would result in new environmental concerns associated with increased energy use, land use, waste disposal, and other environmental impacts.

6.5. Socioeconomic Considerations

With the increasing demand, variable weather conditions, legal requirements, and environmental constraints, California's water resources are facing series of management challenges. Countless efforts have been spent on developing conservation measures, operational improvements, infrastructure changes, and storage options to extend the limited water supplies. ASR is a groundwater storage option that has been implemented and sought out not only in California, but throughout the US and the world. ASR is a type of conjunctive use, which is part of the Water Forum Agreement and it saves water during times of plenty to reduce impacts on the American River during dry years.

To prevent an increase in the background concentrations of chloroform and fluoride by eliminating ASR projects as a water reliability strategy would have negative socioeconomic effects on the area and would not be in the best interest of the region or state, in light of the magnitude and effects of incremental changes to water quality in the groundwater basin. The storage capacity of the North American Basin is estimated by DWR at 4.9 million acre-feet while the capacity of Folsom dam is only 976,000 ac-feet, one fifth of volume of the underlying groundwater subbasin. With decades of continually declining groundwater levels and consider most, if not all, of the subbasin downstream of the City is used for municipal use, the City's proposed ASR project would improve the condition of the subbasin and be a welcoming water reliability practice for the water purveyors.

Statewide, Assembly Bill (AB) 1584, passed and chaptered in 1999, stated the Legislature's declaration that conjunctive management of surface water and groundwater is an effective way to improve water reliability in California. It also provided $200,000,000 for grant funds, known as Prop 13 grant, to fund feasibility studies, project design, and the construction of groundwater storage projects on a pilot or operational scale. The City's has received grant funds to construct ASR wells as part of the Prop 13 grant.

Senate Bill (SB) 1938, passed and chaptered in 2002, states:

> *The Legislature finds and declares the following:*

(a) Groundwater constitutes a major source of water for use by the state's citizens in many urban and rural areas. It is in the interest of those citizens, and of benefit to California's economy, that groundwater resources be protected and managed to optimize the available water supply.

(b) Protection and management include, but are not limited to, protection of recharge areas and source areas from contamination, protection of groundwater quality, artificial recharge, planned variation of pumping, and conjunctive management of both surface water and groundwater to optimize supplies.

In addition, the City's efforts in 2 rounds of test/pilot projects have also received assistance from DWR as an exemplary project of its kind in the region. DWR has also identified in the California Water Plan that ASR is a resource management strategy and should be developed and managed as part of the long term water supply process.

The declaration of the Legislature, passage of related bills, appropriation of grant funds, and endorsement by the CA Department of Water Resources showed that groundwater storage projects are the will of the people of California and bears the justification of socioeconomic considerations for ASR.

7. Evaluation

Based on the analysis above, injecting treated drinking water with DBPs and fluoride as part of an ASR project would not significantly degrade the groundwater or affect the beneficial uses of that groundwater.

Water quality impacts were analyzed based on time and distance from the proposed ASR well locations up to year 2050. Impacts to existing streams, creeks, irrigation wells and public supply wells were addressed for all constituents analyzed.

Based on the results of the transport analysis, groundwater concentrations observed increase concentration in DBPs and fluoride when injection of treated drinking water with no extraction. However, this would not be the City's operation of the proposed ASR project. This exercise is intended to show the worst case impacts to the groundwater aquifer based on the beneficial uses identified in the basin plan over a 50 year time period. Injection only operations has minimum probability of occurring as the City will be utilizing its surface water contracts at buildout and there is no need to expend City's limited resources to treat additional surface water for groundwater storage.

Based on the results of the transport analyses, groundwater concentrations did not extend beyond the city limits from annual injection and extraction operations (Scenario 2a or Scenario 2b) for all of the water quality parameters analyzed. Nitrate, chloride, hardness, sodium, sulfate and TDS concentrations decreased as a result of the proposed ASR operations, improving the aesthetic quality of the water

The results of the transport simulations show that fluoride, Total THM, and Total HAAs reached the 20% available assimilative capacity of the background concentration beyond the city limits for injection and extraction based on hydrologic water type (Scenario 3a and Scenario 3b). At these levels, the values are far below the agricultural level for fluoride and the drinking water MCL levels for Total THM and Total HAAs. For fluoride, the areas for potential impact for fluoride have considered and/or approved by the respective governing bodies for urban development. The agricultural impact will be minimized. For Total HAAs, the groundwater modeling scenarios do not account for the natural degradation of Total HAAs in the groundwater system as observed in the City's previous pilot project. The actual impact from Total HAAs should be less than presented. Both Total THMs and Total HAAs are well within the drinking water standards and do not pose a potential threat to existing public supply.

The remaining impacts from the proposed ASR operations do not constitute a threat to the protection of groundwater's beneficial uses in the area. In fact, constituents such as nitrate, TDS, chloride, sodium, and sulfate have positive effect on the groundwater quality. Furthermore, there are no known gaining streams, creeks, or rivers that rely on the underlying aquifer as a source of base flow within all areas of impacted groundwater.

Even though the Project's storage of treated drinking water may lead to lowering of groundwater quality with respect to DBPs and fluoride, the injected water is not expected to adversely affect any current and potential beneficial uses. A number of water quality parameters would improve within the storage zone. The additional benefits provided by the proposed project would significantly outweigh any potential impact that may or may not occur.

The proposed project would provide maximum benefit to the all people of the State, not just those within the City's service area. By storing surplus surface water during wet years and recovering the stored water during a drought, ASR will provide supplemental drought supply for the public.

8. References

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APPENDIX A

California Code of Regulations – Title 22
Drinking Water Maximum Contaminant Levels (MCLs)

MAXIMUM CONTAMINANT LEVELS AND REGULATORY DATES FOR DRINKING WATER
U.S. EPA VS CALIFORNIA
NOVEMBER 2008

Contaminant	U.S. EPA		California	
	MCL (mg/L)	Date[a]	MCL (mg/L)	Effective Date
Inorganics				
Aluminum	0.05 to 0.2[b]	1/91	1 0.2[b]	2/25/89 9/8/94
Antimony	0.006	7/92	0.006	9/8/94
Arsenic	0.05 0.010	eff: 6/24/77 eff: 1/23/06	0.05 0.010	77 11/28/08
Asbestos	7 MFL[c]	1/91	7 MFL[c]	9/8/94
Barium	1 2	eff: 6/24/77 1/91	1	77
Beryllium	0.004	7/92	0.004	9/8/94
Cadmium	0.010 0.005	eff: 6/24/77 1/91	0.010 0.005	77 9/8/94
Chromium	0.05 0.1	eff: 6/24/77 1/91	0.05	77
Copper	1.3[d]	6/91	1[b] 1.3[d]	77 12/11/95
Cyanide	0.2	7/92	0.2 0.15	9/8/94 6/12/03
Fluoride	4 2[b]	4/86 4/86	2	4/98
Lead	0.05[e] 0.015[d]	eff: 6/24/77 6/91	0.05[e] 0.015[d]	77 12/11/95
Mercury	0.002	eff: 6/24/77	0.002	77
Nickel	Remanded		0.1	9/8/94
Nitrate	(as N) 10	eff: 6/24/77	(as N03) 45	77
Nitrite (as N)	1	1/91	1	9/8/94
Total Nitrate/Nitrite (as N)	10	1/91	10	9/8/94
Perchlorate	-	-	0.006	10/18/07
Selenium	0.01 0.05	eff: 6/24/77 1/91	0.01 0.05	77 9/8/94
Thallium	0.002	7/92	0.002	9/8/94
Radionuclides				
Uranium	30 ug/L	12/7/00	20 pCi/L 20 pCi/L	1/1/89 6/11/06
Combined Radium - 226+228	5 pCi/L	eff: 6/24/77	5 pCi/L 5 pCi/L	77 6/11/06
Gross Alpha particle activity (excluding radon & uranium)	15 pCi/L	eff: 6/24/77	15 pCi/L 15 pCi/L	77 6/11/06
Gross Beta particle activity	4 millirem/yr	eff: 6/24/77	50 pCi/L[f] 4 millirem/yr	77 6/11/06
Strontium-90	8 pCi/L	eff: 6/24/77 now covered by Gross Beta	8 pCi/L[f] 8 pCi/L[f]	77 6/11/06
Tritium	20,000 pCi/L	eff: 6/24/77 now covered by Gross Beta	20,000 pCi/L[f] 20,000 pCi/L[f]	77 6/11/06

Contaminant	U.S. EPA		California	
	MCL (mg/L)	Date[a]	MCL (mg/L)	Effective Date
VOCS				
Benzene	0.005	6/87	0.001	2/25/89
Carbon Tetrachloride	0.005	6/87	0.0005	4/4/89
1,2-Dichlorobenzene	0.6	1/91	0.6	9/8/94
1,4-Dichlorobenzene	0.075	6/87	0.005	4/4/89
1,1-Dichloroethane	-	-	0.005	6/24/90
1,2-Dichloroethane	0.005	6/87	0.0005	4/4/89
1,1-Dichloroethylene	0.007	6/87	0.006	2/25/89
cis-1,2-Dichloroethylene	0.07	1/91	0.006	9/8/94
trans-1,2-Dichloroethylene	0.1	1/91	0.01	9/8/94
Dichloromethane	0.005	7/92	0.005	9/8/94
1,3-Dichloropropene	-	-	0.0005	2/25/89
1,2-Dichloropropane	0.005	1/91	0.005	6/24/90
Ethylbenzene	0.7	1/91	0.68 0.7 0.3	2/25/89 9/8/94 6/12/03
Methyl-tert-butyl ether (MTBE)	-	-	0.005[b] 0.013	1/7/99 5/17/00
Monochlorobenzene	0.1	1/91	0.03 0.07	2/25/89 9/8/94
Styrene	0.1	1/91	0.1	9/8/94
1,1,2,2-Tetrachloroethane	-	-	0.001	2/25/89
Tetrachloroethylene	0.005	1/91	0.005	5/89
Toluene	1	1/91	0.15	9/8/94
1,2,4 Trichlorobenzene	0.07	7/92	0.07 0.005	9/8/94 6/12/03
1,1,1-Trichloroethane	0.200	6/87	0.200	2/25/89
1,1,2-Trichloroethane	0.005	7/92	0.032 0.005	4/4/89 9/8/94
Trichloroethylene	0.005	6/87	0.005	2/25/89
Trichlorofluoromethane	-	-	0.15	6/24/90
1,1,2-Trichloro-1,2,2-Trifluoroethane	-	-	1.2	6/24/90
Vinyl chloride	0.002	6/87	0.0005	4/4/89
Xylenes	10	1/91	1.750	2/25/89

Contaminant	U.S. EPA		California	
	MCL (mg/L)	Date[a]	MCL (mg/L)	Effective Date
SOCS				
Alachlor	0.002	1/91	0.002	9/8/94
Atrazine	0.003	1/91	0.003 0.001	4/5/89 6/12/03
Bentazon	-	-	0.018	4/4/89
Benzo(a) Pyrene	0.0002	7/92	0.0002	9/8/94
Carbofuran	0.04	1/91	0.018	6/24/90
Chlordane	0.002	1/91	0.0001	6/24/90
Dalapon	0.2	7/92	0.2	9/8/94
Dibromochloropropane	0.0002	1/91	0.0001 0.0002	7/26/89 5/3/91
Di(2-ethylhexyl)adipate	0.4	7/92	0.4	9/8/94
Di(2-ethylhexyl)phthalate	0.006	7/92	0.004	6/24/90
2,4-D	0.1 0.07	eff: 6/24/77 1/91	0.1 0.07	77 9/8/94
Dinoseb	0.007	7/92	0.007	9/8/94
Diquat	0.02	7/92	0.02	9/8/94
Endothall	0.1	7/92	0.1	9/8/94
Endrin	0.0002 0.002	eff: 6/24/77 7/92	0.0002 0.002	77 9/8/94
Ethylene Dibromide	0.00005	1/91	0.00002 0.00005	2/25/89 9/8/94
Glyphosate	0.7	7/92	0.7	6/24/90
Heptachlor	0.0004	1/91	0.00001	6/24/90
Heptachlor Epoxide	0.0002	1/91	0.00001	6/24/90
Hexachlorobenzene	0.001	7/92	0.001	9/8/94
Hexachlorocyclopentadiene	0.05	7/92	0.05	9/8/94
Lindane	0.004 0.0002	eff: 6/24/77 1/91	0.004 0.0002	77 9/8/94
Methoxychlor	0.1 0.04	eff: 6/24/77 1/91	0.1 0.04 0.03	77 9/8/94 6/12/03
Molinate	-	-	0.02	4/4/89
Oxamyl	0.2	7/92	0.2 0.05	9/8/94 6/12/03
Pentachlorophenol	0.001	1/91	0.001	9/8/94
Picloram	0.5	7/92	0.5	9/8/94
Polychlorinated Biphenyls	0.0005	1/91	0.0005	9/8/94
Simazine	0.004	7/92	0.010 0.004	4/4/89 9/8/94
Thiobencarb	-	-	0.07 0.001[b]	4/4/89 4/4/89
Toxaphene	0.005 0.003	eff: 6/24/77 1/91	0.005 0.003	77 9/8/94
2,3,7,8-TCDD (Dioxin)	3×10^{-8}	7/92	3×10^{-8}	9/8/94
2,4,5-TP (Silvex)	0.01 0.05	eff: 6/24/77 1/91	0.01 0.05	77 9/8/94

Contaminant	U.S. EPA		California	
	MCL (mg/L)	Date[a]	MCL (mg/L)	Effective Date
Disinfection Byproducts				
Total Trihalomethanes	0.100 0.080	11/29/79 eff: 11/29/83 eff: 1/1/02 [g]	0.100 0.080	3/14/83 6/17/06
Haloacetic acids (five)	0.060	eff: 1/1/02 [g]	0.060	6/17/06
Bromate	0.010	eff: 1/1/02 [g]	0.010	6/17/06
Chlorite	1.0	eff: 1/1/02 [g]	1.0	6/17/06
Treatment Technique				
Acrylamide	TT[h]	1/91	TT[h]	9/8/94
Epichlorohydrin	TT[h]	1/91	TT[h]	9/8/94

a. "eff." indicates the date the MCL took effect; any other date provided indicates when USEPA established (i.e., published) the MCL.
b. Secondary MCL.
c. MFL = million fibers per liter, with fiber length > 10 microns.
d. Regulatory Action Level; if system exceeds, it must take certain actions such as additional monitoring, corrosion control studies and treatment, and for lead, a public education program; replaces MCL.
e. The MCL for lead was rescinded with the adoption of the regulatory action level described in footnote d.
f. Gross beta MCL is 4 millirem/year annual dose equivalent to the total body or any internal organ; Sr-90 MCL = 4 millirem/year to bone marrow; tritium MCL = 4 millirem/year to total body
g. Effective for surface water systems serving more than 10,000 people; effective for all others 1/1/04.
h. TT = treatment technique, because an MCL is not feasible.

California Code of Regulation
Title 22. Division 4. Environmental Health
Chapter 15. Domestic Water Quality and Monitoring Regulations

Article 16. Secondary Water Standards

(1) Amend Section 64449 as follows:

64449. Secondary Maximum Contaminant Levels and Compliance.

(a) The secondary MCLs shown in Tables 64449-A and 64449-B shall not be exceeded in the water supplied to the public by community water systems. ~~, because these constituents may adversely affect the taste, odor or appearance of drinking water.~~

Table 64449-A

Secondary Maximum Contaminant Levels

"Consumer Acceptance ~~Limits~~ Contaminant Levels"

Constituents	*Maximum Contaminant Levels/Units*
Aluminum	0.2 mg/L
Color	15 Units
Copper	1.0 mg/L
~~Corrosivity~~	~~Non-corrosive~~
Foaming Agents (MBAS)	0.5 mg/L
Iron	0.3 mg/L
Manganese	0.05 mg/L
Methyl-*tert*-butyl ether (MTBE)	0.005 mg/L
Odor—Threshold	3 Units
Silver	0.1 mg/L
Thiobencarb	0.001 mg/L
Turbidity	5 Units
Zinc	5.0 mg/L

Table 64449-B

Secondary Maximum Contaminant Levels –

"Consumer Acceptance Contaminant Level Ranges"

Constituent, Units	*Maximum Contaminant Level Ranges*		
	Recommended	*Upper*	*Short Term*
Total Dissolved Solids, mg/L	500	1,000	1,500
or			
Specific Conductance, ~~micromhos~~ μS/cm	900	1,600	2,200
Chloride, mg/L	250	500	600
Sulfate, mg/L	250	500	600

~~(b) The secondary MCLs listed in Table 64449-A shall not be exceeded in:~~

~~(1) New community water systems.~~

~~(2) New sources developed for existing community water systems.~~

~~(3) Existing community water systems.~~

~~(c) Community groundwater systems~~

(b) Each community water system shall monitor its groundwater sources or distribution system entry points representative of the effluent of source treatment every three years and its approved surface water ~~systems shall monitor~~ sources or distribution system entry points representative of the effluent of source treatment annually for the following:

(1) Secondary MCLs listed in Tables 64449-A and 64449-B; and

(2) Bicarbonate, carbonate, and hydroxide alkalinity, calcium, magnesium, sodium, pH, and total hardness.

(c) If the level of any constituent in Table 64449-A exceeds an MCL, the community water system shall proceed as follows:

(1) If monitoring quarterly, determine compliance by a running annual average of four quarterly samples;

(2) If monitoring less than quarterly, initiate quarterly monitoring and determine compliance on the basis of an average of the initial sample and the next three consecutive quarterly samples collected;

(3) If a violation has occurred (average of four consecutive quarterly samples exceeds an MCL), inform the Department when reporting pursuant to Section 64451;

(4) After one year of quarterly monitoring during which all the results are below the MCL and the results do not indicate any trend toward exceeding the MCL, the system may request the Department to allow a reduced monitoring frequency.

~~(d) In existing community water systems, if any MCL in Table 64449-A is exceeded, the water supplier may be required, following an investigation by the Department, to conduct a study.~~

~~(1) The investigation by the Department shall determine the extent of:~~

~~(A) Noncompliance with the MCLs.~~

~~(B) Consumer dissatisfaction which is based upon the secondary drinking water standards.~~

~~(2) The study conducted by the water supplier shall:~~

~~(A) Be conducted in a manner and in accordance with a schedule~~

~~acceptable to the Department and be completed in a period of time not to exceed one year.~~

~~(B) Be made by persons acceptable to the Department.~~

~~(C) Determine the degree of consumer acceptance of the water supply.~~

~~(D) Investigate the causes and methods of correction, and estimate the cost of one or more alternative solutions.~~

~~(3) The results of the study conducted by the water supplier shall be made available to the:~~

~~(A) Users at an appropriately noticed public meeting.~~

~~(B) Department.~~

~~(C) Public Utilities Commission, if appropriate.~~

~~(e) The requirements of (b)(2) and (3) may be waived by the Department following the completion of an investigation as required in (d) based upon, but not necessarily limited to:~~

~~(1) Consumer acceptance of water not meeting the MCLs shown in Table 64449-A.~~

~~(2) Economic considerations.~~

(d ~~f~~) For the constituents shown on Table 64449-B, no fixed consumer acceptance contaminant level has been established.

(1) Constituent concentrations lower than the Recommended contaminant level are desirable for a higher degree of consumer acceptance.

(2) Constituent concentrations ranging to the Upper contaminant level are acceptable if it is neither reasonable nor feasible to provide more suitable

waters.

(3) Constituent concentrations ranging to the short term contaminant level are acceptable only for existing community water systems on a temporary basis pending construction of treatment facilities or development of acceptable new water sources.

(e ~~g~~) New services from community water systems serving water which carries constituent concentrations between the Upper and Short Term contaminant levels shall be approved only:

(1) If adequate progress is being demonstrated toward providing water of improved mineral quality.

(2) For other compelling reasons approved by the Department.

(f ~~h~~) A community water system may apply to the Department for a waiver from the monitoring frequencies specified in ~~paragraph~~ subsection (b ~~c~~) ~~of this section~~, if the system has conducted at least three rounds of monitoring (three periods for groundwater sources or three years for approved surface water sources) and these analytical results are less than the MCLs. The water system shall specify the basis for its request. A system with a waiver shall collect a minimum of one sample per source while the waiver is in effect and the term of the waiver shall not exceed one compliance cycle (i.e., nine years).

(g ~~i~~) Nontransient-noncommunity and transient-noncommunity water systems shall monitor their sources or distribution system entry points representative of the effluent of source treatment for bicarbonate, carbonate, and hydroxide alkalinity, calcium, iron, magnesium, manganese, pH, specific conductance, sodium, and total hardness at least once. In addition, nontransient-noncommunity water systems shall monitor for the constituents in Tables 64449-A and B at least once. ~~, as follows~~:

~~(1) All systems shall monitor all sources at least once.~~

~~(2) Surface water sources for parks and other facilities with an average daily population use of more than 1000 people and/or which are determined to be subject to potential contamination based on a sanitary survey shall be monitored at the same frequency as community water systems.~~

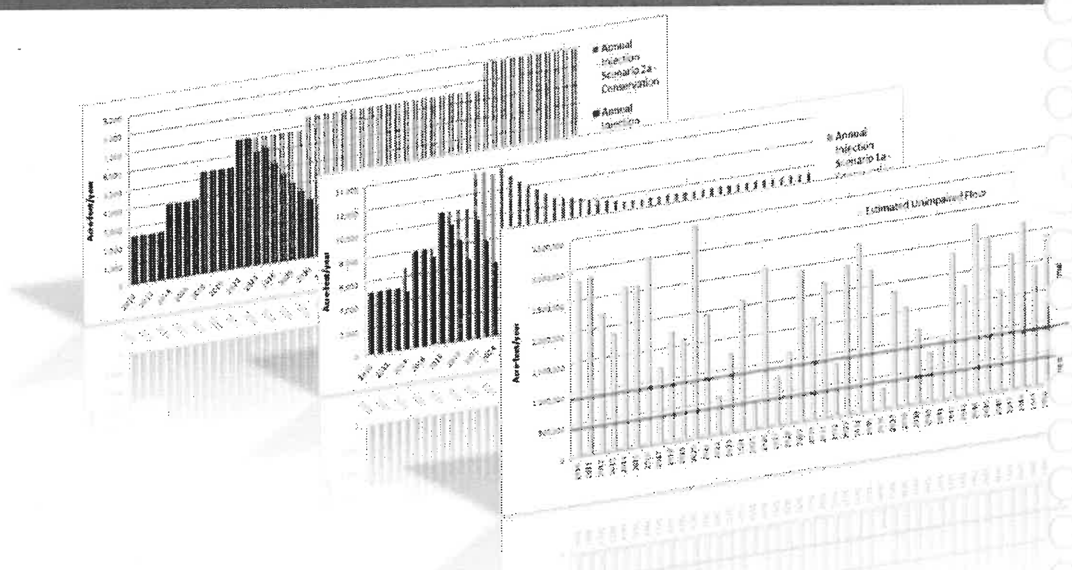
NOTE: Authority cited: Sections 100275 and 116375, Health and Safety Code. Reference: Sections 116385, 116555, and 116610, Health and Safety Code.

APPENDIX B

Technical Memorandum for Development of an Excel-Based Solution for Generating Pumping Files for ASR Transport Scenarios, July 2011

July 2011

Development of an Excel-Based Solution for Generating Pumping Files for ASR Transport Scenarios



HEATWAVEDATA

HEATWAVEDATA

22 July 2011

DELIVERED BY E-MAIL

Derrick Whitehead
Director of Environmental Utilities
City of Roseville
DWhitehead@roseville.ca.us

Cathy Lee
Project Manager
City of Roseville
CLee@roseville.ca.us

RE: TECHNICAL MEMORANDUM DESCRIBING AN EXCEL-BASED SOLUTION FOR GENERATING PUMPING FILES FOR THE ASR TRANSPORT SCENARIOS

Dear Derrick,

Thank you for this opportunity. Please feel free to contact me with any questions or if you need additional information.

Regards,

Michelle Smilowitz

Michelle Smilowitz

Executive Vice President, Heatwave Data

Attachment

TABLE OF CONTENTS

FIGURES

TABLES

1. INTRODUCTION

Heatwave Data was retained by the City of Roseville's Environmental Utilities Department to develop pumping files for groundwater modeling efforts for the Aquifer Storage and Recovery (ASR) work that was completed using the Sacramento Regional Model (SRM). Under a separate contract through Aquaveo, LLC, the SRM was used to assess the impacts of injecting treated drinking water to the underlying aquifer system and to determine the movement of treated drinking water during injection, storage, and extraction operations for selected constituents. The purpose of this technical memorandum is to present the process used to develop pumping data for the groundwater model. Information relating to the development and calibration of the SRM is provided in the *Sacramento Regional Model Groundwater Modeling Report*, dated 17 August 2010 (Aquaveo. 2010). Information relating to the results, conclusions and recommendations from the ASR modeling efforts is presented in Section 5.0 of the *Antidegradation Analysis for Aquifer Storage and Recovery*.

2. PREDICTIVE ANALYSES

A total of six predictive simulations were developed using three potential ASR operational scenarios, including ASR operations that apply injection only, injection/extraction in the same year, and injection/extraction based on hydrogeologic cycle. The simulation period for each analysis ran from October 2006 through September 2050. Each of the three scenarios was simulated with or without conservation measures in place. The significance of whether conservation measures were in place relates to projected demand, which has a direct impact on the amount of water that can be used for injection and/or extraction operations.

Predictive scenarios with conservation include urban water demand estimates that incorporate reductions in per capita demand (i.e. the amount of water usage per person) for municipalities. The reductions in per capita demand correspond to the proposed 2009 Water Conservation Act introduced by Senator Steinberg which sets a goal of reducing per capita urban water use by 20% by December 31, 2020, with an intermediate goal of reducing per capita water use by at least 10% by December 31, 2015. Conservation measures for calculating irrigation demand estimates were guided by proposed goals of achieving incremental progress towards a 5% reduction in irrigation demands by

December 31, 2030, achieved from improvements in irrigation efficiencies, in accordance with the Sacramento Regional Water Master Plan (Aquaveo. 2010).

Predictive scenarios without conservation measures in place assume per capita demand remains constant at 2006 levels and improvements in irrigations efficiencies have not been achieved.

Model nomenclatures for the six predictive simulations are as follows:

- Scenario 1a: Injection only (with conservation)
- Scenario 1b: Injection only (without conservation)
- Scenario 2a: Injection and extraction within the same year (with conservation)
- Scenario 2b: Injection and extraction within the same year (without conservation)
- Scenario 3a: Injection and extraction based on hydrologic water year type (with conservation)
- Scenario 3b: Injection and extraction based on hydrologic water year type (without conservation)

The first set of ASR operational scenarios (Scenario 1a and Scenario 1b) involved injection only. Injection wells were run at maximum capacity until the available water supply was depleted. The available water supply for injection was established based upon the available treatment plant capacity (100 million gallons per day), minus projected water demand.

The second set of ASR operational scenarios (Scenario 2a and Scenario 2b) include both injection and extraction activities within the same year. Each year, injection was allowed from January through June, capturing times of high precipitation and snowmelt. Extraction began in August and continued until the total amount of extracted groundwater was equal to the total amount of injected water each year. Both injection and extraction rates were limited by either available capacity or water supply.

The third set of ASR operational scenarios (Scenario 3a and Scenario 3b) was established to represent potential ASR operations based upon three hydrologic water year types: a wet/normal water year, a drier water year, and a critical (driest) water year. The water year classifications impact both the available supply and the restrictions on injection or extraction.

3. APPROACH AND METHODOLOGY

The approach for developing the pumping data for the ASR scenarios can be summarized in six steps.

1. Calculate water supply based on water contracts with the United States Bureau of Reclamation (USBR) and Placer County Water Agency (PCWA) and normalized annual plant capacity;
2. Calculate water usage based on population projections, water unit demand factors and per capita demand levels;
3. Calculate available water for injection and extraction based on supply and demand;
4. Calculate available well capacity, based upon the expected construction date provided by the City;
5. Develop pumping schedules based on available water and well capacity and distribute pumping to the ASR well network; and
6. Export pumping data to a GMS-formatted text file.

The methodology and approach for each step is summarized in this section.

3.1. Water Supply

The City's primary drinking water supply comes from Folsom Reservoir through two sources: water secured to the City in a contract with the USBR for the Central Valley Project, and water secured from purchased water rights from the PCWA (**Figure 3-1**).

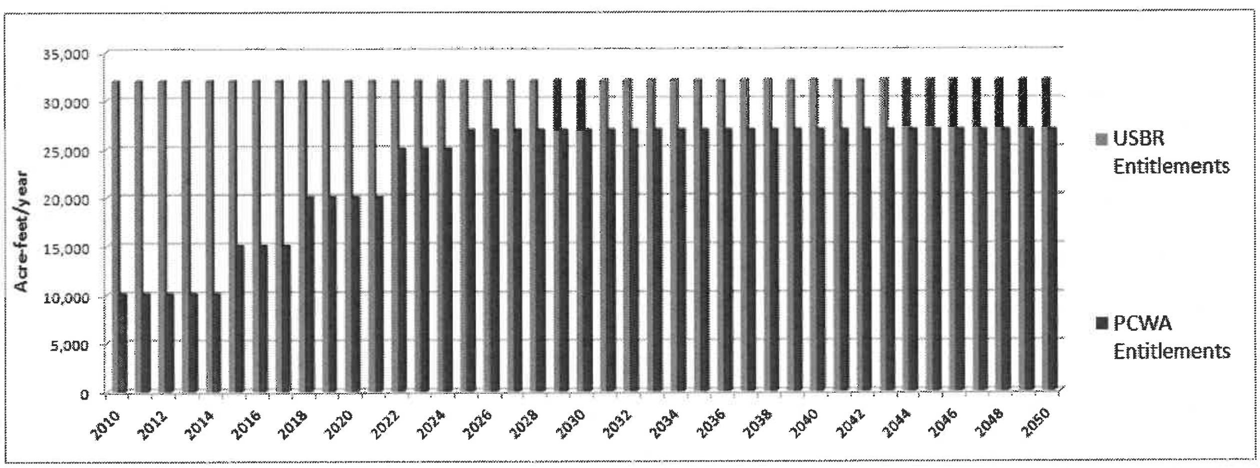


Figure 3-1. Contract Entitlements Secured by the City of Roseville

The City of Roseville has agreed to limit its surface water supply to 54,900 ac-ft/yr in 2030, consistent with Sacramento Area Water Forum and the city's current General Plan build out demand (Aquaveo. 2010).

The first two sets of ASR operational scenarios involving injection and injection/extraction within the same year assume that there are no restrictions on water contract entitlements. The third set of ASR operational scenarios account for cutbacks in water supply contracts based on the hydrologic water year classification. During a wet/normal water year, there were no limitations on water supply contracts. For drier water years, a 25% reduction in the USBR entitlements was applied. For critical years, total contract entitlements for the City were capped at 38,900 ac-ft/yr.

A second factor that impacts the available supply is the treatment plant capacity. The treatment plant capacity was maintained at 100 million gallons per day (mgd). A monthly conversion factor was applied to convert the annual capacity to monthly capacity based on 2007 operations (**Figure 3-2**).

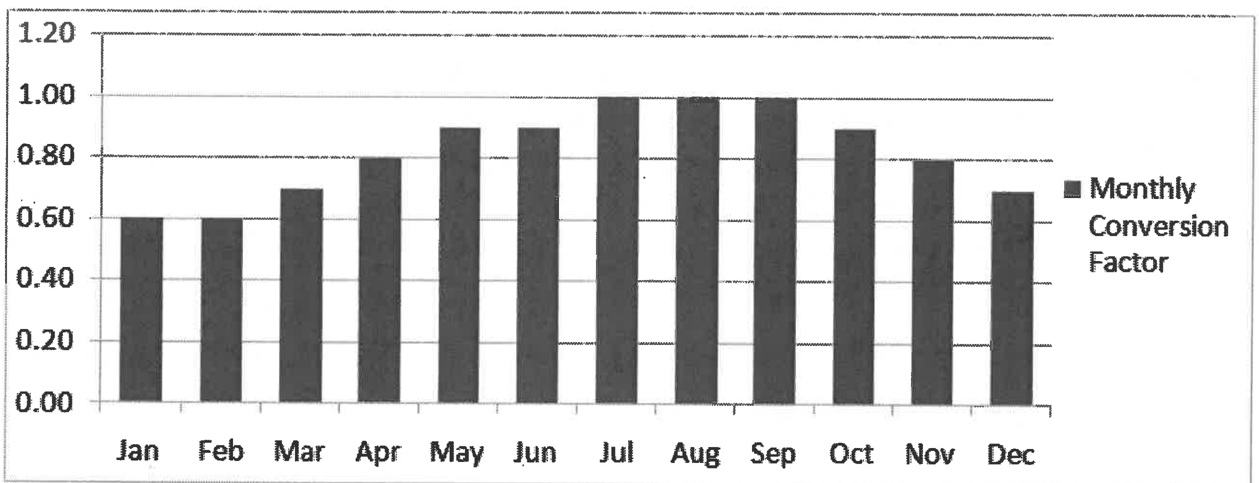


Figure 3-2. Treatment Plant Capacity Monthly Conversion Factor

3.1.1. Water Year Classifications

Water year classifications add a temporal element to water demand to account for changes in meteorological conditions over time. Typically, hotter and drier years tend to exhibit higher rates of evapotranspiration (ET) which increases the amount of water needed to satisfy the demand of a particular land use. Wetter, more humid years generally have lower ET rates and require less water to satisfy the water demand than during warmer, more arid seasons.

The water year classifications are defined based upon the amount of unimpaired flow coming from the American River from March through November of each year. Unimpaired flow is a term used to describe the natural flow of a river without anthropogenic influences such as regulations, diversions, or artificial recharge. Annual unimpaired flow above 950,000 acre-feet per year is considered a normal/wet year (Type 1). Annual unimpaired flow below 400,000 acre-feet per year is considered critical (driest) (Type 3). Unimpaired flow between those two spectrums is considered a drier water year (Type 2).

In order to develop an unbiased method of predicting water year types for the predictive simulation period for the third set of ASR operational scenarios, a random number generator was applied to create random water year classifications that were normally distributed, consistent with the historical trend of unimpaired flow from the American River for the period of record (101 years). The random number generator is setup in the spreadsheet to calculate an infinite number of random water year classifications for the predictive simulation period by simply selecting F9 in the Microsoft Excel spreadsheet, which updates the embedded calculations.

The distribution and frequency of unimpaired flow based on the first set of random numbers generated is shown in **Figure 3-3**.

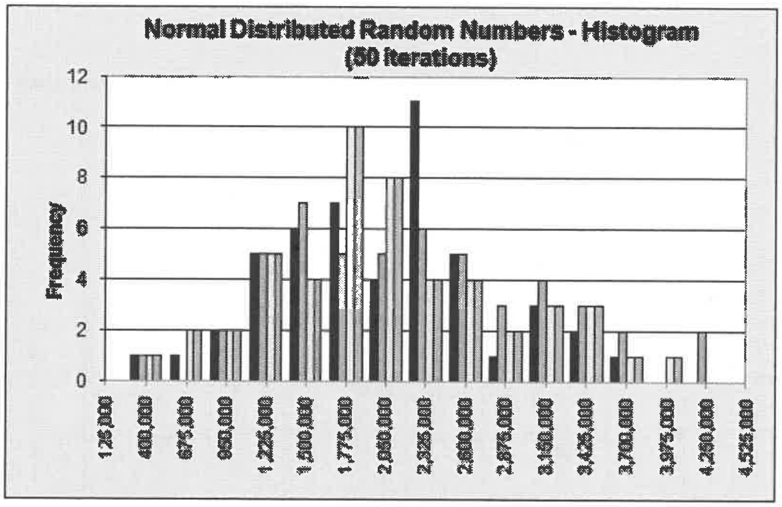


Figure 3-3. Distribution of Unimpaired Flow for Scenario 3a and Scenario 3b

The percentage distribution for the simulated results using the random number generator is consistent with the observed distributions using the last 101 years of record for the American River (**Figure 3-4**).

Water Year	Observed	Simulated
Type 1	86.0%	90.0%
Type 2	12.1%	6.0%
Type 3	1.9%	4.0%

Figure 3-4. Observed and Projected Water Year Type Distribution

The simulated results using the first set of random numbers generated for unimpaired flow and the available water supply from the American River are provided in **Figure 3-5** and **Figure 3-6.**

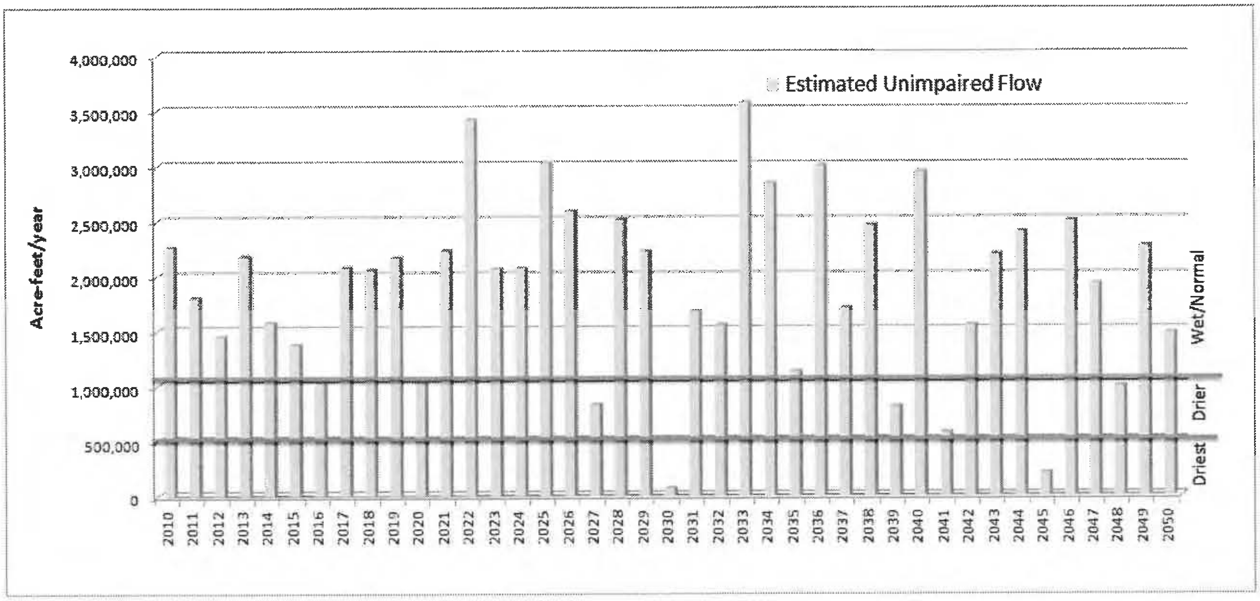


Figure 3-5. Unimpaired Flow and Water Year Classifications - Scenario 3

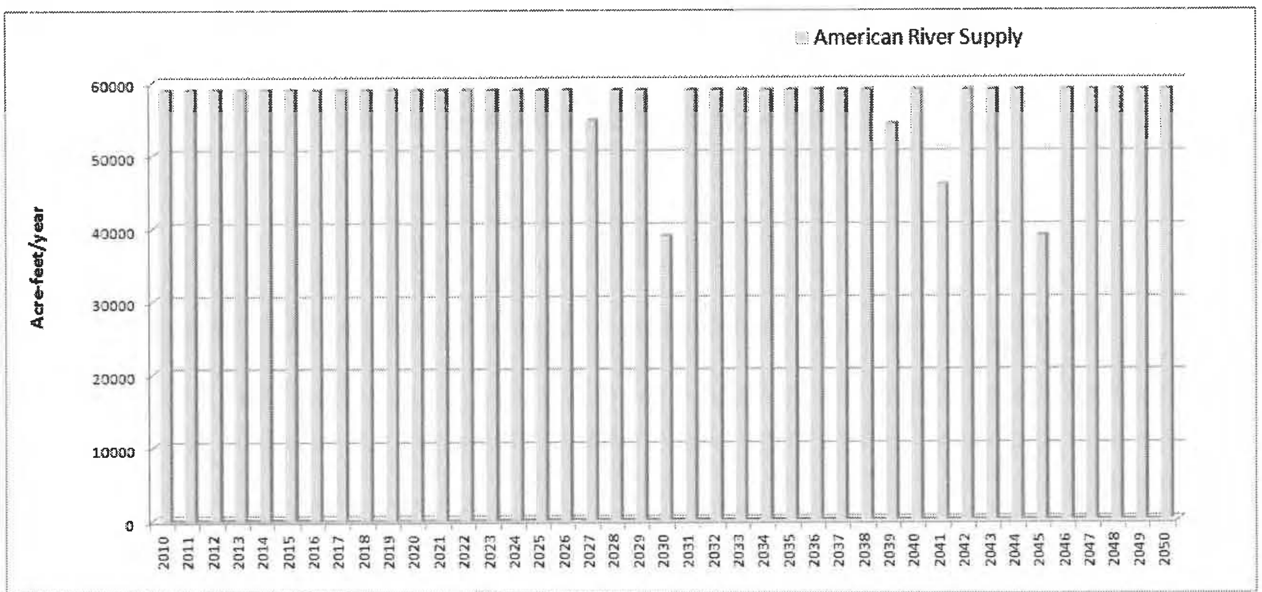


Figure 3-6. American River Supply – Scenario 3

Using the approach described in this section, total water supply was generated. The second step in calculating pumping data involves calculating water usage (total demand) based on population projections, water unit demand factors and per capita demand levels.

3.2. Demand Calculations

Total demand projections are calculated by multiplying the estimated population by the per capita demand. One set of demand estimates represent scenarios with conservation measures in place and another set of demand estimates assume conservation measures have not been adopted. Population estimates were derived from the estimated number o f dwelling units for three land use categories (single family, multi-family, and non-residential) based on the City's General Build-Out Plan. After the number of dwelling units was established, a water unit demand factor specific to the land unit category was multiplied to the total number of dwelling units to come up with total water usage for each land use classification. Water unit demand factors represent the amount of water usage per dwelling unit and are reported in gallons per day per dwelling unit (gpd/DU). The water unit demand factors for SFRUs, MFRUs, and NRUs are 600 gpd/DU, 177 gpd/DU, and 0.24 gpd/DU, respectively. Total water usage was then multiplied by a per capita water usage factor to project total demand for the years 2010 through 2050.

3.2.1. Population Projections for the City of Roseville

Population projections for the City of Roseville were developed by Derrick Whitehead, Director of the Environmental Utilities Department. The methodology used to estimate these projections involved projecting the total single family residential units (SFRUs), multi-family residential units (MFRUs), and non-residential units (agricultural lands) (NRUs) based on the City's General Build-out Plan (**Figure 3-7**).

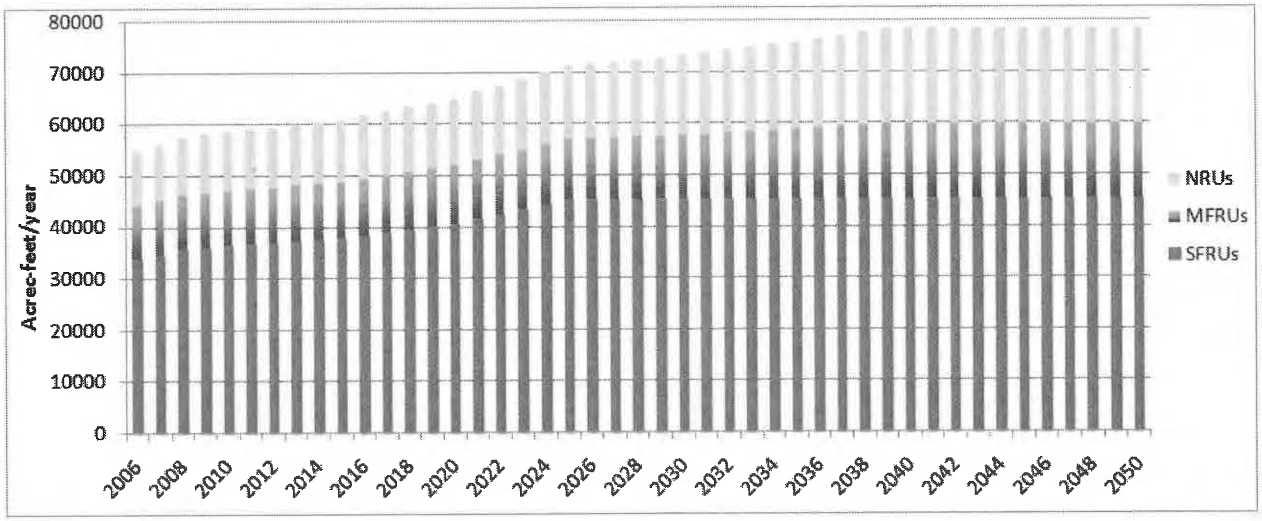


Figure 3-7. Total Projected Dwelling Units for the City of Roseville

Prospective developments including Sierra Vista, WRSP Rezone Areas, Amaroso Ranch (Brookfield) and Westbrook were incorporated into the projections. Population projections for 2006 through 2010 were based on real data.

3.2.2. Per Capita Demand

Per capita demand is reported in units of gallons per day per capita (gpd/capita). Per capita demand for scenarios with conservation and without conservation measures adopted is provided in **Figure 3-8**. Real data was used for 2005-2010.

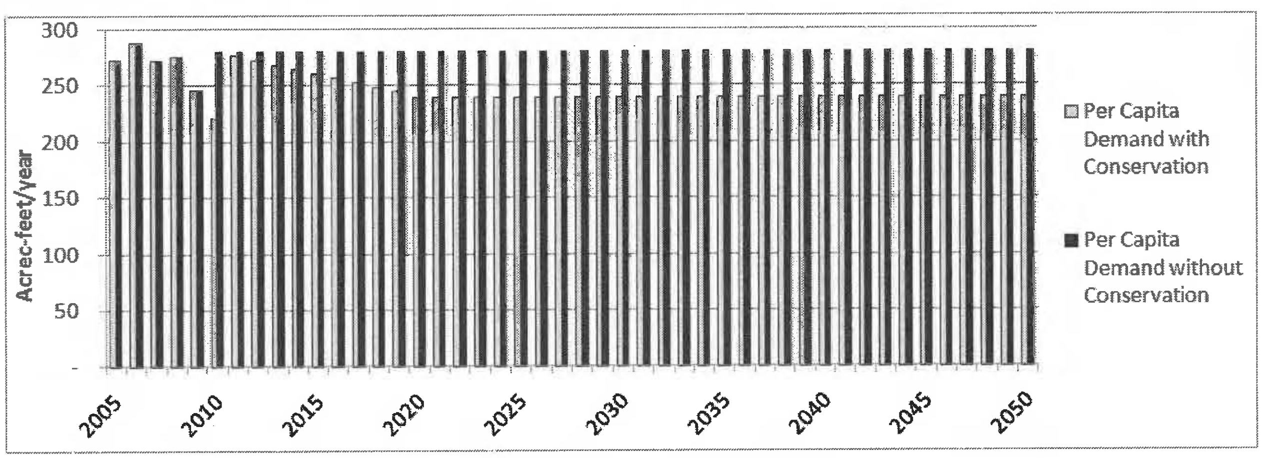


Figure 3-8. Per Capita Demand

3.2.3. Total Demand Projections

Total demand projections for the City of Roseville using the methodology described in **Section 3.2** is presented in **Figure 3-9**.

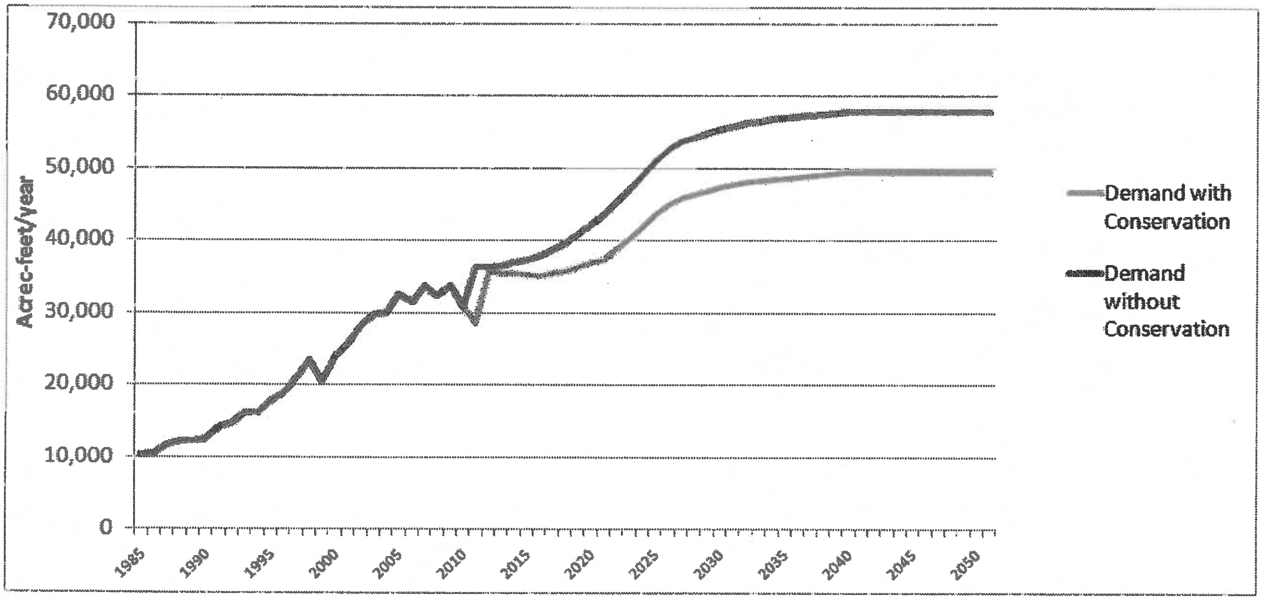


Figure 3-9. Total Demand Projections

Total demand constitutes the amount of water necessary to satisfy the agricultural, industrial, municipal and private water demands for the City of Roseville. In order to satisfy that demand, the City of Roseville depends on its surface water entitlements. If the surface water supply is inadequate, the City will typically enforce water restrictions to decrease the demand and/or supplement using groundwater extraction. Water demand restrictions were established on a two-tiered system. A 10% restriction in water demand was first applied to decrease the amount of resources required by its residents. If 10% reduction in water usage was not adequate, a 20% reduction in water usage was mandatory. For these years, if water restrictions were in place, the City will not inject water for ASR operations. However, supply minus demand does not constitute available water. Available well capacity is also critical in understanding the amount of water that is available for injection or extraction needs.

3.1. Well Capacity for Injection and Extraction

Figure 3-10 shows the locations of the ASR well network and the designated Well ID used in the numerical model for this analysis (shown in parentheses).

Figure 3-10. City of Roseville ASR Well Network Locations

A summary of the well construction dates and well capacity for each well in the ASR well network is provided in **Table 3-1**.

Construction Date	Well Number	Name	Injection Rate (gpm)	Extraction Rate (gpm)
1947	1	Atlantic Street	0	600
1958	3	Darling Street	400	800
1978	5	Oakmont	600	1,200
2001	6	Diamond Creek	1,250	2,500
2008	7	Woodcreek North	900	1,800
2014	8	WRSP Hayden Parkway	900	1,800
2014	9	West Side Park Dr - 1	900	1,800
2018	11	Hewlett Packard	900	0
2018	12	Fiddyment	900	1,800
2022	13	SVSP - 1 (West Sierra Vista)	900	1,800
2022	14	SVSP - 2 (East Sierra Vista)	900	1,800
2030	17	Creekview Well	900	1,800
2050	15	Woodcreek West	900	1,800
2050	16	Del Webb	900	1,800

Table 3-1. City of Roseville ASR Well Network

Available well capacity was often the limiting factor for the ASR operations. This information is very useful to the City of Roseville water managers and may be used to advance well construction dates so there can be sufficient well capacity to deliver the available water to its residents. For purposes of model simulations, the information provided in **Table 3-1** was relied upon for ASR modeling analyses.

3.2. Estimating Available Water for Injection and Extraction

Supply, demand, and well capacity are the three components that are used to calculate the amount of water available for injection and/or extraction purposes. Each set of ASR scenarios required available water to be calculated independently.

The water available for injection only is dependent on supply, demand and well capacity. The water available for injection and extraction scenarios is limited by the number of months available for injection (6 months), since total extraction is equal to total injection. The available water for injection and extraction based on hydrologic water year type is dependent on water year classification and the restrictions described in **Section 3.1** and **Section 3.2.2**.

3.3. Distributing Pumping to ASR Well Network

Pumping schedules represent the amount of injection and extraction that will be used for the ASR modeling scenarios and was calculated using the amount of water that is available for injection or extraction purposes and then distributed equally to wells assuming that each well was pumping at maximum capacity. For months where total well capacity exceeded available supply, a factor was applied equally to all of the wells. The factor was a percentage of the total available supply to the available well capacity.

3.4. Export Modeling Files

The last task for this effort was to provide for the City a formatted text file that can be automatically read into the SRM. The spreadsheet contains six tabs that contain the pumping information for each model simulation. The well ID, date, time, and flow rate was provided for each well from October 2006 through October 2050. The flow rate was converted to modeling units which are units of cubic feet per day. A button at the top of each page can be selected to automate the exportation of the information based upon the latest version of the spreadsheet into a text file formatted for the SRM or the user can go to a supplemental worksheet that provides that raw text-formatted information.

Using the information provided in **Section 3**, the methodology and tools available to generate pumping files was complete. **Section 4** presents the results generated from the Microsoft-Excel-based solution.

4. RESULTS

Fortunately, the City of Roseville typically can satisfy the water demand of its residents through surface water entitlements, with sufficient surplus in supply to provide water available for ASR operations. Conservation measures increase the amount of water available for injection, but for years where the supply is dependent on water year type, sometime the City will need to extract water from the underlying aquifer to supplement any deficiencies if restrictions on water usage are not adequate, as described in **Section 3.2.2.**

The conservative and projected demand with the amount available for injection for Scenario 1 and Scenario 2 is provided in **Figure 4-1** and **Figure 4-2**.

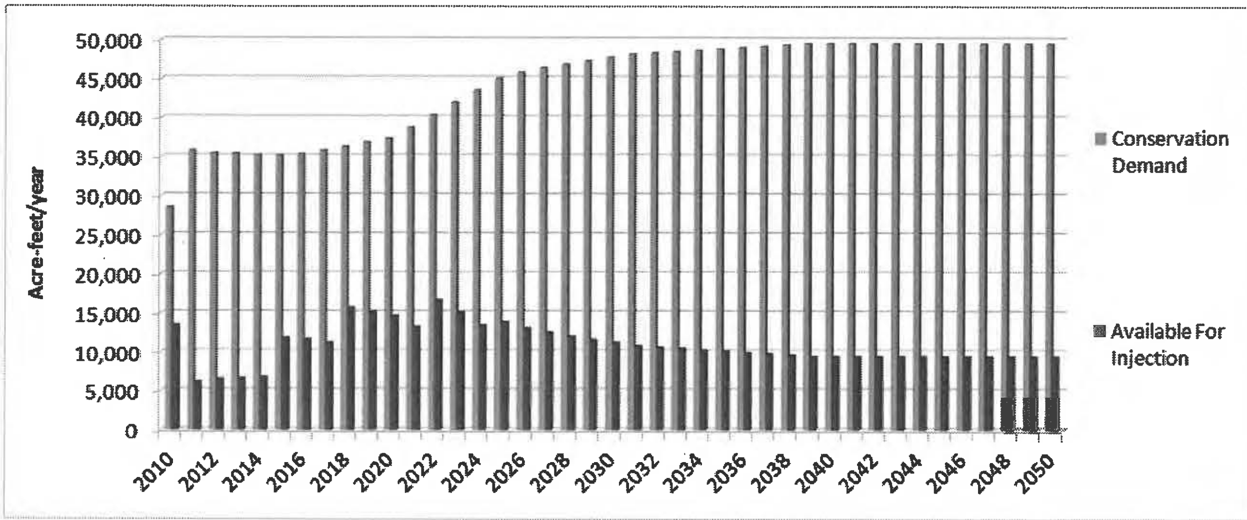


Figure 4-1. Conservation Demand and Water Available for Injection

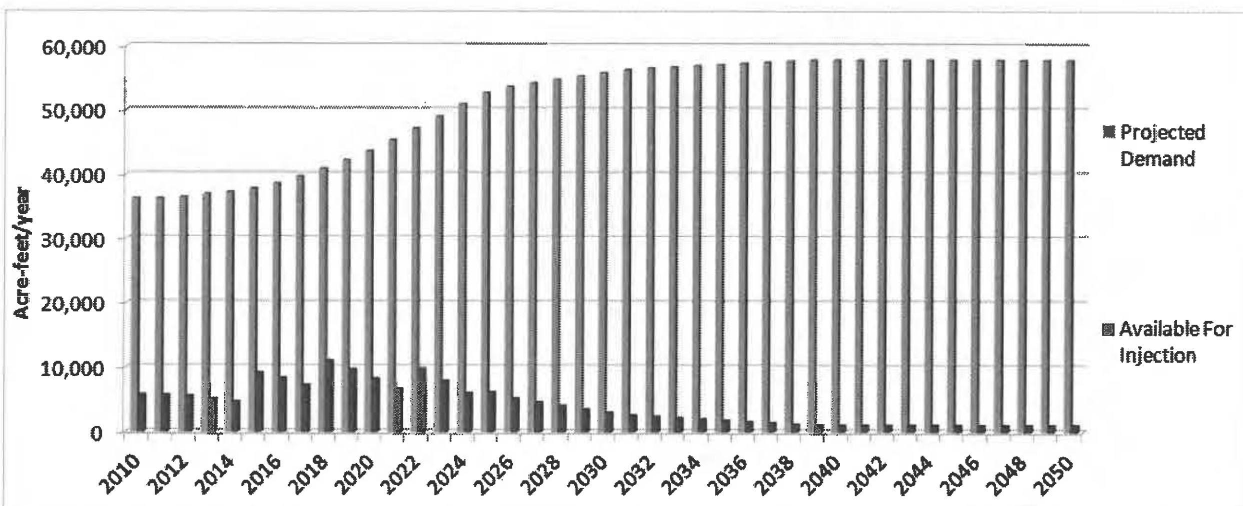


Figure 4-2. Projected Demand and Water Available for Injection

The conservative and projected demand with the amount available for injection for Scenario 3 is provided in **Figure 4-3** and **Figure 4-4**.

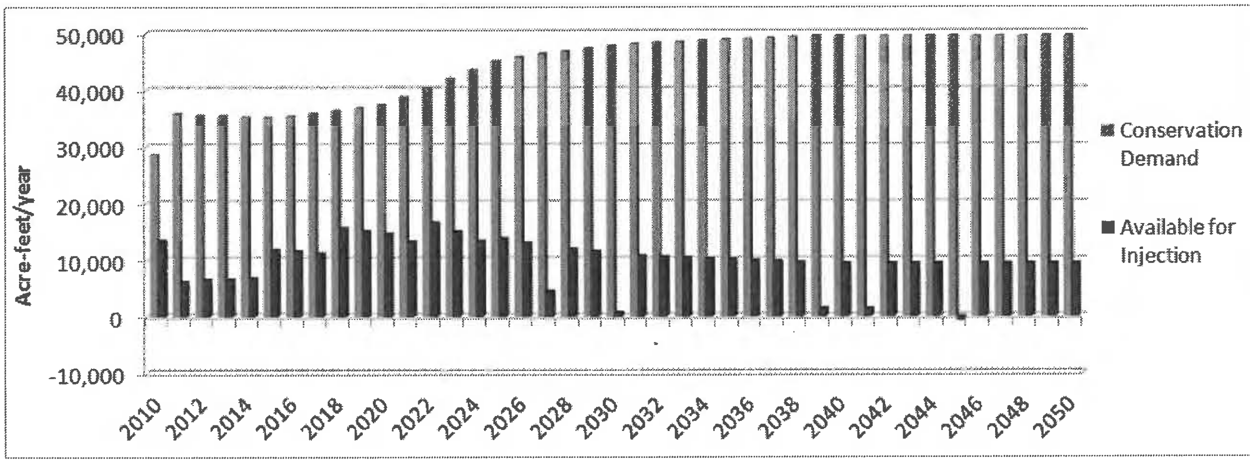


Figure 4-3. Conservation Demand and Water Available for Injection – Scenario 3a

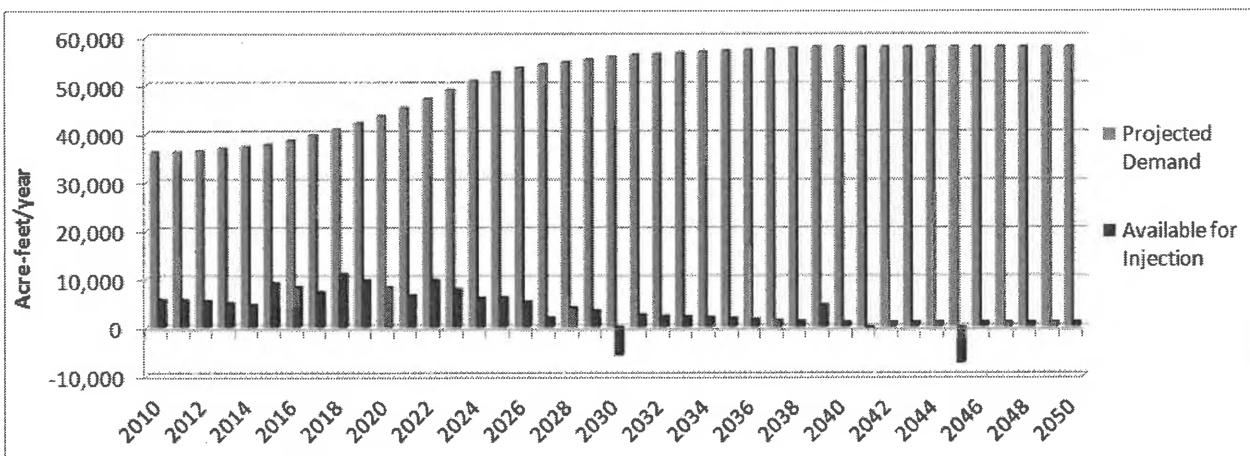


Figure 4-4. Projected Demand and Water Available for Injection – Scenario 3b

Annual injection for Scenario 1a and Scenario 1b is provided in **Figure 4-5.**

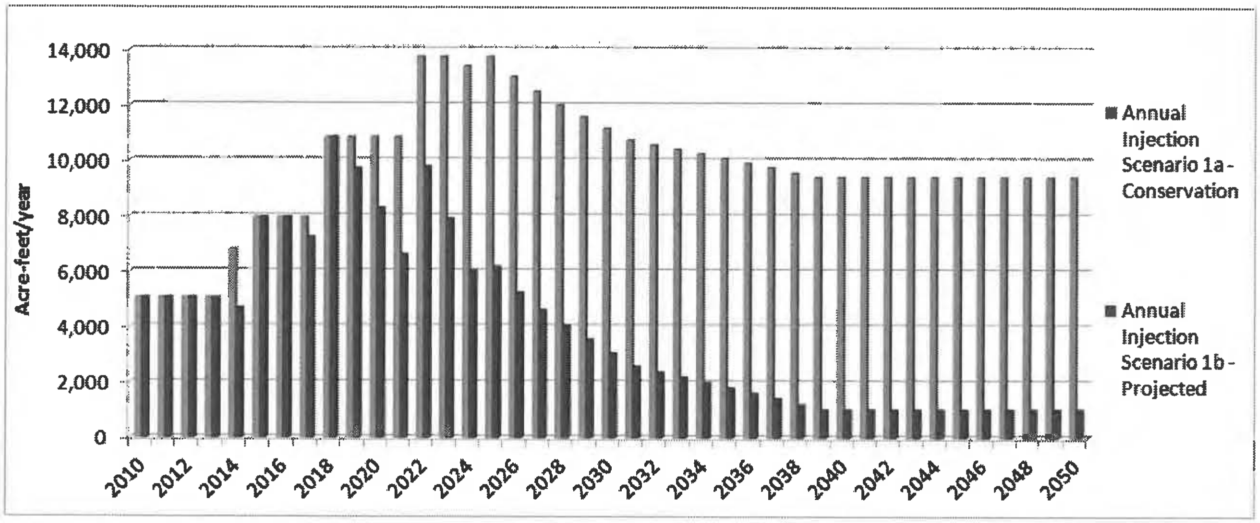


Figure 4-5. Annual Injection for Scenario1a and Scenario 1b

Annual injection and extraction for Scenario 2a and Scenario2b is provided in **Figure 4-6.**

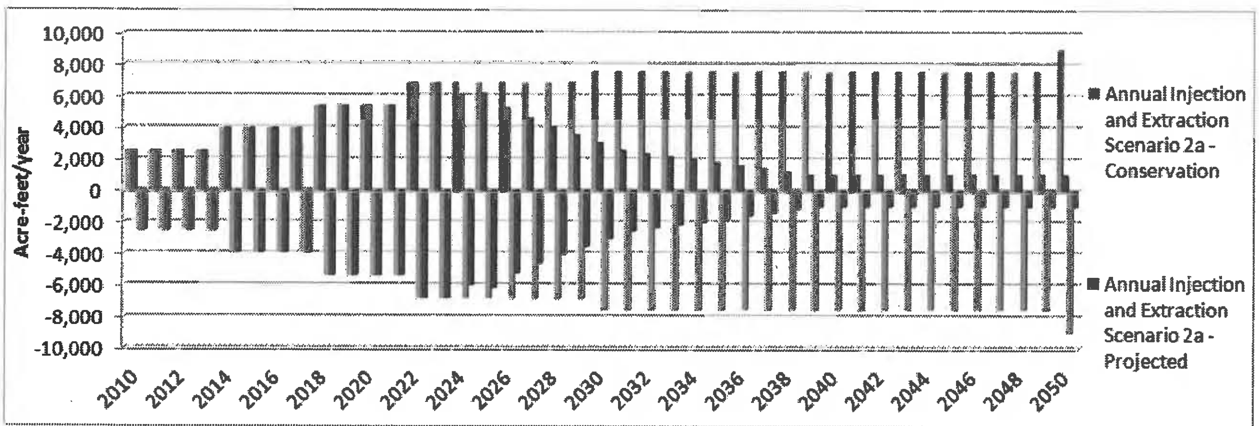


Figure 4-6. Annual Injection and Extraction for Scenario2a and Scenario 2b

Annual injection and extraction for Scenario 3a and Scenario3b is provided in **Figure 4-7**.

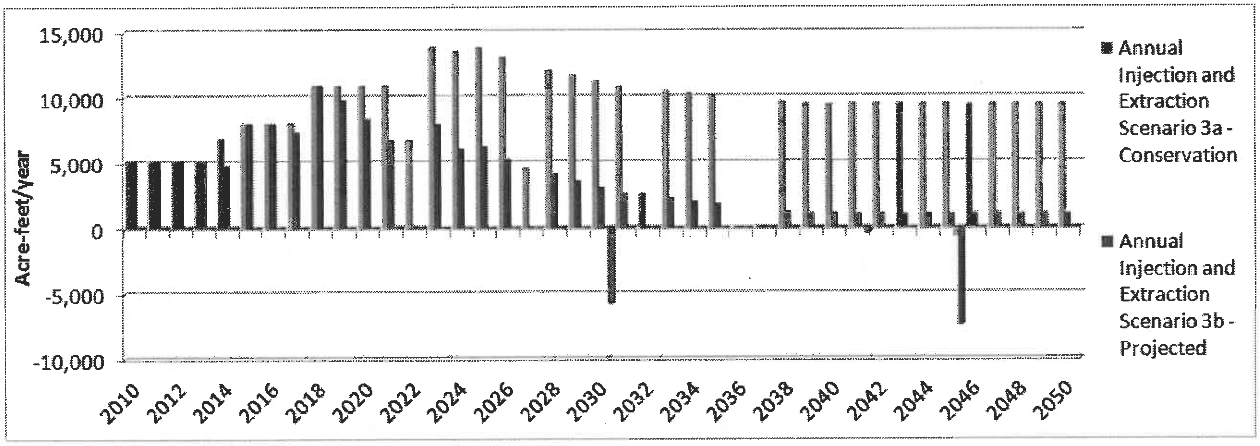


Figure 4-7. Annual Injection and Extraction for Scenario 3a and Scenario 3b

5. CONCLUSIONS

This technical memorandum describes the methodology, assumptions and calculations used to generate pumping data for the ASR scenarios that were evaluated by the City of Roseville.

The information included in this technical memorandum incorporates the latest information provided by the City at the time of its development. The calculations derived from this spreadsheet were intended to provide input for the modeling simulations using the SRM. This information is not intended to reflect any modifications to well construction dates or new information that becomes available subsequently that may impact supply and demand calculations.

References

Aquaveo. August 2010. *Sacramento Regional Model Groundwater Modeling Report.* Unpublished consulting report.

City of Roseville Environmental Utilities Department.

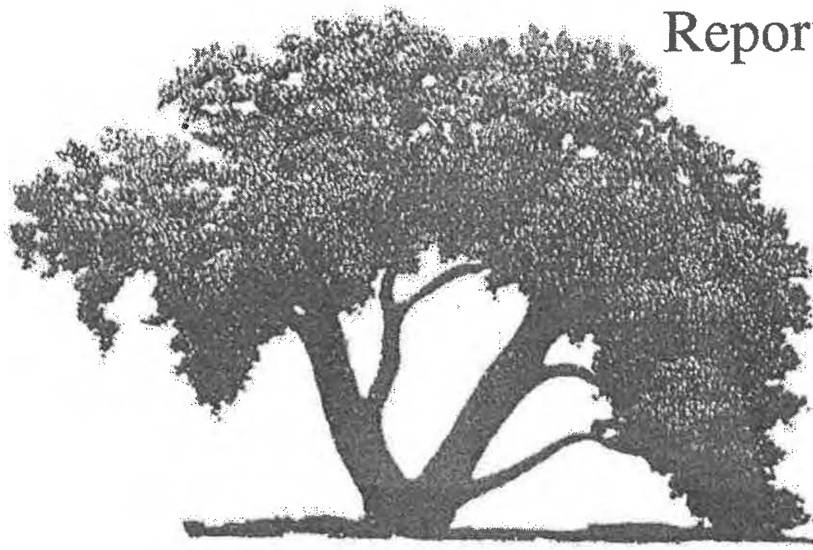
APPENDIX F: EXCERPT FROM DEL WEBB SPECIFIC PLAN EIR

Note: All certified City of Roseville Specific Plan Environmental Impact Reports, and related documents, are available in their entirety online, at www.roseville.ca.us/planning/planning_document_library, at all libraries, and at the Civic Center, located at 311 Vernon Street, Roseville, during regular business hours.

D r a f t

Del Webb Specific Plan

Environmental Impact Report



Prepared for:

The City of Roseville
316 Vernon Street
Roseville, CA
95678

September 1993

DAMES & MOORE

pool, tennis courts and a half-basketball court. Actual uses will be determined based on resident need and demand on existing facilities.

3.5.7 Section 7. Public Facilities & Services Element

The Proposed Project would include a variety of public facilities and services intended to serve the needs of Proposed Project residents. These services include electric utilities, water, sewer, storm drainage systems, solid waste disposal, fire protection, and other public services. Parks and recreation facilities are discussed in Section 3.5.6, above.

Water

Onsite water improvements would include a 12-inch water main which would enter the site from Pleasant Grove Boulevard and proceed to Blue Oaks Boulevard (Figure 3-25). Smaller lines, from six to 12 inches, would be located within the rights-of-way of major arterial and collector streets. Distribution water lines would be installed at the time the streets are constructed.

Offsite improvements would include a 24-inch line constructed within the Blue Oaks Boulevard right-of-way (Figure 3-8) from the proposed 12-inch onsite line to an existing 24-inch line in the Foothills Boulevard right-of-way. The onsite 12-inch line would also tie into a 24-inch line in Pleasant Grove Boulevard which would extend to the Proposed Project boundary. From there, a 16-inch line would be constructed parallel to an existing 12-inch line in Pleasant Grove Boulevard for approximately 2,900 feet to a 36-inch line at Woodcreek Oaks Boulevard. The Pleasant Grove line would be constructed by the Applicant to its connection with the line at Woodcreek Oaks.

One potable water well would be installed for emergency backup water supply (Figure 3-25).

Reclaimed Water

Tertiary treated effluent from the existing City Regional Wastewater Treatment Plant would be piped to the golf course area via a 16-inch and a 12-inch pressurized reclaimed water line to be constructed by the Applicant. These lines would come off an 18-inch reclaimed pressurized water line to be constructed by the City that will serve the Woodcreek Oaks Municipal Golf Course.

A new 30-inch force main is planned to be constructed as part of a separate project. Upon completion, the existing 18- and 20-inch force mains would become the City's reclaimed water line between lift station no. 2 and the plant. The 16-inch reclaimed water line would be extended from Woodcreek Oaks Boulevard to the Proposed Project along the existing Pleasant Grove Boulevard right-of-way. This line would be constructed by the Applicant and would serve the Proposed Project's golf courses and provide some landscaping irrigation.

Sewer

The Proposed Project would be incorporated into the City's sewer service area. The Proposed Project would be served by the Roseville Regional Wastewater Treatment Plant on Dry Creek at Atkinson Street until a future treatment plant is constructed by the City on Pleasant Grove Creek. Most of the Proposed Project lies within the Kaseberg Creek gravity sewer shed and may be served

KEY

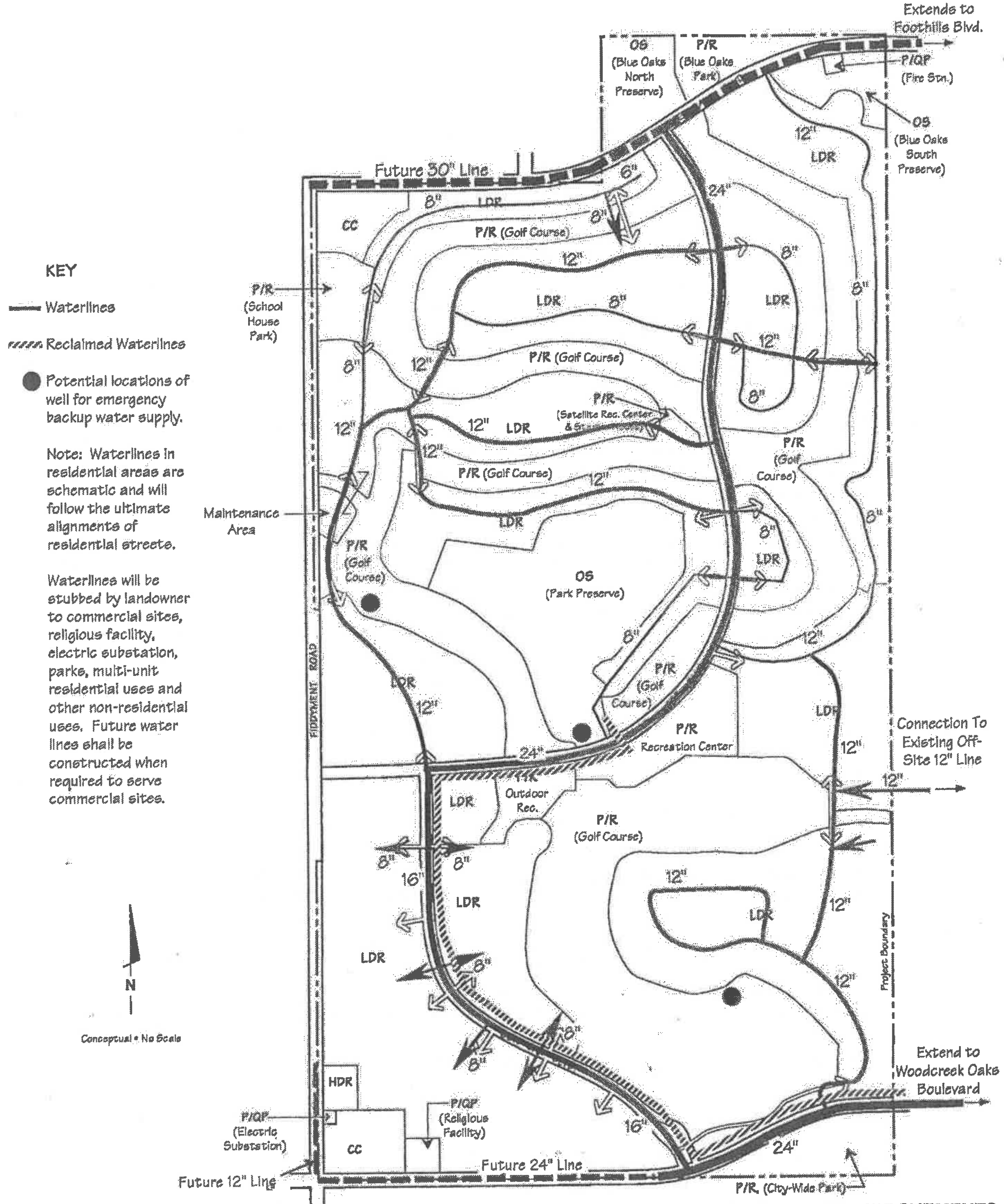
Waterlines

Reclaimed Waterlines

Potential locations of well for emergency backup water supply.

Note: Waterlines in residential areas are schematic and will follow the ultimate alignments of residential streets.

Waterlines will be stubbed by landowner to commercial sites, religious facility, electric substation, parks, multi-unit residential uses and other non-residential uses. Future water lines shall be constructed when required to serve commercial sites.



SOURCE: Wade Associates

ONSITE WATER IMPROVEMENTS

City of Roseville
Del Webb Specific Plan EIR
Roseville, California

10026-028-001

DAMES & MOORE

FIGURE 3-25

PUBLIC SERVICES 6.0

6.0 PUBLIC SERVICES

6.1 ENVIRONMENTAL SETTING

6.1.1 Water

Water Supply

Surface Water

The City of Roseville Water Division provides water to over 2,200 commercial and over 15,700 residential connections within the City. Total City-wide use ranges from 11,000 to 16,500 acre-feet per year (Wade, 1993) with an average annual use of about 14,600 acre-feet per year, or 13.0 million gallons per day (mgd) (City of Roseville, 1991). The current average daily water demand is 9.8 to 14.7 mgd. Peak usage is about seven million gallons per day (mgd) during the winter and 30 mgd during the summer. Estimated average demand under General Plan 2010 market conditions is 37,800 acre-feet per year (33.7 mgd). Peak usage in 2010 is estimated to be 58.4 mgd (Spink, 1993).

The City water supply is provided from two main sources, Folsom Reservoir and the Placer County Water Agency. The United States Bureau of Reclamation (USBR) is responsible for management of Folsom Reservoir. Water is discharged from Folsom Reservoir through an 84-inch-diameter tunnel through Folsom Dam. USBR restrictions on the velocity of flow through the tunnel limit the rate of water conveyance from the reservoir to 385 cubic feet per second (cfs); however, normal flows have not yet reached this limit and historic flows have only reached 210 cfs. Due to these limitations the maximum amount of water that can be obtained by the City as specified in the USBR contract is 42 mgd.

The City's entitlement for surface water includes 32,000 acre-feet per year (28.56 mgd) from Folsom Reservoir (Spink, 1992). The City has contracted with the Placer County Water Agency (PCWA) for 20,000 acre-feet (17.85 mgd) of water per year and is presently negotiating with PCWA for an additional 10,000 acre-feet (8.93 mgd). Once the negotiations are concluded, the City will have a total entitlement of 62,000 acre-feet per year (55.34 mgd). Table 6-1 summarizes the City's current water entitlement.

TABLE 6-1
CITY OF ROSEVILLE WATER ENTITLEMENT

Source	Amount (acre-ft/yr)	Amount (mgd)	Present Status
American River at Folsom Lake (USBR)	32,000	28.56	Contracted
American River at Folsom Lake (Placer County Water Agency)	20,000	17.85	Contracted
American River at Folsom Lake (Placer County Water Agency)	10,000	8.93	Pending
TOTALS	62,000	55.34	

Source: Spink, 1992.

In addition to the water entitlements discussed above, the City can access water from other sources to respond to emergency conditions to transfer water between jurisdictions or to supplement the City's water supply. These sources are discussed below and summarized in Table 6-2.

TABLE 6-2
ADDITIONAL CITY OF ROSEVILLE WATER SUPPLY SOURCES

Source	Amount (acre-ft/yr)	Amount (mgd)
Wells	5,000	4.46
PCWA Intertie	3,360[1]	3.00[2]
SJSWD Intertie	8,400	7.50[3]

Notes:
1. This entitlement is included in the PCWA 20,000 acre-feet allotment shown in Table 6.1.
2. Intertie capacity being increased to 5.0 mgd.
3. Minimum amount available depending upon SJSWD demands. The available supply could be increased to a total of 15 mgd.

Source: Spink, 1992.

Wells

Additional water supply sources are provided through groundwater wells. Groundwater sources are comprised of five City-owned water wells, two of which are not used because of water quality concerns. The remaining three can provide a total of 5,000 acre-feet per year (4.46 mgd) (City of Roseville, 1991).

Interties with Surrounding Agencies

The City maintains interties with four surrounding agencies: PCWA, San Juan Suburban Water District (SJSWD), Citizens Utility (CU) and Citrus Heights Irrigation District (CHID). The interties can be used to transfer water between jurisdictions or to supplement the City's water supply. The CU and CHID supplies are only accessible for emergency zonal use due to low operating pressures in the CU and CHID distribution systems and cannot be relied upon as a continued source of water. The PCWA and SJSWD interties have been used during interruptions of water deliveries from the City water treatment plant (City of Roseville, 1991).

Drought Conditions

In 1991 the City developed and adopted the Roseville Water Conservation and Drought Mitigation Plan. The Environmental Utilities Director has authority to declare water shortage conditions and take mitigation measures. The director can declare drought stages and impose appropriate drought response measures. The stages and drought response measures are presented in Table 6-3. City groundwater wells can be activated to supplement surface water during droughts but cannot be used

TABLE 6-3
CITY OF ROSEVILLE DROUGHT STAGES AND DROUGHT RESPONSE MEASURES

Stage	Surface Water Supply	Drought Response Measures
Basic Stage	Capable of meeting all projected demands	Landscape standards, drought-tolerant landscape for model homes, water consumption calculations required, site reviews include water reclamation or recycling capabilities
Stage I	Capable of meeting 90 percent projected demands	Basic Stage mitigation plus no washing of paved areas, use of buckets and control nozzle for washing vehicles, restaurants serve water only upon request
Stage II	Capable of meeting 80 percent projected demands	Stage I mitigation plus irrigation of landscape only from 4am to 8am or 8pm to 10pm, reduction of nonresidential irrigation by 30 percent over 1990 usage
Stage III	Capable of meeting 70 percent projected demands	Stage II mitigation plus allowance of only drought tolerant varieties for new and expanded landscaping, reduction of nonresidential irrigation by 50 percent over 1990 usage, hand watering of trees and shrubs, no watering of golf course fairways, irrigation of only one-half of City park and median turf areas, drainage of all decorative pools and fountains, augmentation of construction dust control by use of hardened temporary travel routes, covering of swimming pools when not in use and prohibition of refilling drained swimming pools
Stage IV	Capable of meeting 60 percent projected demands	Stage III mitigation plus reduction of nonresidential irrigation by 75 percent over 1990 usage, residential irrigation only by hose with control nozzle, no irrigation of City park and median turf, prohibition of using water for dust control
Stage V	Capable of meeting 50 percent projected demands	Stage IV mitigation plus no irrigation of turf and grass areas, irrigation of drought tolerant trees and shrubs only by hose with control nozzle

Source: City of Roseville, 1991.

to avoid declaration of Stage I or Stage II conditions. These drought response measures are enforceable via City of Roseville ordinances.

Due to drought conditions throughout California, Roseville's water entitlement was reduced by 50 percent in 1990 and 75 percent in 1991. The 75 percent reduction required the City to exercise water options with PCWA. However, access to PCWA water was limited to 4,000 acre-feet due to USBR regulations restricting wheeling of water through USBR facilities and due to limited intertie capacity. The City had a 3,000 acre-feet shortfall (2.7 mgd, approximately 20 percent of demand) and so declared a Stage II drought. The City is working on increasing PCWA intertie capacity and on promoting legislation to allow wheeling of municipal and industrial water through Folsom Reservoir.

Water Treatment

The City operates a potable water treatment plant which treats potable water from Folsom Reservoir. The plant is located on the east side of the City off Barton Road. It has primary clarification and filtration. Chemical addition includes polymer addition prior to clarification and chlorination for disinfection after filtration. The plant has capabilities for other chemical additions (i.e., lime and fluoride) as required (Whitehead, 1993). The plant has recently been expanded to a treatment capacity of 48 mgd (City of Roseville, 1991).

Water Distribution

A 42-inch pipeline carries water from the treatment plant into the southeast corner of the City. The City is planning to construct a parallel 66-inch pipeline from the treatment plant to provide additional capacity through 2010. A four-million-gallon City-owned reservoir and a two-million-gallon City-owned reservoir are located at the treatment plant, and water is also stored in a six-million-gallon City-owned reservoir located just west of Sierra College Boulevard in the Cavitt Ranch area. These reservoirs are used for operation, fire and emergency storage. Water throughout the City is distributed by pipelines ranging from 12 inches or smaller to as large as 54 inches (Spink, 1992).

City water distribution piping has been extended to several locations accessible to the Proposed Project. Two 24-inch water lines and one 16-inch water line connect at the intersection of Foothills Boulevard and Blue Oaks Boulevard which is located about 7,600 feet east of the Proposed Project site.

Two 36-inch water lines, one 24-inch water line and one 12-inch water line connect at the intersection of Woodcreek Oaks Boulevard and Pleasant Grove Boulevard. The 12-inch water line extends along Pleasant Grove Boulevard to the eastern border of the Proposed Project site. The 24-inch water line extends northward along Woodcreek Oaks Boulevard for about 3,900 feet, at which point a 12-inch line branches westward to near the boundary of the Proposed Project. A 16-inch line continues northward another 900 feet, terminating at the southern edge of the North Woodcreek Oaks Urban Reserve area. In the future, the 24-inch line would be extended to Blue Oaks Boulevard where it would connect to water distribution piping constructed as part of the Proposed Project. The 16-inch line would be replaced.

Reclaimed Wastewater

The City is constructing a reclaimed water distribution system that would pass near the Proposed Project site. The reclaimed water distribution system would utilize existing sewer force mains that would be abandoned after construction of a new force main with increased sanitary waste conveyance capacity. The existing force mains extend from the City's treatment plant to lift station no. 3, then north past Pleasant Grove Boulevard to lift station no. 2, where it continues north to lift station no. 1. The existing force mains follow an alignment that falls about 3,000 feet east of and parallel to the Proposed Project site. The existing force main is comprised of 18-inch and 20-inch pipe which would be replaced with a new 30-inch force main extending from the treatment plant to lift station no. 1. The City has awarded the contract for construction of a portion of the new 30-inch force main.

The City is currently implementing plans for the utilization of reclaimed water for irrigation of the Woodcreek Oaks Municipal Golf Course. Reclaimed water distribution piping exists in the golf course.

Current flows to the treatment plant average between nine and 10 mgd and the plant is currently being expanded to 18 mgd (Spink, 1992). The plant is therefore currently capable of supplying about nine mgd of reclaimed wastewater; however, the capacity of existing reclaimed water distribution pumps is limited to six mgd.

Groundwater Wells

The California Department of Water Resources maintains records on groundwater wells. Well drillers are required to complete and submit logs of well installations to the state. The records, however, are incomplete due to the presence of wells installed before requirement for submission of well logs or failure of well drillers to submit the required logs. It is likely that numerous additional wells exist that are not included in the state records.

The Applicant reviewed the well records at the California Department of Water Resources and compiled a list of existing wells in the vicinity of the Proposed Project. Section 14.1.3 discusses the locations of the identified wells and other information as available regarding well depth, size and parcel identification number.

6.1.2 Wastewater

Wastewater Collection

Wastewater from the City of Roseville is collected via gravity pipelines and force mains which deliver wastewater to the Roseville Regional Wastewater Treatment Plant located in the southwest corner of the City. Major collection lines vary in size from 15 inches to 66 inches (Spink, 1992). The City operates five wastewater pumping stations near the Proposed Project site.

The Proposed Project lies within the Kaseberg Creek and South Branch Pleasant Grove Creek gravity sewersheds. The closest connection to the existing sewer system is the force main exiting lift station no. 1, which is located about 3,000 feet east of the study area along the Blue Oaks Boulevard corridor. Lift station no. 1 is in the South Branch Pleasant Grove Creek sewershed.

Groundwater Wells

IMPACT NO. PS-7:	Lowering of shallow groundwater table
SIGNIFICANCE:	Potentially significant
MITIGATION:	
PROPOSED BY APPLICANT:	None
ADDITIONAL MITIGATION:	Mitigation Measure PS-C (Well drawdown testing)
RESIDUAL SIGNIFICANCE:	Less than significant

The Proposed Project would construct one groundwater well for emergency backup of the City's potable water and irrigation water supplies. The City would own, operate and maintain the well. The well would be approximately 600 to 650 feet deep and would be 16 inches in diameter. The well would be expected to provide between 2,000 to 3,000 gpm. In any case, the City requires a minimum of 1,040 gpm. The well would be used for emergency back-up only in the event of a failure in the potable water or reclaimed water distribution systems.

In the event of a sustained drought and water emergency, it is possible (but unlikely) that the groundwater well would be operated over a sustained interval of time. This could potentially result in a lowering of the water table in the surrounding area of the Proposed Project. It should be noted, however, that the City did not use its existing wells to supplement the City's water supply during the previous seven-year drought.

The Applicant is currently studying the underlying aquifer formations. Preliminary information indicates that two water-bearing strata exist and that the two formations are likely interconnected. The first is a more shallow groundwater source and the second is somewhat deeper and would be used for the proposed well. The shallow source could provide water to some of the identified wells in the vicinity of the Proposed Project.

The City's Director of Environmental Utilities states that there is a very small probability that the proposed groundwater well would be operated for an extended period of time, and that during periods of severe drought, water conservation would be the primary means of maintaining an adequate potable water supply. However, given the possibility that the aquifers are interconnected and infrequent extended operation of the proposed well could result in diminished capacity of adjacent wells, it is concluded that the proposed groundwater well would, if operated over an extended period, have a potentially significant impact on shallow groundwater elevations and wells in the vicinity of the Proposed Project.

Testing could determine the zone of influence of the proposed well and identify existing adjacent wells that could be impacted by extended operation of the proposed well. This would allow measures to be taken to provide well owners with an adequate water supply during extended operation of the proposed well, as described in Mitigation Measure PS-C (Well drawdown testing). Implementation of this mitigation measure would reduce the potential impacts of operating the proposed well over an extended period to less than significant.

6.4 MITIGATION MEASURES

Mitigation Measure PS-A: Restrict development based upon accessible water supply

Mitigation Measure PS-A applies to Impacts PS-1, PS-2, and L-12.

Additional accessible water supply should be required prior to full buildout of the Proposed Project. Four options for increasing the accessible water supply are discussed in Section 6.3.1. They involve the acquisition of additional water entitlement and improvements to the treatment and conveyance systems.

As mitigation for the Proposed Project's impact on water supply, planning for the increased accessible water supply and water storage capacity must begin when the peak day demand exceeds 75 percent of the supply delivery or when the annual demand exceeds 75 percent of the total supply allotment. When the average day demand exceeds 90 percent of the accessible water entitlement, the City Council will evaluate all feasible water supply alternatives and water conservation measures, and the maximum use of reclaimed water, prior to a consideration of restricting additional water service connections. This mitigation measure cannot be implemented by the Applicant. The City should monitor peak day and annual demand and, according to the trigger identified above, should notify the City Council when these thresholds are reached. Increasing the accessible water supply should also help to ensure that during the next period of drought, the City will be capable of meeting the domestic water needs of the City. This mitigation should reduce the impact of the Proposed Project on water supply to a level that is less than significant.

Mitigation Measure PS-B: Restrict development based upon water treatment capacity

Mitigation Measure PS-B applies to Impacts PS-3 and L-13.

This mitigation measure is applicable to increasing water treatment capacity. Additional water treatment capacity should be required prior to full buildout of the Proposed Project. As mitigation for the Proposed Project's impact on water treatment capacity, planning for expansion of the City's water treatment capacity must begin when the peak day demand exceeds 75 percent of the treatment plant capacity. When the demand for water treatment exceeds 90 percent of the treatment plant capacity, the City Council will evaluate all available water treatment options, the maximum use of reclaimed water, and water conservation measures, prior to a consideration of restricting additional water service connections. This mitigation measure cannot be implemented by the Applicant. The City should monitor peak day demand and, according to the trigger identified above, should notify the City Council when these thresholds are reached. This mitigation should reduce the impact of the Proposed Project on water treatment capacity to a level that is less than significant.

Mitigation Measure PS-C: Well drawdown testing

Mitigation Measure PS-C applies to Impact PS-7.

The proposed well should be tested by the Applicant during development to determine the zone of influence of the wells during normal and prolonged operation at rates of flow commensurate with irrigation water supply requirements and at full capacity, which would be commensurate with City emergency water supply requirements. The wells should be tested in accordance with standard practices for determination of cone of depression and radius of influence for the two flow rate scenarios mentioned above. The resulting information would be used to assess the area of potential drawdown impact and to identify existing adjacent wells that could be impacted by extended operation of the proposed well.

Based on available information it appears that the probability of continued operation of the well is remote. If the well is operated on an extended basis and it becomes apparent that adjacent wells are subject to reduced yield, appropriate measures should be taken by the City to provide the well owners with an adequate water supply. Appropriate measures could include one or more of the following:

- development and implementation of an emergency water supply plan for affected domestic groundwater users;
- extending water distribution piping to service the affected groundwater users;
- enhancing the capacity of existing wells; or
- discontinuing operation of the well.

Mitigation Measure PS-D: Provide additional lift station/conveyance capacity to provide service beyond the year 2000

Mitigation Measure PS-D applies to Impact PS-8 and L-14.

Lift station no. 1 would provide service to the Proposed Project during the initial phases, but it is expected to reach its maximum capacity before the year 2000. As part of its environmental utility CIP, the City is planning to provide additional sewerage capacity at lift station no. 1 by constructing a new force main from lift station no. 1 to the existing treatment plant.

Although lift station no. 1 is currently being expanded to a capacity of 10 mgd, and the lift station should be capable of providing service to the Proposed Project at full build-out, other areas are expected to develop that would place additional demand upon the capacity of lift station no. 1 and there is no guarantee that adequate sewerage capacity will exist at the time the Proposed Project reaches full build-out. Therefore, as an additional mitigation measure, the construction of the new force main should be completed by the City by the year 2000. The City has initiated this mitigation measure. If the Pleasant Grove Regional Wastewater Plant is constructed, lift station no. 1 would be abandoned and the need for this mitigation measure would be eliminated.

Mitigation Measure PS-E: Restrict development based upon wastewater treatment capacity

Mitigation Measure PS-E applies to Impact PS-9.

Additional wastewater treatment capacity should be required prior to full buildout of the Proposed Project. As mitigation for the Proposed Project's impact on wastewater treatment capacity, planning for expansion of the City's wastewater treatment capacity must begin when the peak dry weather flow exceeds 75 percent of the treatment plant capacity. When the peak day dry weather inflow rate

HYDROLOGY AND WATER QUALITY 14.0

14.0 HYDROLOGY AND WATER QUALITY

14.1 ENVIRONMENTAL SETTING

14.1.1 Hydrology

The Proposed Project site is located in the subwatersheds of South Branch Pleasant Grove Creek and the north branch, middle branch, and south branch tributaries of Kaseberg Creek. These creeks, as well as the City of Roseville, are located within the Sacramento River basin.

As shown on Figure 14-1, the majority of the study area is drained by Kaseberg Creek (main branch) and its three tributaries (south, middle and north branches). Kaseberg Creek begins near Kaseberg School southeast of the study area near Main Street. The creek meanders in a generally northwestern direction from there into the southeast corner of the Proposed Project site south of Pleasant Grove Boulevard and then northwesterly through the Proposed Project site. Kaseberg Creek varies in width from 8 to 24 feet (Wade, 1993b).

Kaseberg Creek leaves the site through an 8-foot by 13-foot corrugated arched pipe (super span) under Fiddyment Road. The corrugated arched pipe can handle approximately 1,340 cubic feet per second (cfs). From there, the creek meanders in a north-northwesterly direction for about 5,000 feet and joins with the north branch Kaseberg Creek about 1,000 feet upstream of the Kaseberg Creek confluence with Pleasant Grove Creek.

Three branches of Kaseberg Creek also flow through the Proposed Project site. The south branch is located west of Kaseberg Creek (main branch) and north of Baseline Road. It enters the Proposed Project site about 950 feet west of the southeast corner of the site and meanders for about 5,400 feet in a general northwest direction to join with the main branch of Kaseberg Creek.

The middle branch begins east of the study area and flows in a general westerly direction, entering the Proposed Project site about 3,400 feet north of the southeast corner of the site. The creek meanders for about 6,050 feet in a general westerly direction to join with the main branch of Kaseberg Creek.

The north branch of Kaseberg Creek begins just east of the study area almost directly east of the Phillips Road/Fiddyment Road intersection. It is a minor drainage generating less than 200 cfs during a 10-year storm event, with only 17 acres of its total tributary area located offsite to the east of the Proposed Project site. The north branch meanders for about 8,060 feet in a general west-northwesterly direction, leaving the Proposed Project site through a 5-foot by 8-foot reinforced concrete box culvert that passes under Fiddyment Road. The box culvert is approximately 36 feet long with upstream and downstream invert elevations of 88.04 feet and 87.96 feet (MacKay & Somps, 1993c). The culvert has a capacity of approximately 250 cfs. West of the study area, the north branch enters Kaseberg Creek approximately one-quarter mile west of Fiddyment Road near the Kaseberg Creek confluence with Pleasant Grove Creek.

Pleasant Grove Creek begins approximately five miles east of the study area near Citrus Colony Road and Humphery Road north of Rocklin. The creek meanders westerly from there towards the study area. The creek does not flow through the study area but instead runs north of it. However, South

Branch Pleasant Grove Creek, which begins near the Roseville/Rocklin border, flows through portions of the northeast portion of the Proposed Project site. The south branch is as wide as 30 feet in some places (Wade, 1993b).

Pleasant Grove Creek continues in a westerly direction and flows into Pleasant Grove Creek Canal, approximately seven miles downstream of the City limits. The Pleasant Grove Creek Canal flows into Cross Canal in Sutter County and through an extensive levee network into the Sacramento River just south of its confluence with the Feather River, approximately 14 miles west of Roseville.

The City has not modeled any of Kaseberg Creek and the Kaseberg Creek drainage basin is not included in Federal Emergency Management Administration (FEMA) floodplain mapping. However, analysis and modeling of the Kaseberg Creek drainage basin has been developed by consultants hired by the Applicant. Information was compiled from computer models developed by MacKay & Somps. The computer modeling was developed using the U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package and the HEC-2 Water Surface Profiles computer program. The model appears to have been compiled in accordance with standard practices. Table 14-1 presents data extracted from the model for Kaseberg Creek, Pleasant Grove Creek, and their respective branches which drain portions of the study area.

Data on the extent of existing development within the Kaseberg Creek watershed was developed by Dames & Moore using aerial photography of the watershed. The aerial photography was flown on December 18, 1992 and reasonably represents the existing condition.

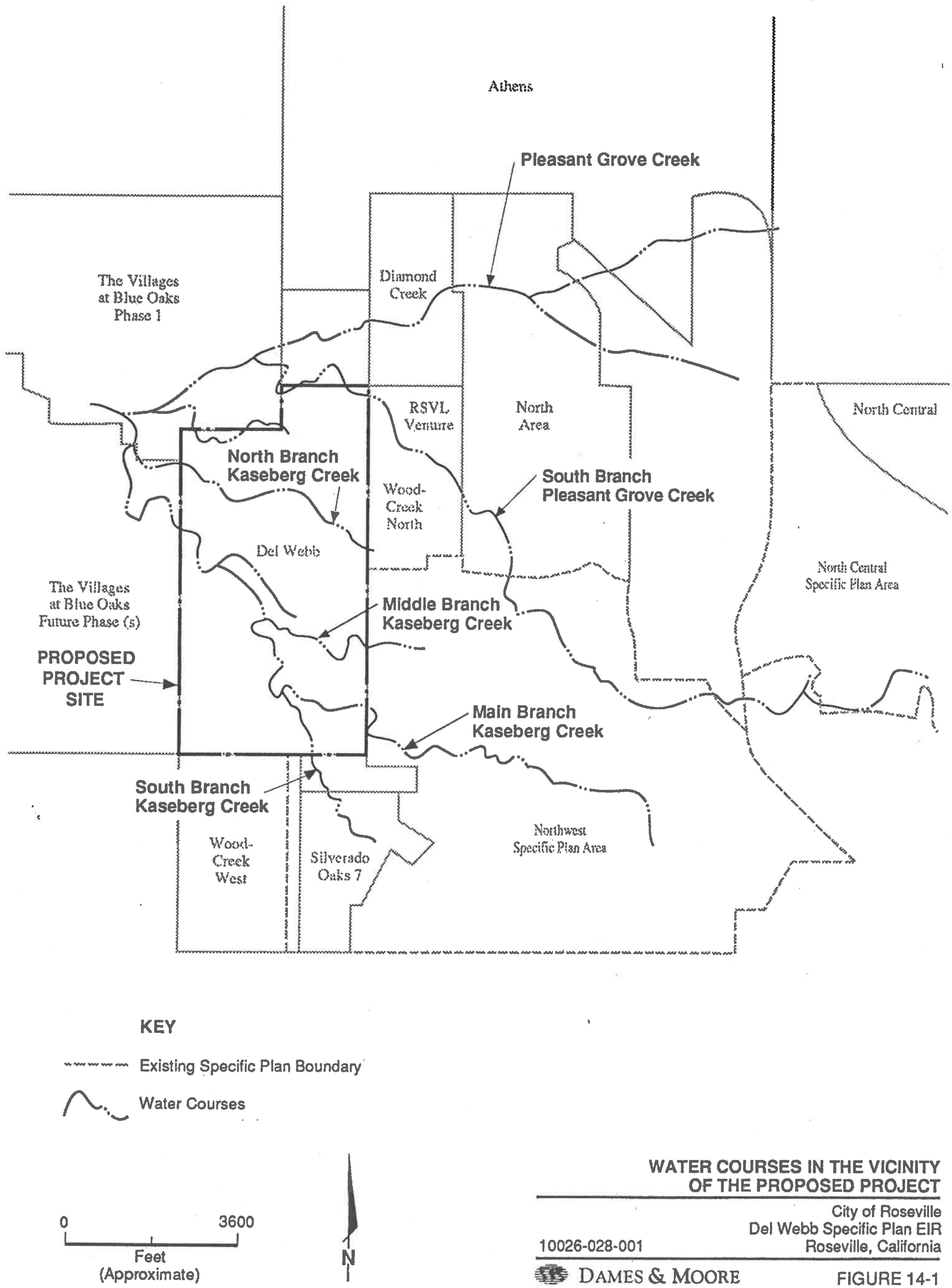
TABLE 14-1
DRAINAGE BASIN AREAS
(Existing Condition)

Basin Water Course	Total Basin Area (acres)	Basin Area Within Project Site			Basin Area Outside Project Site		
		Acres	Percent Developed	Percent of Total Basin	Acres	Percent Developed	Percent of Total Basin
Kaseberg Creek (K.C.)	2,675	951	0	35.6	1,724	34	64.4
K.C. Main Branch	1,235	525	0	42.5	710	47	57.5
K.C. South Branch	851	102	0	12.0	749	44	88.0
K.C. Middle Branch	320	90	0	28.0	230	45	72.0
K.C. North Branch	269	234	0	87.0	35	0	13.0
Pleasant Grove Creek South Branch	3,878	249	0	6.4	3,629	Unknown[1]	93.6

Note: [1] The majority of this drainage basin is undeveloped; however, sufficient data were not available to quantify the developed area.

Source: MacKay & Somps, 1993j; Dames & Moore.

A portion of the northeast corner of the Proposed Project site is within the floodplain of South Branch Pleasant Grove Creek, which meanders mostly in a northwesterly direction but turns to follow a



WATER COURSES IN THE VICINITY OF THE PROPOSED PROJECT

City of Roseville
Del Webb Specific Plan EIR
Roseville, California

10026-028-001

DAMES & MOORE

FIGURE 14-1

westerly direction along the north edge of the Proposed Project site beginning at the site's northeast corner. The south branch turns to follow a northerly direction and merges with North Branch Pleasant Grove Creek which is located to the north of the Proposed Project site. The north branch meanders in a westerly direction. Adjacent to the creek and its branches, the 100-year floodplain is estimated to be 200 to 300 feet wide (MacKay & Somps, 1993f).

The City has conducted hydraulic modeling of Pleasant Grove Creek, including portions of the south branch. The results of the modeling are shown on the City's Official Floodplain Maps and are based upon the full build-out of the watershed (including the Proposed Project site). The maps shown use the National Geodetic Vertical Datum (NGVD) for elevation reference. Table 14-2 presents flood elevation data for Pleasant Grove Creek.

TABLE 14-2
PLEASANT GROVE CREEK 100-YEAR
FULL BUILD-OUT FLOOD ELEVATIONS

Location	100-Year Flood Elevation (feet NGVD)
Fiddyment Road	92.0
Confluence of North and South Branches	94.0
South Branch at Eastern Border of Project Site	97.0

Source: City of Roseville, 1987.

Table 14-3 presents a summary of estimated discharge rates and flood elevations at selected locations on Kaseberg Creek and its branches as they meander through the Proposed Project site. The data were developed using parameters that reflect full buildout development of drainage basin areas outside of the Proposed Project limits. Ordinarily, this would not be representative of the existing condition case; however, in the Roseville area, the predominant soil types are highly impermeable and runoff rates from pre-development and post-development conditions are similar.

The Applicant's consultant checked the suitability of using model parameters that reflected existing development outside of the Proposed Project site. The consultant reviewed the ratio of developed and undeveloped areas using aerial photography of the watershed and re-evaluated the precipitation loss parameters that were used in the modeling. The results of this re-evaluation yielded runoff rates that were similar to the fully developed runoff rates. Therefore, it was concluded that the existing condition was reasonably represented by the modeling that used parameters reflecting full build-out of the watershed upstream of the limits of the Proposed Project site.

14.1.2 Water Quality

Stormwater runoff quality is regulated by the National Pollutant Discharge Elimination System (NPDES) which is administered by the State Water Resources Control Board. Municipalities are required to obtain an NPDES permit based upon population thresholds. The City of Roseville, with a current population of approximately 54,000 people, is not currently required to obtain a permit for

TABLE 14-3
EXISTING CONDITION
FLOOD ELEVATIONS FOR VARIOUS 12-HOUR RETURN FREQUENCY STORMS
(Page 1 of 3)

Station[1]	Description	10-YEAR, 12-HOUR STORM			25-YEAR, 12-HOUR STORM			100-YEAR, 12-HOUR STORM		
		Existing Drainage Area (acre)	Flow (cfs)[2]	Elevation (feet)	Existing Drainage Area (acre)	Flow (cfs)[2]	Elevation (feet)	Existing Drainage Area (acre)	Flow (cfs)[2]	Elevation (feet)
KASEBERG CREEK MAIN CHANNEL										
23800	Easterly Boundary Proposed Project	935	577	113.52	935	749	113.82	935	1024	114.23
19225	U/S Confluence with South Branch	1024	571	105.47	1024	744	105.9	1024	1015	106.48
18328	D/S Confluence with South Branch	1876	1025	104.32	1876	1335	104.85	1876	1803	105.55
15320	U/S Confluence with Middle Branch	2100	1051	100.43	2100	1358	101.05	2100	1837	101.86
14182	D/S Confluence with Middle Branch	2426	1109	99.79	2426	1434	100.38	2426	1939	101.16
10160	Upstream of Fiddyment Road	2676	1133	91.64	2676	1464	92.03	2676	1967	92.55
9895	Downstream of Fiddyment Road	2676	1133	90.88	2676	1464	91.37	2676	1967	91.94
KASEBERG CREEK SOUTH BRANCH										
5405	Southerly Boundary Proposed Project	749	458	111.8	749	604	112.15	749	832	112.61
1390	U/S Confluence with Main Branch	851	471	104.91	851	601	105.41	851	822	106.08

b:DELWEBB2\TABLE14.3

TABLE 14-3
EXISTING CONDITION
FLOOD ELEVATIONS FOR VARIOUS 12-HOUR RETURN FREQUENCY STORMS
(Page 2 of 3)

Station[1]	Description	10-YEAR, 12-HOUR STORM			25-YEAR, 12-HOUR STORM			100-YEAR, 12-HOUR STORM		
		Existing Drainage Area (acre)	Flow (cfs)[2]	Elevation (feet)	Existing Drainage Area (acre)	Flow (cfs)[2]	Elevation (feet)	Existing Drainage Area (acre)	Flow (cfs)[2]	Elevation (feet)
KASEBERG CREEK MIDDLE BRANCH										
5550	Easterly Boundary Proposed Project	230	239	113.26	230	317	113.45	230	446	113.71
1885	U/S Confluence with Main Branch	320	288	100.03	320	366	100.73	320	522	101.55
1270	U/S Del Webb Blvd.	320	288	100.1	320	366	100.7	320	522	101.5
KASEBERG CREEK NORTH BRANCH										
8290	Near East Boundary of Proposed Project, Outfall to #7 green	32	19	118.25	32	24	118.32	32	35	118.44
6700	Upstream of Del Webb Blvd.	90	45	112.23	90	58	112.33	90	79	112.46
5530	Downstream of Del Webb Blvd.	166	111	106.06	166	148	106.2	166	206	106.38
3405	U/S of Rdwy Between Village 2, 3	231	166	100.08	231	216	100.21	231	306	100.4
1620	Upstream of Fiddyment Road	269	166	93.36	269	216	93.46	269	306	93.62
820	Downstream of Fiddyment Road	269	166	92.07	269	216	92.43	269	306	92.97

b:DELWEBB2\TABLE14.3

TABLE 14-3
EXISTING CONDITION
FLOOD ELEVATIONS FOR VARIOUS 12-HOUR RETURN FREQUENCY STORMS
(Page 3 of 3)

Station[1]	Description	10-YEAR, 12-HOUR STORM			25-YEAR, 12-HOUR STORM			100-YEAR, 12-HOUR STORM		
		Existing Drainage Area (acre)	Flow (cfs)[2]	Elevation (feet)	Existing Drainage Area (acre)	Flow (cfs)[2]	Elevation (feet)	Existing Drainage Area (acre)	Flow (cfs)[2]	Elevation (feet)
PLEASANT GROVE CREEK SOUTH BRANCH										
Not Available	Downstream of Southern Pacific RR	2,074	350	117.5	Not Available for 25-year Event			2,074	640	119.0
Not Available	Confluence with Right Tributary	3,155	440	94.0				3,155	820	95.0
Not Available	U/S of Confluence with Pleasant Grove Creek Main Branch	3,878	470	87.5				3,878	880	90.0

Notes: [1] Stationing for Main and North Branches begins at 100+00, which is the west edge of Fiddyment Road at Kaseberg Creek Main Branch. The middle branch begins with station 10+00 at its confluence with Kaseberg Creek Main Branch. The south branch begins with station 10+00 at its confluence with Kaseberg Creek Main Branch.

[2] Data represent full build-out of Northwest area and full build-out of urban reserve areas, as modeled by MacKay & Somps, June 1993.

U/S = upstream

Source: Mackay & Somps, 1993j.

b:DELWEBB2\TABLE14.3

municipal stormwater discharges. However, it is likely that the City will be required to obtain this permit sometime within the next several years. The NPDES permit generally requires the collection of surface water quality data, and it is expected that the City will collect this data, as a condition of the permit.

NPDES permits are also issued for construction sites of five acres or more. The NPDES General Construction permit requires preparation of a Stormwater Pollution Prevention Plan (SWPPP) which details the Best Management Practices that will be employed during construction.

A search for existing surface water quality data in the vicinity of the Proposed Project was performed by the Applicant. The Applicant requested existing surface water quality data from the City of Roseville, the United States Geological Survey (USGS), the California Regional Water Quality Control Board (RWQCB), the California Department of Fish and Game (CDFG), and United States Department of Agricultural Soils Conservation Service (SCS). None of the agencies was able to provide data (MacKay & Somps, 1993g).

The Proposed Project site is currently classified as agricultural and has been used as pasture in the recent past. Runoff water quality from the site is likely similar to runoff from other pasture land uses and could contain elevated levels of nitrogen, phosphorous, and coliform bacteria. Based on this, the pollutant concentrations in the existing runoff are estimated to be (EPA, 1983):

- TKN 3.0 mg/L
- PO_4 0.3 mg/L
- Lead 0.02 mg/L
- Zinc 0.05 mg/L

14.1.3 Groundwater

The City, as well as portions of Sacramento and Sutter Counties, is situated over the north central portion of the Central Valley Groundwater Basin. This aquifer is a system of basins extending from Red Bluff to Bakersfield.

In the Roseville area, the groundwater aquifers have been overdrafted. The groundwater is recharged by rainwater that infiltrates through surficial soils and stream and river bottoms. Much of the City is underlain by soils that limit the infiltration of groundwater and so limit groundwater recharge. The primary locations for potential groundwater recharge are along major water courses (City of Roseville, 1992).

Figure 14-2 shows the approximate locations of 19 existing groundwater wells that were identified within one-half mile of the Proposed Project. These wells supply water for agricultural and domestic uses. Most of the wells are of unknown depth. The Department of Water Resources has stated that many more wells likely exist in the area which have not been reported to the Department of Water Resources.

Information on the quality of groundwater in the vicinity of the Proposed Project was not available during preparation of the DEIR. It is expected that the Applicant will collect information on groundwater quality during installation of the proposed wells.

14.2 REGULATORY SETTING

14.2.1 Hydrology (Floodplains)

The City of Roseville restricts the placement of fill in floodplains and floodways within the City's jurisdiction. The U.S. Army Corps of Engineers (Corps) regulates the placement of fill or dredged materials that affect waters of the United States, which include stream courses and jurisdictional wetlands. The Corps regulates these activities under the authority of Section 404 of the Clean Water Act. The Corps would regulate any development in the study area that affect jurisdictional wetlands.

The CDFG has authority over stream bed and bank alterations within the 100-year floodplain under Sections 1600 through 1603 of the California Fish and Game Code as discussed in Section 15.2.

The Placer County Flood Control District (PCFCD) formulates regional strategies for flood control management. The PCFCD consists of several communities within the County, including the Cities of Roseville, Rocklin, and Lincoln. The PCFCD and the Placer County Resource Conservation District provide advice and assistance on floodplain management.

Sacramento and Sutter Counties have expressed concern that development in the Roseville area and western Placer County may increase flooding problems in their counties. In response, the PCFCD initiated a study and determined that future development would increase the acreage subject to the amount and frequency of flooding. The study initially recommended constructing regional retention facilities for each watershed. An expanded study is currently underway to address existing flood control problems and to examine feasible improvements in western Placer County and southern Sutter County.

FEMA oversees the delineation of flood zones and the provision of disaster assistance. They play a prominent role in floodplain management, including the mapping of floodplains. FEMA manages the National Flood Insurance Program (NFIP), which enables property owners within designated flood zones to purchase flood insurance. As part of this program, flood zones are mapped on the Flood Insurance Rate Maps (FIRM), which show the expected frequency and severity of flooding by area. Once these maps are formally recognized, residents can participate in the NFIP. In September 1990, the City adopted revised FIRM maps. The FIRM maps cover a small portion of the South Branch Pleasant Grove Creek but do not cover Kaseberg Creek or any of its branches.

14.2.2 Water Quality

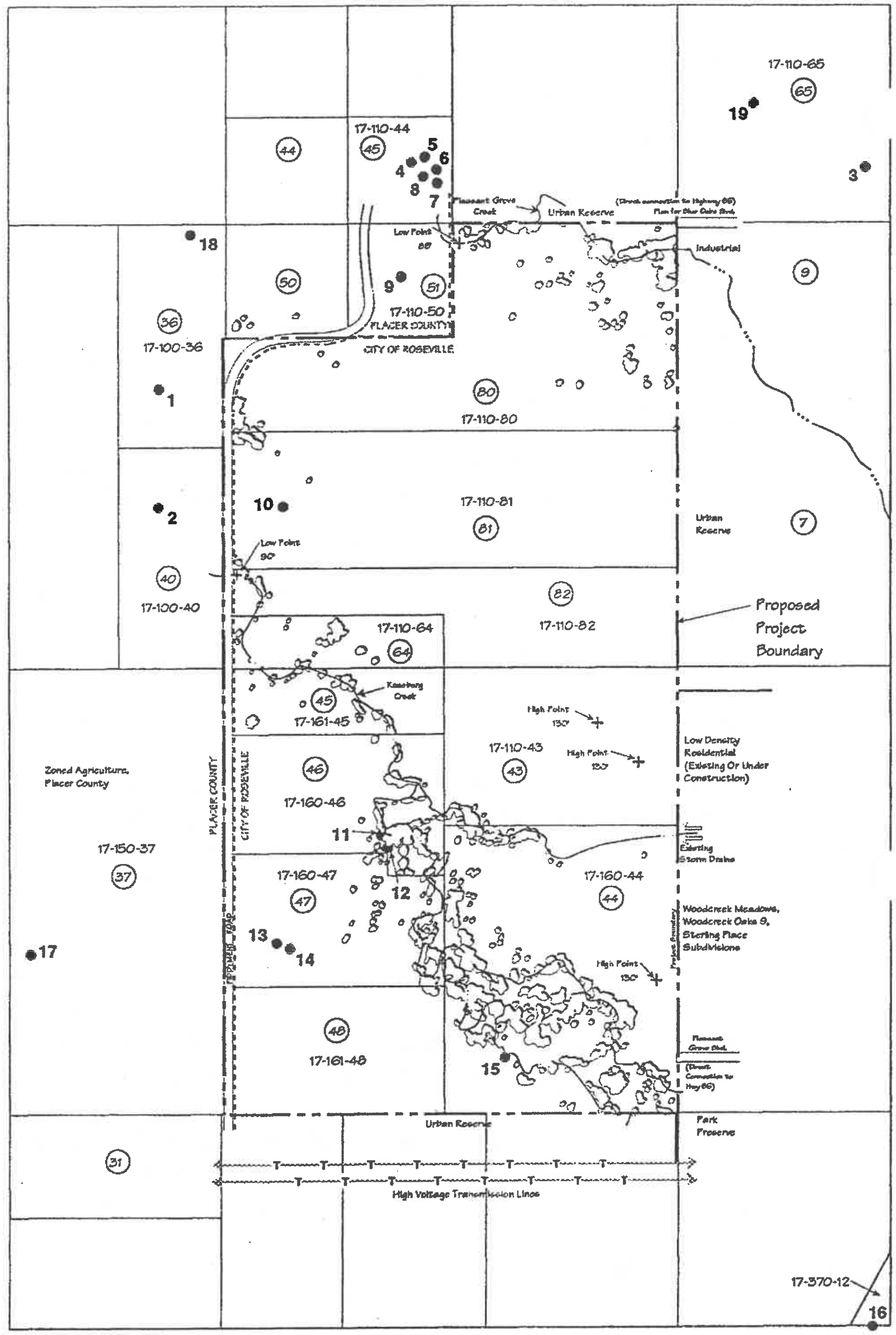
The EPA, based on the amended Clean Water Act which required NPDES permits for non-point sources, has developed stormwater management regulations. The RWQCB Central Valley Region is the designated authority responsible for managing water quality in the Roseville area. The RWQCB grants stormwater management permits on an individual, system-wide, or jurisdictional basis.

WELL LOCATION DATA
FROM DEPARTMENT OF WATER RESOURCES RECORDS

NO. ON EXHIBIT	ASSESSOR'S PARCEL NO.	LOCATION TOWNSHIP/ RANGE/SECTION	SIZE	DEPTH
1	17-100-36	T11N R5E - 24H1	UK	UK
2	17-100-40	T11N R5E - 24J1	UK	UK
3	17-110-65	T11N R6E - 17P1	12"	340'
4	17-110-44	T11N R6E - 18P1	8"	148'
5	17-110-44	T11N R5E - 18P2	UK	UK
6	17-110-44	T11N R5E - 18P3	12"	UK
7	17-110-44	T11N R5E - 18P4	10"	UK
8	17-110-44	T11N R5E - 18P5M	UK	UK
9	17-110-50	T11N R5E - 19C1	UK	UK
10	17-110-81	T11N R5E - 19M1	UK	UK
11	17-160-46	T11N R5E - 30F1	6"	UK
12	17-160-46	T11N R5E - 30F2M	10"	UK
13	17-160-47	T11N R5E - 30M1	8"	UK
14	17-160-47	T11N R5E - 30M2	UK	UK
15	17-160-44	T11N R5E - 30Q	8"	121'
16	17-370-12	T11N R5E - 32F1, 2, 3M	8"	165'
ADDITIONAL WELLS SHOWN ON 1975 U.S.G.S. MAP, ROSEVILLE, CALIFORNIA				
17	17-150-37	T11N R5E - 25K	UK	UK
18	17-100-36	T11N R5E - 24A	UK	UK
19	17-110-65	T11N R6E - 17M	UK	UK

NOTES:

1. UK = Unknown; M = DWR groundwater level monitoring well.
2. Well No. 16 monitoring appears to be located in the vicinity of the proposed Kerry Downs Subdivision. The current status of this well and the other DWR monitoring wells is unknown.
3. Wells as shown are generally within a 700 foot radius of the plotted location. The location is plotted from either Department of Water Resources records or as shown on the 1975 U.S.G.S. Map of Roseville, California.
4. The Department of Water Resources stated that many more wells likely exist in the area which have not been reported to the Department of Water Resources.



N

Conceptual • No Scale

KEY

Existing Trees

Streams

Roseville City Limit Line

15 Location of Existing Groundwater Wells

Abbreviated Parcel Number

SOURCE: Wade Associates

EXISTING GROUNDWATER WELL LOCATIONS

City of Roseville
Del Webb Specific Plan EIR
Roseville, California

10026-028-001

DAMES & MOORE

FIGURE 14-2

14.3 IMPACTS

14.3.1 Hydrology

IMPACT NO. H-1: Runoff rate exceeds capacity of existing culverts
SIGNIFICANCE: Significant
MITIGATION:
PROPOSED BY APPLICANT: Mitigation Measure H-A (Replace/add culverts)
ADDITIONAL MITIGATION: None
RESIDUAL SIGNIFICANCE: Less than significant

The main channel of Kaseberg Creek passes through an existing 8-foot by 13-foot corrugated arched pipe (super span) under Fiddyment Road (MacKay & Somps, 1993f). The existing arched pipe has a capacity of approximately 1,340 cfs, which is less than the estimated existing condition 100-year rate of flow. The existing culvert has enough capacity to pass the 10-year existing flow but not the 25-year flow (MacKay & Somps, 1993j).

The north branch of Kaseberg Creek passes through an existing 5-foot by 8-foot concrete box culvert at Fiddyment Road. This existing culvert has a capacity of approximately 250 cfs, which is also less than the estimated existing condition 100-year rate of flow. The culvert has enough capacity to handle the existing 10-year and 25-year flows (MacKay & Somps, 1993j).

The Applicant will replace these culverts and add three new culverts. The culverts will be sized to convey the estimated full-buildout rate of flow in a manner that is consistent with the City's flood control and floodplain management policies. This mitigation would reduce the impact of the Proposed Project on culvert capacity to a level that is less than significant.

■■■

IMPACT H-2: Offsite increase in flood elevations
SIGNIFICANCE: Potentially significant
MITIGATION:
PROPOSED BY APPLICANT: Mitigation Measures H-B (Pay developer fees for regional flood control improvements); H-C (Provide a post-development stormwater management program); H-D (Provide runoff rate control); H-E (Provide compensatory floodplain storage)
ADDITIONAL MITIGATION: Mitigation Measure H-F (Demonstrate no increase in water surface elevation, or revise the Proposed Project to delete proposed floodplain fill)
RESIDUAL SIGNIFICANCE: Less than significant

The Proposed Project would result in an increase in impermeable surface area. Increases impermeable surface area are associated with an increase in the rate and volume of runoff and with a decrease in infiltration and groundwater recharge. Soils in the Roseville area are categorized by the United States Department of Agriculture, Soil Conservation Service as primarily belonging to the hydrologic soil groups Type C and D. Figure 12-7 shows the soil types on the Proposed Project site. The soil types shown on the figure belong predominantly to hydrologic group Type D. These soil types are among the least permeable soils and subsequently result in higher rates and volumes of runoff than do Type A, B or C soils, which are more permeable. The figure also shows some Type B soils. These soils are located along the stream beds and are indicated by map symbols 175, 193, and 194.

Along South Branch Pleasant Grove Creek, the Nolte study indicates that flood elevations could be expected to increase as the watershed develops. The study indicates that flood elevations could increase 2.5 to 3 feet in the vicinity of the Proposed Project when compared to the elevations shown on the Flood Insurance Rate Map. The Proposed Project contains a small portion (6.4 percent) of the South Branch Pleasant Grove Creek located at the downstream end of the watershed. The Proposed Project would include a new crossing at Blue Oaks Boulevard. This crossing could potentially result in an increase in upstream water surface elevations. At another location the Applicant proposes to place fill for construction of residential streets or lots. This fill could also potentially result in an increase in upstream water surface elevations.

The PCFCD and the City are currently in the process of delineating a regional flood control plan for Pleasant Grove Creek along the western portion of the City. The plan includes provision for construction of a regional stormwater retention pond in western Placer County downstream of the Proposed Project and channel improvements between the regional retention pond and the confluence of Pleasant Grove and Kaseberg Creeks. The City would be the lead agency in construction of these improvements. All new development within the watershed in the City of Roseville would be assessed an impact fee for the acquisition of land and construction of the regional detention basins or for acquisition of the floodplain. The fees would be based on the incremental increase in runoff volume coming from each proposed development.

Although existing soil types on the Proposed Project site facilitate a high volume and rate of runoff, construction of impermeable surfaces such as buildings and roads would result in a slight increase in the rate and volume of runoff from the project site, unless stormwater management practices are implemented. Appendix G presents an estimate of the rate of runoff discharged from the Proposed Project site during 10-year, 25-year, and 100-year return frequency storms. The figures presented in Appendix G reflect estimated flow rates and volumes in South Branch Pleasant Grove Creek and Kaseberg Creek and its branches as they enter and leave the Proposed Project site.

The increase in runoff volume due to the Proposed Project was estimated using data from the Northwest Specific Plan Drainage Plan which utilizes long-duration storms capable of generating large volumes of runoff. The Northwest Specific Plan Drainage Plan will be the basis for determining developer fees for the regional retention pond. Using information from the Plan, the increased runoff volume attributable to the Proposed Project was estimated to be about 274 acre-feet. The Applicant's engineer is in the process of analyzing the final storage requirements for the Proposed Project.

Estimated flood elevation at various locations throughout the Proposed Project site as well as upstream and downstream of the Proposed Project are shown in Appendix G. This information was extracted from HEC-2 modeling prepared by the Applicant's consultant. As shown in Appendix G, preliminary estimates of offsite flood elevations for the post-project condition are, for all practicable purposes, equivalent to the estimated existing condition flood elevations, resulting in no impact to offsite water surface elevation. During final design, this will be verified at all locations.

The Applicant has proposed to enclose a portion of the north branch of Kaseberg Creek in a pipe at the eastern boundary of the Proposed Project site. The pipe would extend through the Proposed Project for about 300 feet to the eastern border of the Proposed Project site. The pipe would be designed in accordance with City standards. Unless the pipe and drainage system is properly designed, the system could potentially result in an increase in upstream flood elevations.

Mitigation has been identified that would require the Applicant to demonstrate that the Proposed Project would result in no increases in offsite surface water elevation. This mitigation measure would reduce the impact to a level that is less than significant.

IMPACT NO. H-3:	Onsite increase in flood elevations
SIGNIFICANCE:	Potentially significant
MITIGATION:	
PROPOSED BY APPLICANT:	Mitigation Measure H-G (Locate open space uses next to the floodplain)
ADDITIONAL MITIGATION:	Mitigation Measures H-F (Demonstrate no increase in water surface elevation, or revise the Proposed Project to delete proposed floodplain fill); H-H (Provide overland flow routes for 100-year rate of runoff); H-I (Provide two feet of freeboard between 100-year flood elevations and first floor of all structures)
RESIDUAL SIGNIFICANCE:	Less than significant

The Applicant proposes to grade the site for construction of roadways, building pads and other facilities that comprise the Proposed Project and stormwater management facilities. This work would alter the existing runoff patterns and conveyance capacities of the site and would increase the area and depth of onsite flooding.

Estimated flood elevations for the existing condition 10-year, 25-year, and 100-year storms for Kaseberg Creek (including branches) and South Branch Pleasant Grove Creek are presented in Table 14-3. The estimated increases in flood elevations for Kaseberg Creek and its branches within the Proposed Project site would be on the order of two feet or less. Proposed Project features, including creek crossings for pedestrians or motor vehicles, along with proposed grading and placement of fill in the Floodway and Floodway Fringe, would all contribute to the increased flood elevations onsite. Several of the features are part of the stormwater discharge rate control plan for the Proposed Project. Appendix G includes a tabulation of post-development onsite flood elevations. Existing and future floodplains on the Proposed Project site are shown on Figure 4-3.

From a hydrologic perspective, portions of proposed fill would be consistent with City requirements to maintain the rate of runoff from the project site to pre-development levels as well as not increasing flood elevations either upstream or downstream of the Proposed Project site. These portions of the fill are required as part of the overall stormwater management plan, for construction of runoff rate control, and for stormwater treatment facilities.

The General Plan prohibits placement of fill in the Floodway and allows fill in the Floodway Fringe on a case-by-case basis if it does not result in any increase in flood elevations (Floodplain Designation Policy No. 2). The Applicant-proposed fill would be inconsistent with a literal interpretation of this policy; however, the Proposed Project is the first application of this policy and is, for the most part, considered by the City staff to be consistent with the intent of the policy.

The City has therefore proposed an amendment to the General Plan that clarifies the intent of the policy. This is discussed in detail in Section 4.3.4 and in Chapter 18.

Table 14-4 summarizes the proposed fill along Pleasant Grove Creek, Kaseberg Creek, and its tributaries.

TABLE 14-4
PROPOSED FILL IN FLOODWAY AND FLOODWAY FRINGE

Water Course	Proposed Fill			
	Roadways[1] (cubic yards)	Floodway (cubic yards)	Floodway Fringe (cubic yards)	Total (cubic yards)
Kaseberg Creek				
Main Branch	5,280	400[2]	955	6,635
Middle Branch	190	0	3,625	3,815
South Branch	2,300	0	370	2,670
North Branch[3]	N/A	N/A	N/A	9,715[3]
Pleasant Grove Creek	115	0	0	115
Total	7,885	400	4,950	22,950[4]

Notes: [1] With approval of the City's proposed General Plan amendment, roadway fill would be considered an essential facility.
[2] This fill would be considered inconsistent with the City's General Plan even with approval of the City's proposed General Plan amendment.
[3] With approval of the City's proposed General Plan amendment, the Kaseberg Creek North Branch would be classified as a minor drainage with 10-year storm flows of less than 200 cfs.
[4] Includes fill in the Kaseberg Creek North Branch.

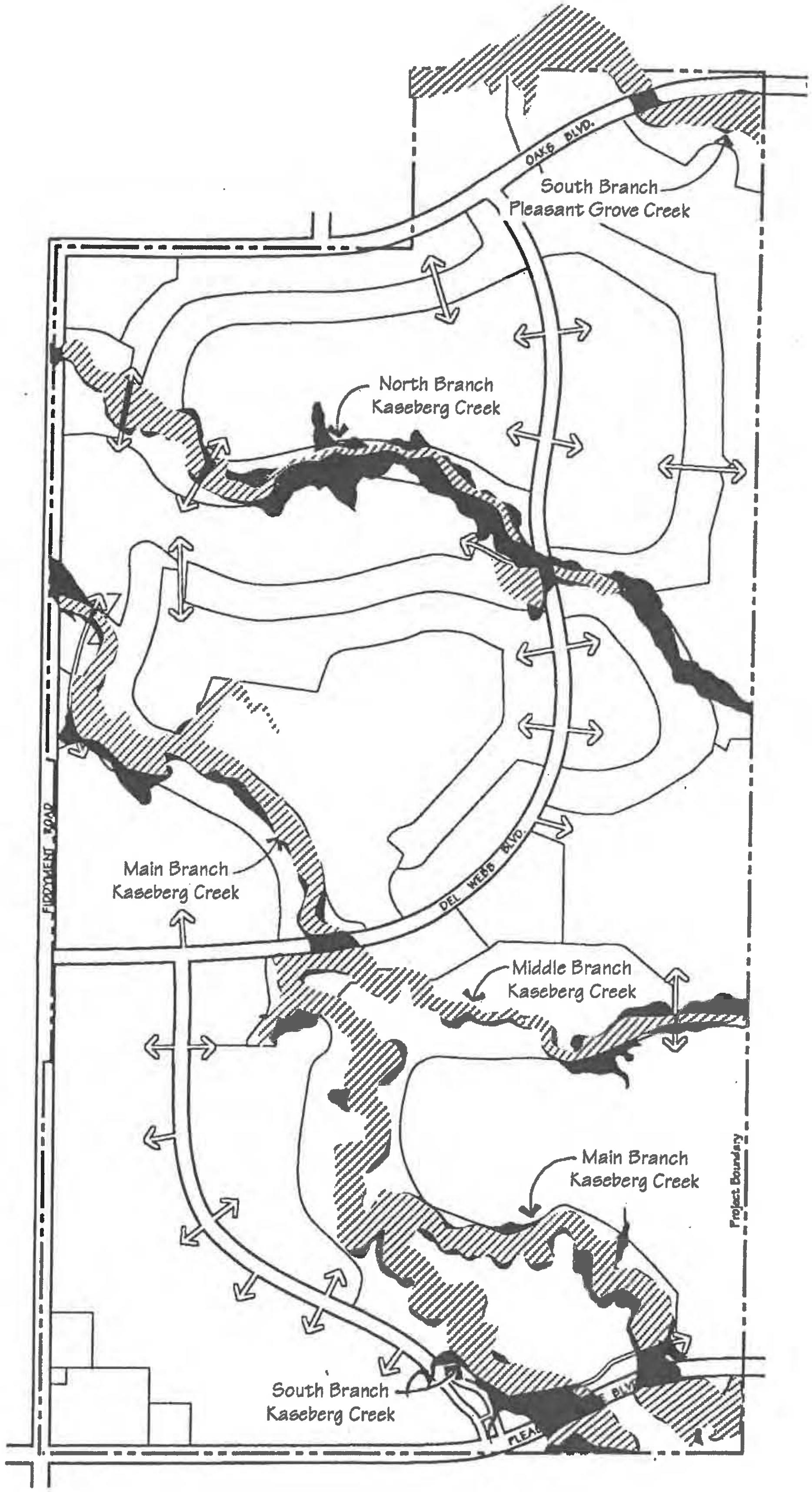
Source: Mackay & Somps, 1993k.

The fill volumes presented in Table 14-4 breaks down as follows:

- 7,885 cubic yards of fill for construction of roadways. This fill would be classified as required for construction of "essential" facilities and so would be found consistent if the City's proposed General Plan amendment is approved.

- 400 cubic yards of fill in the Floodway at golf course hole no. 3. This fill would be inconsistent with the City's General Plan, even if the City's proposed General Plan amendment is approved, because other feasible alternatives exist that could accomplish the flood control objectives of the Proposed Project.

- 4,950 cubic yards of fill in the Floodway Fringe, broken down as follows:



KEY

Pre-development Floodplain

Post-development Floodplain

Note: North Branch of Kaseberg Creek not regulated as floodplain per definition contained in city proposed general plan clarification.

N

Conceptual • No Scale

SOURCE: Wade Associates

FLOODPLAINS

City of Roseville
Del Webb Specific Plan EIR
Roseville, California

10026-028-001

DAMES & MOORE

FIGURE 14-3

1) 1,450 cubic yards of fill along the middle branch of Kaseberg Creek at the eastern boundary of the Proposed Project site (Village 9). The Applicant has demonstrated that this proposed fill does not increase flood elevations but requires the floodway to be modified to include an excavated channel to achieve no flood elevation increase. It could therefore be found inconsistent with the existing General Plan because the purpose of the fill is to enable the development of lots.

2) 2,100 cubic yards of fill along the edge of the Floodway Fringe at Village 12. This fill occurs in an area where stormwater management facilities result in an intentional onsite increase in flood elevations. This fill would be placed along the floodway fringe in minor drainages (finger swales). From a hydrologic perspective this fill could result in a slight increase in onsite flood elevations beyond that which would be required for runoff rate control and offsite flood elevation control. Therefore, mitigation has been identified that requires the Applicant to demonstrate that this fill would be consistent with the General Plan.

3) 1,080 cubic yards of fill related to golf course grading/stormwater detention, drainage control, and treatment pond construction. This fill would be part of the cut and fill grading operations required to contour the golf course, control drainage routes, and provide stormwater detention/water quality treatment facilities. Net excavation (cut) volume exceeds the fill volume and would therefore maintain the floodplain volume. This fill could be found consistent with the General Plan, if the City's proposed General Plan amendment is approved, as this fill comprises part of the overall stormwater management and detention (essential) facilities.

4) 320 cubic yards within minor drainages along the perimeter of the floodplain. These minor drainages have 10-year flow rates less than 200 cfs. This fill would therefore be consistent with the General Plan if the City's proposed General Plan amendment is approved.

Mitigation measures have been identified to reduce the impact of onsite flooding to a level that is less than significant from a hydraulic perspective. Mitigation Measure H-F (along with adoption of the City's proposed General Plan Amendment) would eliminate the Proposed Project's inconsistencies with the General Plan. At two locations, the Applicant does not believe that feasible alternatives exist which would meet their objectives and result in consistency with the General Plan. This is discussed in detail in Sections 14.4 and 4.3.4 and in Chapter 18.

■ ■ ■

IMPACT NO. H-4:	Increased erosion and sedimentation
SIGNIFICANCE:	Potentially significant
MITIGATION:	
PROPOSED BY APPLICANT:	Mitigation Measure H-J (Prepare a grading and erosion control plan)
ADDITIONAL MITIGATION:	Mitigation Measure H-K (Provide streambank reinforcement and sediment zone monitoring)
RESIDUAL SIGNIFICANCE:	Less than significant

During construction, existing vegetation would be stripped off the soil during site grading operations. These actions would cause increased erosion and sedimentation. The sediment could be carried into the adjacent creeks, wetlands and vernal pools and could cause potentially significant impacts on the local water quality and biological resources.

The Proposed Project includes several features which would tend to increase or decrease the velocity of flows through the stream course on the Proposed Project site. These features would include culvert crossings and grading activities that would alter the cross-sectional area of the floodplain or reduce backwater affects. In general, stream velocities through the project site, both before and after build-out of the water shed, would be in the two to seven feet per second (fps) range, with higher velocities at isolated locations approaching eight fps.

An increase in stream velocities increases the capacity of the stream to carry sediment. This in turn increases the rate of erosion. A decrease in steam velocities decreases the capacity of the stream to carry sediment, and this in turn increases the rate of sedimentation.

Mitigation measures require preparation of a grading and erosion control plan, and streambank reinforcement and sediment zone monitoring. These measures would reduce the impact to a level that is less than significant.

14.3.2 Water Quality

IMPACT NO. H-5:	Reduced stormwater runoff water quality
SIGNIFICANCE:	Potentially significant
MITIGATION:	
APPLICANT PROPOSED:	Mitigation Measures H-C (Provide a post-development stormwater management program); H-L (Implement water quality BMPs); H-M (Grade the golf course to drain through treatment ponds)
ADDITIONAL MITIGATION:	Mitigation Measure H-N (Promote stormwater treatment pond plug flow)
RESIDUAL SIGNIFICANCE:	Less than significant

The Proposed Project would increase the amount of impermeable surface area at the project site. Impermeable surfaces are associated with an increase in pollutant loads in stormwater runoff. Airborne pollutants are deposited on impermeable surfaces as are deposits from cars, trucks and other transportation devices. Runoff from the Proposed Project would be typical of urban runoff water quality and would include heavy metals, oil and grease, sediments, herbicides, pesticides and nutrients (nitrogen and phosphorous (EPA, 1983). Option NC-1 would provide for 3.0 more acres of commercial development. This would result in a somewhat higher level of stormwater pollutant uptake and discharge. In addition, the Proposed Project would include golf courses. Golf courses are associated with an increase in herbicide, pesticides and nutrients in runoff. Typical pollutants in stormwater runoff are presented in Table 14-5.

TABLE 14-5
TYPICAL CONCENTRATIONS OF NON-POINT SOURCE POLLUTANTS IN STORMWATER

Land Use	Typical Non-Point Source Pollutant (pounds per acre/year of runoff)			
	Biological Oxygen Demand (BOD_5)	Suspended Solids	Total Phosphorus	Total Nitrogen
Residential	24	545	0.32	4.0
Commercial	98	745	0.75	9.0
Recreation	1.3	420	0.06 to 0.2	2.3 to 4.4
Cropland, pasture, and unused rural land	2.1 to 30	420 to 10,000	0.09 to 0.64	0.9 to 23

Source: Walesh, 1989.

Vegetation within the Proposed Project consists primarily of annual grassland and vernal pool communities. Also present is a dense mature oak riparian forest along the creeks and a deciduous blue oak savannah that typically parallels portions of the riparian forest. The wetland habitats within the study area are 1) vernal pools, 2) seasonal freshwater wetlands, 3) defined drainages, and 4) swales. All of the communities have been degraded by the recent and historic livestock grazing. In particular, vernal pool community diversity has been reduced from trampling, fertilization, and dry farming, although native plant species still predominate in most of the pools. These types of vegetation and the wildlife habitat they provide could potentially be impacted by reduced water quality. These impacts are discussed further in Chapter 15, Biological Resources.

The Applicant proposes to route stormwater on the Proposed Project site through grassed swales, and/or wet and dry detention ponds prior to discharge into natural drainages. Prior to discharge of stormwater into preservation or compensation wetlands, the Applicant proposes to treat the stormwater by routing it through wet detention basins. The wet basin would be designed to remove or reduce floating oil, grease and debris, settleable solids and dissolved nutrients.

In other areas, runoff from the Proposed Project will be routed through grassed swales and dry detention basins prior to discharge to Kaseberg Creek and its tributaries. Grassed swales and dry detention basins would be designed to remove floatables such as oil, grease and debris as well as settleable solids. The dry detention facilities would discharge their stored water in about 24 to 48 hours. These facilities would not be expected, however, to substantially reduce dissolved nutrients such as nitrogen and phosphorous. Dissolved nutrient removal typically requires sufficient time (7 to 10 days) for effective nutrient uptake by plant and micro-organisms. The Proposed Project would therefore result in an increased nutrient load on Kaseberg Creek and its tributaries which would accelerate the growth of vegetation within the drainages. This vegetation would require periodic removal during operation and maintenance of the stormwater management system

Mitigation measures have been identified that would reduce the stormwater runoff water quality impacts of the Proposed Project to a level that is less than significant.

■■■

IMPACT NO. H-6:	Reduced water quality resulting from use of reclaimed water
SIGNIFICANCE:	Potentially significant
MITIGATION:	
APPLICANT PROPOSED:	Mitigation Measures H-C (Provide a post-development stormwater management program); H-L (Implement water quality BMPs); H-M (Grade the golf course to drain through treatment facilities)
ADDITIONAL MITIGATION:	Mitigation Measure H-N (Promote stormwater treatment pond plug flow)
RESIDUAL SIGNIFICANCE:	Less than significant

Reclaimed water from the City's wastewater treatment plant would provide irrigation for the proposed golf courses and landscape corridors. The system for providing the reclaimed water to the Proposed Project is described in Chapter 6. There is the potential for irrigation runoff, including reclaimed water runoff, to degrade the water quality of Kaseberg Creek.

State of California Water Resources Control Board sets water quality criteria for agricultural and municipal irrigation. As shown in Table 14-6, reclaimed water from the Roseville Treatment Plant compares favorably to these standards. Expected quality of the reclaimed water falls within the acceptable range of water quality criteria as shown on the table.

If irrigation rates or conditions result in runoff of reclaimed water, constituents similar to those in stormwater runoff could be conveyed to natural drainages. Given the initial quality of the reclaimed water and the mitigations proposed to reduce impacts on water quality resulting from stormwater runoff, the impacts of reclaimed water on water quality would be less than significant.

14.4 MITIGATION MEASURES

14.4.1 Hydrology

Mitigation Measure H-A: Replace/add culverts

Mitigation Measure H-A applies to Impact H-1.

The main channel of Kaseberg Creek, which passes through an existing 8-foot by 13-foot corrugated arched pipe (super span) under Fiddyment Road, is large enough to pass the 10-year build-out flow but not the 25-year flow. The north branch, which passes through an existing 5-foot by 8-foot concrete box culvert at Fiddyment Road, is large enough to pass the 10-year and 25-year flows but not the 100-year flow.

TABLE 14-6
PRELIMINARY WATER QUALITY CRITERIA FOR AGRICULTURAL AND MUNICIPAL IRRIGATION

Parameter	Acceptable	Marginal	Unacceptable	Roseville[1] Effluent
Total Salts				
TDS, mg/l	<450	450-2000	>2000	406[2]
EC, dS/m	<0.7	0.7-3.0	>3.0	0.69[2]
Permeability				
Sodium, %[4]	<60	60-75	>75	NA
SAR	<6	6-9	>9	NA
Toxic Ions				
Sodium, mg/l				52[c]
sprinkler irrigation	<70	>70		
Boron, mg/l	<0.5	0.5-1.0	>1.0	NA
Chloride, mg/l				67[3]
surface irrigation	<140	140-350	>350	
sprinkler irrigation	<100	>100		
Copper, mg/l	<0.2			0.009955
Nickel, mg/l	<0.5			0.006
Zinc, mg/l	<5.0			0.048929
Cadmium, mg/l	<0.005			0.00024
Sulfate, mg/l	<950	950-1900	>1900	41[3]
Bicarbonate				
RSC, meq/l	<1.25	1.25-2.5	>2.5	NA
Bicarbonate (HC03), mg/l	<90	90-520	>520	NA
Nitrogen (Total-N), mg/l	<5	5-30	>30	NA
pH	6.5-8.4			7.1[2]
Residual Chlorine, mg/l	<1.0	1.0-5.0	>5.0	NA

Notes: [1] Roseville Waste Water Treatment Plant (WWTP) effluent average concentrations for 1989-1992
[2] Roseville WWTP effluent average concentrations for 1992
[3] Percent Sodium Na = 100 Na (Na+Ca+Mg-K); all ions expressed in meq/l
[4] Roseville WWTP effluent grab samples for August 1988
NA - Not Available

Source: James M. Montgomery, 1993a.

The Applicant proposes to increase the flood conveyance capacity at each of the Kaseberg Creek crossings of Fiddyment Road. Replacement of the culverts will be consistent with the regional flood control plan. New roadway crossings will be designed to provide capacity for the 100-year storm for full build-out of the Proposed Project site, as well as areas upstream of the Proposed Project. The existing Kaseberg Creek (main branch) crossing will be extended to accommodate an increased Fiddyment Road width. In addition, three 8-foot by 10-foot culverts will be added. For the North Branch Kaseberg Creek, the existing culvert will be replaced with two 6-foot by 7-foot culverts.

This mitigation measure will reduce the impact of the Proposed Project on existing culvert capacity to a level that is less than significant.

Mitigation Measure H-B: Pay developer fees for regional flood control improvements

Mitigation Measure H-B applies to Impact H-2.

The PCFCD and the City are currently in the process of defining the regional flood control plan for Pleasant Grove Creek along the western portion of the City. The City of Roseville has proposed to construct a regional stormwater retention pond in western Placer County downstream of the Proposed Project, and is also proposing channel improvements between the pond and the confluence of Pleasant Grove and Kaseberg Creeks.

A feasibility study is currently being prepared to evaluate possible regional detention basin locations. An alternative also under consideration includes the acquisition of land located within the floodplain in selected reaches along Pleasant Grove Creek. The PCFCD is also reviewing several flood control alternatives for Pleasant Grove Creek. These include downstream storage, levees, flood proofing, insurance pooling, and upstream storage basins (Huff, 1993).

The PCFCD proposes to collect a fee from all developers in the watershed. The fees will be used for the acquisition of land and construction of the regional detention basins or for acquisition of the affected floodplain. The fees will be based on the incremental increase in runoff volume coming from Proposed Project sites. The City already collects such a fee.

The Applicant proposes to participate in the regional flood control plan through the payment of developer fees. Once implemented, the regional flood control plan will reduce the impact of the Proposed Project on downstream flood elevations to a level that is less than significant. Downstream impacts would be mitigated directly through purchase of the floodplain or by construction of the retention basin.

It should be noted, however, that development of the regional flood control plan is still in progress and elements of the plan may be outside the control of the City. The developer, therefore, has proposed several additional mitigation measures that help address the concerns of the interim condition:

Mitigation Measure H-C: Provide a post-development Stormwater Management Program

Mitigation Measure H-C applies to Impacts H-2, H-5 and H-6.

Through a combination of site land use configuration, grading design, onsite detention facilities, floodplain storage and storm drainage system operation and maintenance, the Applicant proposes to control the rate of runoff and reduce pollutant conveyance from the Proposed Project site. A post-development Stormwater Management Program will be developed that identifies operation and maintenance procedures and schedules so that rate control and pollutant removal efficiency of the stormwater management system is sustained. The plan will also describe runoff rate control features required to hold the increase in the rate of runoff to pre-development levels, operations and maintenance requirements will be described along with the frequency of required activities. The plan will include provisions for vegetation removal to maintain the conveyance capacity of natural channels. The Applicant has identified mitigation that would control the rate of runoff from the Proposed Project site (Mitigation Measures H-E and H-F), as described below.

Mitigation Measure H-D: Provide runoff rate control

Mitigation Measure H-D applies to Impact H-2.

The regional flood control plan may not be implemented concurrently with the Proposed Project. This could result in potentially significant increases in downstream flood elevations during the interim period unless the rate of runoff from the site is regulated.

The Applicant proposes to increase the culvert capacity at Fiddyment Road to remove existing flow constrictions and allow runoff to be conveyed more quickly to the future downstream regional retention basin. The Applicant proposes to provide runoff rate controls designed to restrict the rate of discharge from the Proposed Project site to pre-development levels. These measures should remain in place and be incorporated into the regional flood control plan. Runoff rate control would increase onsite runoff storage and would result in more frequent inundation of the proposed golf course. This mitigation measure would increase flood elevations on the Proposed Project site. The Applicant has demonstrated that runoff rate control measures can be incorporated into the Proposed Project and can control the post-development rate of runoff to the pre-development rate.

This mitigation measure would increase onsite flood elevations and would therefore be inconsistent with the General Plan Floodplain Designation Policy No. 2 unless the City's proposed General Plan amendment is approved (see discussion in Section 4.3.4).

Mitigation Measure H-E: Provide compensatory floodplain storage

Mitigation Measure H-E applies to Impact H-2.

The Applicant proposes to provide compensatory floodplain storage volume to replace storage that is lost due to placement of fill in the Floodway and Floodway Fringe. The Applicant proposes to place fill in the Floodway and Floodway Fringe as part of the transportation and stormwater management improvements. The Applicant proposes to provide compensation for this fill volume by grading the golf course and open space areas adjacent to the floodplain along with onsite increases in flood elevations. The Applicant has demonstrated that compensatory onsite floodplain storage has been provided.

This mitigation measure would involve the placement of fill in the Floodway and Floodway Fringe, and would therefore be inconsistent with the General Plan Floodplain Designation Policy No. 2 unless the City's proposed General Plan amendment is approved (see discussion in Section 4.3.4).

Mitigation Measure H-F: Demonstrate no increase in water surface elevation, or revise the Proposed Project to delete proposed floodplain fill

This Mitigation Measure applies to Impacts H-2, H-3, and L-15.

At most locations the Applicant has demonstrated that the Proposed Project would not result in any increase in flood elevations and that proposed placement of fill in the Floodway and Floodway Fringe would be consistent with the General Plan, if the City's proposed General Plan amendment is approved.

In several areas, however, the Applicant has not yet demonstrated consistency with the General Plan, even if the City's proposed General Plan amendment is approved. During the final design process, it may become evident that additional areas, beyond those identified below, may require the Applicant to demonstrate General Plan consistency. This mitigation measure would require the Applicant to submit design computations that demonstrate General Plan consistency, at a minimum, in the following locations (and at other locations as may be required by the City before approval of final design):

(1) proposed bridge crossing of South Branch Pleasant Grove Creek at Blue Oaks Boulevard;

(2) fill within the Floodway Fringe within the South Branch Pleasant Grove Creek associated with residential streets and lots;

(3) along the north branch of Kaseberg Creek, where the Applicant proposes to enclose a portion of the drainage within a pipe between Del Webb Boulevard and the eastern boundary of the Proposed Project;

(4) along the middle branch of Kaseberg Creek at the eastern boundary of the Proposed Project site; and

(5) at golf course hole no. 3.

At locations (4) and (5) above, the Applicant does not believe that feasible alternatives exist which would meet their objectives and result in consistency with the General Plan (if amended).

Mitigation H-G: Locate open space uses next to the floodplain

Mitigation Measure H-G applies to Impact H-3 and L-8.

The Applicant proposes to locate open space uses in the areas adjacent to the floodplains. This reduces the likelihood of damage to buildings during flood events by providing a buffer zone that will be inundated during flooding prior to buildings being flooded. This measure would help reduce the impact of increased onsite flood elevations due to the Proposed Project to a level that is less than significant; however, City development standards require additional measures to guard against flooding. These additional requirements are identified in Mitigation Measure H-H and H-J, below.

Mitigation Measure H-H: Provide overland flow routes for 100-year rate of runoff

Mitigation Measure H-H applies to Impact H-3.

City development standards require that overland flow routes be provided. The overland flow routes must be designed for the 100-year rate of runoff without regard to storm sewer pipe capacity. Grading plans and building elevations should be developed to accommodate this City standard.

Mitigation Measure H-I: Provide two feet of freeboard between 100-year flood elevations and first floor of all structures

Mitigation Measure H-I applies to Impact H-3.

City development standards require a minimum of two feet of freeboard between the 100-year flood elevations and the first floor of adjacent buildings. Grading plans and building elevations should be developed to accommodate this City standard.

Mitigation Measure H-J: Prepare a grading and erosion control plan

Mitigation Measure H-J applies to Impact H-4, L-9 and B-12.

The RWQCB issues regulates runoff water quality from general construction activity for sites with five acres or more in area under the authority of the EPA NPDES Permit. The Applicant will be required to secure an NPDES permit for construction of the Proposed Project. The Permit process will require submission of a Notice of Intent (NOI) and supporting documents including a Storm Water Pollution Prevention Plan (SWPPP). The objectives of the SWPPP are to identify the sources of sediment and other pollutants that affect the quality of stormwater discharges and to describe and ensure the implementation of practices to reduce sediment and other pollutants in stormwater discharges. The SWPPP must include Best Management Practices (BMPs) which address source reduction and, if necessary, should include BMPs which require treatment. Potential source reduction measures could include temporary silt fences, temporary sedimentation basins, mulching, and diversion ditches. The Applicant proposes to develop the grading and erosion control plan in a manner that is consistent with preservation of oak woodland habitat and other biological resources. The locations of these pollutant-reduction measures will be determined during the final design process.

The development of a grading and erosion control plan in conformance with the requirements of the NPDES General Construction Activity Permit will, in combination, reduce water quality impacts due to construction activities to a level that is less than significant; however, other water quality impacts due to increases in stream velocity would not be mitigated by this measure. Mitigation Measure H-I (discussed below) has been identified to further reduce impacts.

Mitigation Measure H-K: Provide streambank reinforcement and sediment zone monitoring

Mitigation Measure H-K applies to Impacts H-4 and L-9.

Some features of the Proposed Project would increase stream velocities in segments of Kaseberg Creek and its branches, which would increase the rate of erosion in these segments. In other areas, Proposed Project features would result in a reduction in stream velocities, which would result in an increase in the rate of sedimentation in these segments.

Stream course segments with an increase or decrease in stream flow velocities of 25 percent or more should be identified. Stream segments with velocity increases should be examined by a qualified geologist or soils engineer to determine those areas that would be sensitive to an increase in flow velocity and subsequent erosion. A stream bank reinforcement plan should be developed to reduce the impact of increased velocities to a level that is less than significant. Depending on the magnitude of the velocity increase, reinforcement measures could include the placement of gabions, geotextile materials and plantings. If practicable, geotextile reinforcement and planting would be preferable to gabions.

Stream segments with velocity reductions should be surveyed to identify sensitive plant communities that could be adversely impacted by accumulation of sediments. Identified plant communities should be mapped and monitored and compensatory measures taken to maintain or replace these communities. This measure should be coordinated with the overall wetland mitigation plan for the Proposed Project.

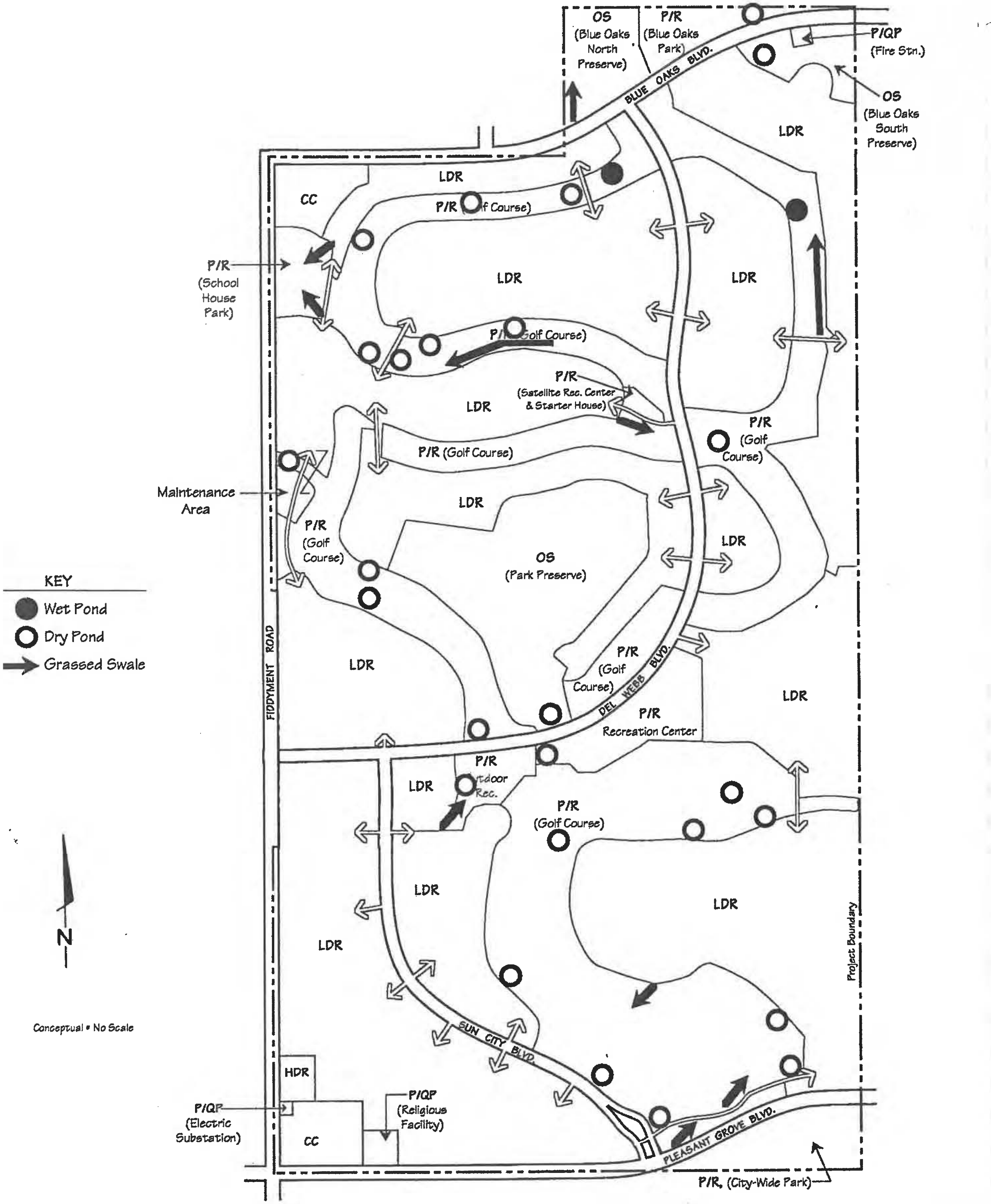
Mitigation Measure H-L: Implement water quality BMPs

Mitigation measure H-L applies to Impacts H-5, H-6, B-6, B-12 and B-13.

The Applicant proposes to implement a Stormwater Management Program using Best Management Practices (BMPs) defined in the State of California Manual for Best Management Practices. One measure would be the use of non-structural controls. These may include controlled maintenance of public and golf course landscaping to reduce nutrients, pesticides and insecticides. Proposed structural BMPs will include designing grassed swales, stormwater wetlands, extended dry detention ponds, wet ponds, and/or irrigation ponds. Based on the anticipated pollutant loading of a particular watershed, these measures could be implemented as serial BMPs and would substantially reduce pollutant loads. Figure 14-4 shows the planned locations of stormwater management ponds.

The Proposed Project would be designed to reduce vehicular traffic by encouraging pedestrian and electric cart transportation. Proactive education programs to reduce pollutant dumping, such as stenciling of storm drains, will be implemented. Residents would be encouraged to use electric carts to travel with in the Proposed Project (MacKay & Somps, 1992a).

The Applicant proposes to reduce the size of the developed watersheds by incorporating additional curb inlets, which will reduce the total pollutant loads of the first flush. The curb inlets which drain the residential areas will outfall into grassed swales located behind the lots along the edges of the golf course and Central Preserve. Outlet structures such as level spreaders may be used to allow the discharge to enter the swales in the form of sheet flow. The primary pollutant removal mechanisms associated with grassed swales are sedimentation and infiltration. Changes in the flow hydraulics affected by routing the flow through grassed channels increase the opportunity for infiltration of



STORMWATER TREATMENT FACILITIES

City of Roseville
Del Webb Specific Plan EIR
Roseville, California

10026-028-001

DAMES & MOORE

FIGURE 14-4

soluble pollutants, deposition of suspended solids, filtration of suspended solids and absorption of the soluble fraction of the pollutants by plants. In order to maximize the contact time within the swales, the incorporation of check dams within the system will be considered. The grassed swales will convey the runoff, at non-erosive velocities, to either a stabilized channel, or directly into another BMP facility (i.e., detention pond, constructed wetlands) (MacKay & Somps, 1992a).

The Stormwater Management Program should address the accumulation of heavy metals such as lead, zinc, cadmium, and copper, including the frequency of periodic excavation to restore sediment storage volumes, and disposal of excavated materials in accordance with applicable laws and regulations in effect at the time of excavation.

Mitigation Measure H-M: Grade the golf course to drain through treatment facilities

Mitigation Measure H-M applies to Impacts H-5 and H-6.

The Applicant proposes to design golf course grading, to the extent practicable, so that runoff is directed through grassed swales, wet ponds and/or stormwater wetlands prior to discharge to natural drainageways, preserved wetlands, or compensatory wetlands. Golf course grading plans must be approved by the City. The Applicant proposes to design these features in a manner consistent with preservation of the oak woodland and other biological resources. This would involve the placement of fill in the Floodway Fringe and would be inconsistent with the City's General Plan unless the City's proposed General Plan amendment is approved.

Mitigation Measure H-N: Promote stormwater treatment pond plug flow

Mitigation Measure H-N applies to Impacts H-5, H-6, B-6, B-13 and L-9.

Storm sewer piping and drainage swales should be design to promote plug flow through proposed "wet" treatment ponds (water entering one end and leaving the other) to prevent "short circuiting" caused by inflow lines located near the outlet end of the pond. The pools should be generally designed to provide long and wide hydraulic paths that provide plug flow, and very low velocities.