INITIAL STUDY/MITIGATED NEGATIVE DECLARATION

AGRICULTURAL AQUIFER STORAGE AND RECOVERY PROGRAM

August 2019

LEAD AGENCY:
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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION AND PROJECT DESCRIPTION

1. Project Title: Agricultural Aquifer Storage and Recovery (Ag-ASR) Program

2. Lead Agency Name and Address:
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4. Program Location:

The location of the Westlands Water District (Westlands or District) is shown on Figure 1. The Ag-ASR Program would be located within the District's boundary. The District is composed of more than 1,000 square miles of prime farmland on the west side of the San Joaquin Valley within Fresno County and the northern portion of Kings County.

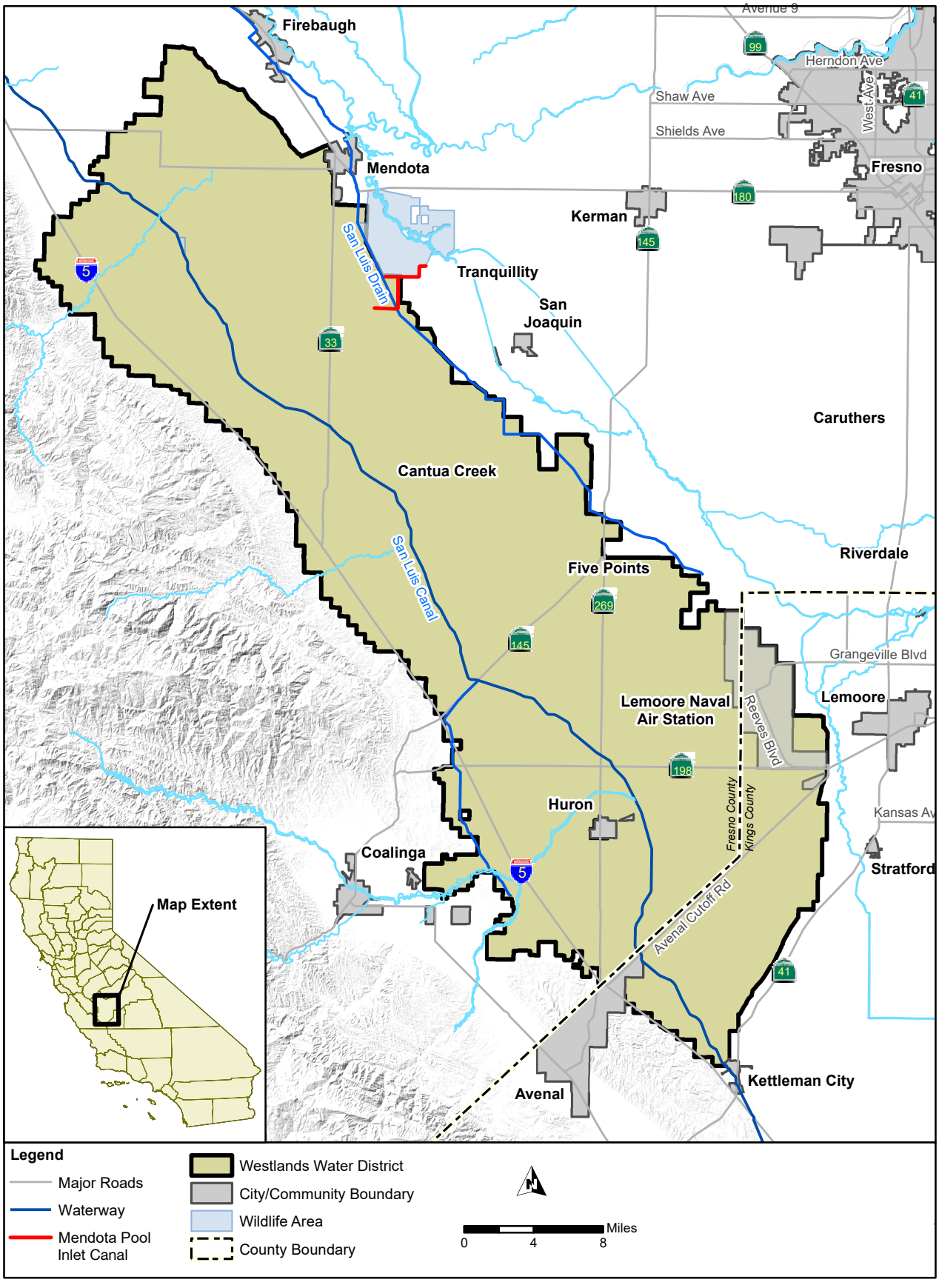
5. Program Sponsor's Name and Address:
Westlands Water District
3130 W. Fresno Street
Fresno, CA 93703-6056

6. General Plan Designation: Agriculture

7. Zoning: Agriculture

8. Introduction:

The District is proposing to implement a large-scale Ag-ASR Program through use of recharge wells to enhance subsurface recharge and subsequent recovery in the Westside Subbasin (Groundwater Subbasin Number 5-22.09). Introductory discussion is provided in this section while Section 9 provides a description of the Program.



Source: Westlands Water District, July 2019

Figure 1. District Map

Westlands Water District

The District was formed in 1952 with a mission to provide timely, reliable, and affordable water services to landowners and water users in western Fresno and Kings Counties. These water services include the sustainable management and delivery of water supply, as well as the provision of ongoing education, advanced technology and innovative methods for environmental conservation.

Westlands is the largest agricultural water district in the United States.[1] Under federal contract, Westlands provides water to 700 family-owned farms that average 875 acres in size. Westlands also provides a limited quantity of untreated, non-potable Central Valley Project (CVP) water for municipal and industrial customers in the District.

Westlands receives its water allocation under a water service contract with the federal government as part of the San Luis Unit of the CVP. The water delivered to Westlands is pumped from the Sacramento-San Joaquin Delta. It is then pumped through the Delta-Mendota Canal and lifted via the O'Neill Pumping Plant to the O'Neill Forebay and to the San Luis Canal to meet immediate demands or stored in the San Luis Reservoir for later use. Water stored in the San Luis Reservoir for later use is released from this reservoir when Jones Pumping Plant is unable to meet demands. The Westlands water users take delivery from the San Luis Canal and Coalinga Canal.

Deliveries from the CVP allowed water users within the District to curtail their dependence on groundwater pumping which can be associated with aquifer overdraft. The District water delivery system includes 1,034 miles of fully-enclosed buried pipes and 3,300 water meters along the entirety of its system to ensure water is delivered with zero losses. About 95% of Westlands' irrigated lands are serviced by efficient drip irrigation systems.

Westlands' water service contracts with the Bureau of Reclamation (Reclamation) to deliver up to 1,197,000 acre-feet of CVP water.[2] However, the total water available during the year is about 35% short of the 1.14 million acre-feet average water demand in the District. The average sustainable yield of the Westlands Subbasin ranges from 250,000 acre-feet to 300,000 acre-feet. CVP water deliveries often vary substantially from year to year depending on precipitation patterns. The CVP water allocation over the last 14 years is summarized in Table 1.

Table 1. Historical CVP Allocation

2006 – 100%	2013 – 20%
2007 – 50%	2014 – 0%
2008 – 40%	2015 – 0%
2009 – 10%	2016 – 5%
2010 – 45%	2017 – 100%
2011 – 80%	2018 – 50%
2012 – 40%	2019 – 75%

Source: Reference 1

Westlands and its water users must adapt to ongoing supply shortages which requires more reliance on groundwater pumping and other sources of water supply, as well as variations in the amount of agricultural land that needs to be fallowed. The District continues to fund increased education and technology enabling growers to effectively utilize water allotments. This has resulted in some of the most productive and water-efficient farms in the world.

Sustainable Groundwater Management Act

On September 16, 2014, a three-bill legislative package composed of AB 1739, SB 1168, and SB 1319, collectively known as the Sustainable Groundwater Management Act (SGMA), was signed into law. For the first time in its history, California has a framework for sustainable groundwater management – "management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable effects." [3]

SGMA requires governments and water agencies of high and medium priority basins to halt overdraft and bring groundwater basins into balanced levels of pumping and recharge. Under SGMA, these basins should reach sustainability within 20 years of implementing their sustainability plans. For critically over-drafted basins, the deadline would be 2040, and 2042 for remaining high and medium priority basins. SGMA empowers local agencies to form Groundwater Sustainability Agencies (GSAs) to manage basins sustainably and requires those GSAs to adopt Groundwater Sustainability Plans for crucial groundwater basins in California. Westlands has been designated as the GSA for the Westside Subbasin and the proposed Ag-ASR Program will be identified as an essential augmentation strategy in the District's Groundwater Sustainability Plan.

SGMA directs the California Department of Water Resources (DWR) to identify groundwater basins and subbasins in conditions of critical overdraft. As defined by SGMA, "A basin is subject to critical overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts." The Westside Subbasin is one of nine critically overdrafted basins in California. [4]

Regulatory Overview

ASR projects are regulated both by the United States Environmental Protection Agency (USEPA), the State Water Resource Control Board (SWRCB), and the nine Regional Water Quality Control Boards (RWQCB). Relevant statues, regulations and policies are summarized below.

Underground Injection Control Program. At the federal level, ASR wells are implemented through the Underground Injection Control Program which implements the pollution prevention provisions of the Safe Drinking Water Act. USEPA classifies ASR wells as "Class V" injection wells which are regulated through a "permit by rule" process. Injection wells are authorized unless or until a contaminant incident or other cause for concern prompts further investigation. State regulation, where applicable, takes primacy over federal regulation of ASR wells as long as Safe Drinking Water Act provisions are met.

General Waste Discharge Requirements for Municipal ASR Projects. The SWRCB adopted Order 2012-0010 in 2012, General Waste Discharge Requirements for Aquifer Storage and Recovery Projects that Inject Drinking Water into Groundwater.[5] An Initial Study/Mitigated Negative Declaration (IS/MND) was prepared on the General Order by the SWRCB (General Order).[6] The General Order includes the following introduction highlighting the importance of ASR for groundwater management:

> "Aquifer Storage and Recovery (ASR) projects will improve statewide water management by increasing local storage that will be responsive to the needs of local communities and environmental resources. Statewide implementation of ASR projects will help California fulfill its vast conjunctive use potential. This is particularly true in the Central Valley, which possesses not only the state's largest sources of surface water, but also by far the state's largest aquifer."

The objectives of the General Order are to comply with California Water Code Sections 13263 and 13264, provide uniform interpretation of state standards to ensure the safe, reliable storage of drinking water in aquifers for later use as a municipal/domestic supply, and help streamline the regulation process for authorizations to use aquifer storage and recovery.

The General Order establishes terms and conditions of discharge to ensure that the discharge does not unreasonably affect present and anticipated beneficial uses of groundwater and surface water, requiring ASR projects to not cause groundwater to exceed any water quality objective, unreasonably affect beneficial uses, or cause a condition of pollution or nuisance. The General Order requires implementation of best practicable treatment or control (BPTC) measures.

California Water Code. Several sections of the California Water Code apply to ASR projects.[7] Even though the recharge water technically is not waste, regulation is through the regional water quality control boards because these projects involve the injection of water into groundwater. Water Code requirements include the project sponsor filing a report of waste discharge (ROWD) with the appropriate regional board (Sections 13260 and 13264), and prescribing of general waste discharge requirements (Section 13263). Regional boards may choose to waive ROWD filings for pilot tests, in which case federal Underground Injection Program requirements are applied.

Antidegradation Policy. Procedures for the implementation of the antidegradation directives of the SWRCB are established by the Implementation Plans of the various Water Quality Control Plans (Basin Plans). In general, the prevention of degradation of high quality groundwaters and surface waters is a high priority of the California Water Boards. In 1960, the SWRCB adopted Resolution 68-16 which states:[8]

"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 the maximum benefit to the people of the State will be maintained."

Any activity that results in the degradation of the quality of waters of the state must be required to employ best practicable treatment or control of the discharge necessary to assure that pollution or nuisance will not occur and the highest quality of water will be maintained consistent with maximum benefit to the people of the state. Resolution 68-16 and the antidegradation implementation plans of the various Water Quality Control Plans are collectively known as the "Antidegradation Policy."

The Water Quality Control Plan for the Tulare Lake Basin, in which the Ag-ASR Program is located, was last revised in January 2015.[9] The Basin Plan also provides the following approach for the Tulare Lake Basin:

"The Regional Water Board will apply the directives of Resolution No. 68-16 in considering whether to allow a certain degree of degradation to occur or remain. In conducting this type of analysis, the Regional Water Board will evaluate the nature of any proposed, existing, or materially changed discharge, that could affect the quality of waters within the region. Any discharge of waste to high quality waters must apply best practicable treatment or control not only to prevent a condition of pollution or nuisance from occurring but also to maintain the highest water quality possible consistent with the maximum benefit to the people of the State."

Agricultural Aquifer Storage and Recovery Program

As discussed above, the Westside Subbasin has been identified as a critically overdrafted groundwater subbasin by DWR and SGMA requires that a Groundwater Sustainability Plan (GSP) must be developed by January 2020 and sustainability achieved by 2040. Westlands has practiced groundwater basin management for decades with a formal groundwater management plan developed in 1996.[10] Westlands is currently evaluating water resource management strategies to achieve sustainability as defined by SGMA. Ag-ASR is being considered as a key management strategy utilized in the GSP being developed by Westlands.

With Ag-ASR, groundwater conditions would be improved through recharge of surface water into groundwater aquifers during times when surplus or supplemental surface water may be available. The Ag-ASR concept being evaluated by Westlands is direct recharge of water into the groundwater basin and recovery using up to approximately 400 irrigation wells owned by individual landowners (Ag-ASR Program). If Program economics are sufficiently positive and there are no significant adverse effects, additional wells could be converted. Converting many existing wells to Ag-ASR wells could provide a substantial source of supplemental water for drought areas and maintain sustainability under the California SGMA.

ASR Pilot Studies

Earlier investigations by the District recommended exploration of the potential for Ag-ASR because of the difficulty with surface percolation for groundwater recharge.[11] Given this recommendation, the District performed an Ag-ASR pilot study on a single well in 2017 and a technical report was prepared.[12] The purpose of the ASR Pilot Study was to determine the general feasibility of recharge potential through injection and recovery, investigate water quality impacts, evaluate performance, address unforeseen issues, and provide a basis for estimating costs recharge and recovery of surface water using groundwater wells in the District. Results of the Pilot Study enabled the District to demonstrate that the Ag-ASR Program would not cause groundwater to exceed any

water quality objective, unreasonably affect beneficial uses, or cause a condition of pollution or for nuisance, in conformance with the General Order.

The well selected for the Pilot Study was a District well that was no longer in use and located about 10 miles south of Mendota. Surface water for the pilot study was obtained from the San Luis Canal and from the Kings River from the Mendota Pool. The pilot study well was regulated as an USEPA Class V injection well associated with a waiver approval letter from the RWQCB. Facilities included a booster pump, agricultural and media filtration, control values, chlorine injection, cation water conditioning, and monitoring instrumentation. A photograph of the installed facilities is shown as Figure 2.

The major elements of the monitoring program for the pilot test are listed in Table 2. In all, 178 acre-feet of water were injected during an 84-day period and recovered during a 64-day period. Overall, the results of the pilot study were very encouraging from a water quality perspective and the risks of adverse effects to other wells in the area were determined to be very low. The overall conclusion from the ASR Pilot Study was that the District should consider the development of a new District-wide ASR Program under a programmatic permit. Specific results of the Pilot Study are integrated into the evaluation of water quality impacts in Chapter 3.

Table 2. Major Elements of the ASR Pilot Monitoring Program

Parameter Category	Measurement
Recharge Operation	Flow, pressures, turbidity, Electrical Conductivity (EC)
Recharge Well Water Level	Level transducer
Nearby Well Water Level	Sounder
Recharge Water Quality	Samples and analyses, including microbial testing
Nearest Drinking Water Well	EC of samples as intrinsic tracer
Backflush Water Quality	EC (meter), chlorine (test strips)
Recovery Water Quality	EC monitoring, samples and analyses (including intrinsic tracers and microbial testing)

Source: Pilot Study Report, reference 12

Additional pilot Ag-ASR wells are being considered for late 2019 that would provide additional data for the final Design, Operations and Monitoring Plan. Additional pilot wells would also provide operational experience and data for different areas and hydrogeologic conditions in the District.

Report of Waste Discharge and Technical Report

A draft Report of Waste Discharge and Technical Report (ROWD) has been prepared by Brown and Caldwell and is under review by the RWQCB.[13] The ROWD is required by

(Westlands, 2016)

Figure 2. Installed Equipment and Related Facilities for Pilot Ag-ASR Well

Source: ROWD, Reference 13

Figure 2. Installed Equipment and Related Facilities for Pilot Ag-ASR Well

California Water Code Section 13260 for injection wells. The ROWD establishes the hydrogeology and groundwater quality in the Westlands Subbasin, describes the Ag-ASR Program and addresses the impacts of the Ag-ASR Program relative to hydrologic influence, water quality impacts and effects on water quality objectives and beneficial uses, an antidegradation analysis, and the specific components of the District's Ag-ASR Program management. Information from the ROWD forms the basis for the Ag-ASR Program description which follows, and the discussion of water quality and hydrologic impacts in Chapter 3.

9. Program Description:

The proposed Ag-ASR Program will include direct recharge of surface water into retrofitted groundwater production wells. In this way, underground water supplies will be increased by injecting water into the aquifer in times of abundant supply, and later extracting water when it is needed. According to the USEPA, ASR wells are used to achieve two objectives: 1) storing water in the ground, and 2) recovering the stored water either using the same well or pairing recharge wells with recovery wells located in the same well field.[3] The draft ROWD for the Ag-ASR Program serves as the main source of information for the following discussion.

Program Objectives

The Westside Subbasin has been designated as a critically overdrafted basin. The SGMA requires governments and water agencies of high and medium priority basins, such as Westlands, to halt overdraft and bring groundwater basins into balanced levels of pumping and recharge. SGMA empowers local agencies to form GSAs and requires GSAs to adopt GSPs for critically overdrafted groundwater basins. Although not directly applicable, the General Order for drinking water ASR projects can provide guidance on the intent of ASR well regulation. The General Order for drinking water (municipal) ASR projects establishes terms and conditions of discharge to ensure that the discharge does not unreasonably affect present and anticipated beneficial uses of groundwater and surface water, requires ASR projects to not cause groundwater to exceed any water quality objectives, unreasonably affect beneficial uses, or cause a condition of pollution or nuisance. A general order for Ag-ASR may be developed in the near future by the State Water Resources Control Board or the Central Valley Regional Board. Westlands, as the GSA for the Westside Subbasin, proposes to implement to Ag-ASR Program with the following objectives:

- Comply with the requirements of the SGMA and program-specific Waste Discharge Requirements issues by the Central Valley Regional Water Board.

- Develop the Ag-ASR Program as an augmentation strategy in the District's GSP.

- Through the Ag-ASR Program, provide a substantial source of supplemental water to landowners for drought years and maintain sustainability under the SGMA.

- Assist in improving statewide water management by increasing local storage that will be responsive to the needs of local communities and environmental resources.

Water Sources

As discussed earlier in this chapter, imported surface water within the Subbasin is derived largely from CVP water deliveries and smaller amounts from flood flows off the Kings River. Surface water from the San Luis Canal and from the Kings River diverted from a location near the upstream end of the Mendota Pool would be the main sources of supply for the Ag-ASR Program (Figure 1).

Conveyance. The District can convey surface water available from both diversion points through existing turnouts, pumping plants, equalization storage, and pressurized pipeline distribution facilities. The distribution system serves about 90% of the irrigable land in Westlands. Landowners may also use temporary diversion and privately-owned pipelines to further distribute water. The municipal General Order notes that many current ASR projects utilize existing conveyance infrastructure to avoid the cost and environmental impacts associated with constructing duplicate conveyance systems.[5] An important consideration for selecting wells for the Ag-ASR Program will be to have easy access to a District turnout.[a] The vast majority of wells in the Program will be within 200 feet of the District turnouts.[14]

Available Flows. Aquifer storage is anticipated to occur during periods when water is available water for recharge. Based on the District's hydrogeology, long-term modeling and planning assumptions, maximum recharge rates from the Pilot Study, and implementation of Ag-ASR in 400 wells, it is anticipated that water stored in Westlands' Ag-ASR Program could average as much as 29,000 feet (AF) annually. [13] Depending on Program economics and performance, this quantity could be increased in future years.

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a. Turnouts can be concrete structures or pipe structures which are constructed in a bank of a canal and divert part of the water from the canal to a smaller one, thus minimizing the need for the landowner to construct a shallow, below-surface pipeline to the recharge well.

Source Water Quality

The quality of surface water for the Ag-ASR program is historical source water quality values for 2009 through 2015 and the fact that future recharge will occur more during wet hydrological periods. The estimated typical recharge water quality is therefore reflective of wetter than average conditions.

Detailed estimates for source water quality during recharge periods are discussed laater in Chapter 3 Section J. Expected recharge mineral water quality is also well below Municipal and Domestic Supply (MUN) and Agricultural Supply (AGR) Basin Plan water quality objectives discussed further in Chapter 3.

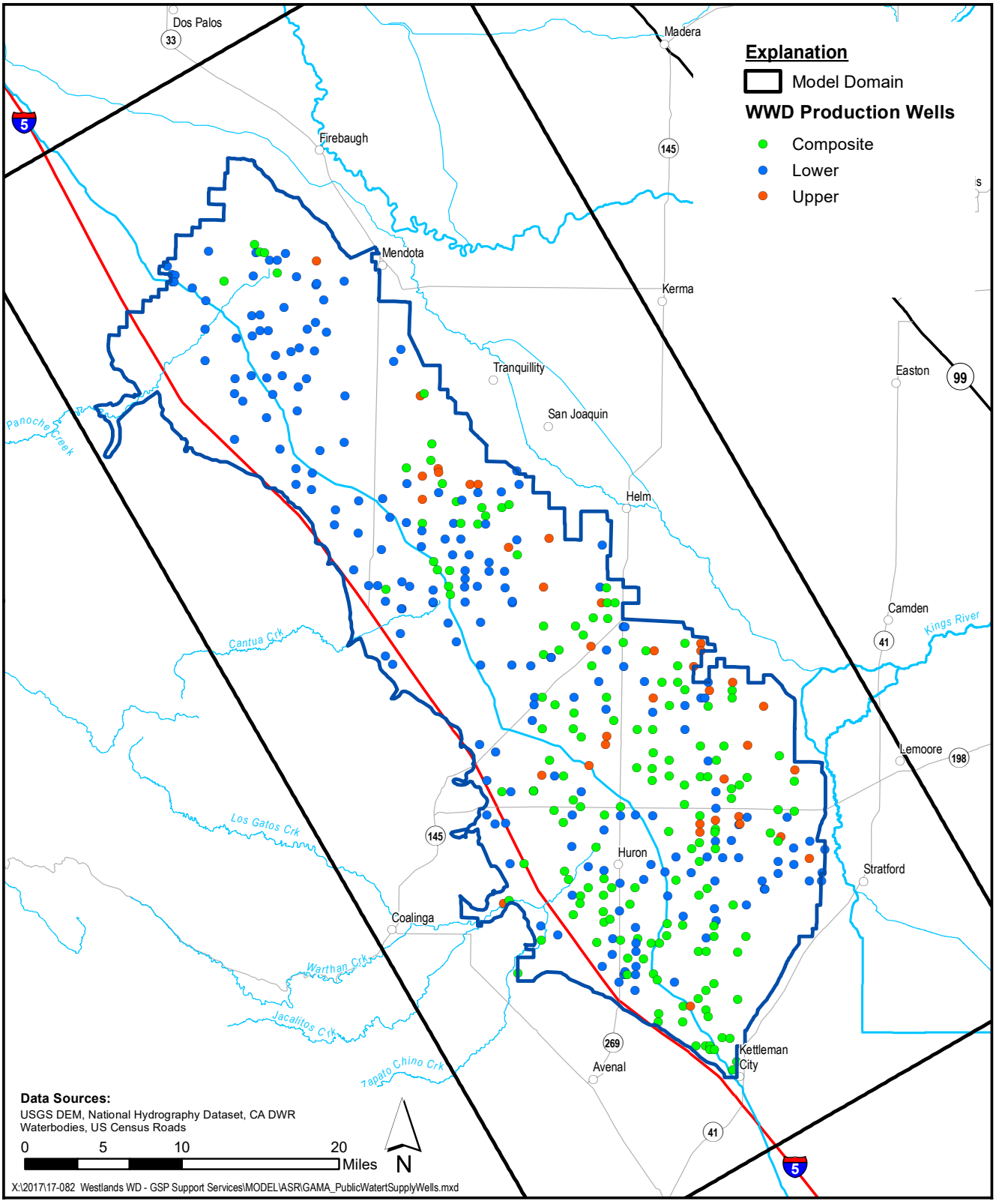
Potential Ag-ASR Wells

The prominent geologic formation in the Westside Subbasin is the Tulare Formation. The hydrogeology of the Ag-ASR Program area is discussed thoroughly in Chapter 3, Section J. The Westside Subbasin contains two general water-bearing zones (Upper and Lower Aquifers) separated by a nearly impervious Corcoran Clay layer containing the Coastal and Sierran aquifers.

The ideal wells for conversion to ASR will be wells that are structurally sound, intersect zones with high hydraulic conductivity, near the District's delivery location and are furnished with features compatible with conversion to ASR operation. Lastly, the well should be located outside of any exclusion zone for protection of municipal or domestic wells established as part of the District Ag-ASR Program and program-specific waste discharge requirements.

Wells intersecting zones with high transmissivity and having other promising characteristics for use as Ag-ASR wells were identified for program evaluation purposes. These wells are shown in Figure 3 along with the aquifer intercepted by the wells. Some of these wells may not ultimately be converted to ASR, while other wells in the District may also be suitable and included in the Program. Higher priorities were assumed for areas with greater subsidence and for achieving good water distribution throughout the Subbasin. The locations of actual initial wells will be provided as individual wells owners sign up for the District program. It is expected that most initial Ag-ASR wells will be completed into the Lower Aquifer, but some wells may be Upper Aquifer or composite wells if that is the typical construction in a particular area of the Subbasin.

Schedule for Recharge Wells. Current plans call for 3 to 10 initial Ag-ASR wells to be identified before March 2020. Well conversions, as discussed below, would likely be complete by approximately the end of 2020. The conversion of some wells may occur as early as late 2019. After the first full year of operation of the initial wells, the District expects up to 20 additional well conversions per year until landowners and the District



Source: ROWD, Reference 13

Location of WWD Production Wells Used for Aquifer Storage and Recovery

Figure 4

SGMA Sustainability Analyses
Westside Subbasin

Figure 3. Location of WWD Production Wells Used for Aquifer Storage and Recovery Impacts Modeling

achieve sufficient capacities based on market and water availability factors. Modeling for the Program assumed a conservatively high target of 400 operational Ag-ASR wells by the 2037 model year.

Buffer Zone Exclusion. A buffer zone exclusion zone will be established for protection of municipal or domestic wells. Based on the modeling results contained in the ROWD, a base buffer exclusion of 1,300 feet in the direction opposite or perpendicular to the regional gradient and an exclusion buffer of 2,600 feet in the direction of the regional gradient was proposed in the ROWD. This would apply if the Ag-ASR wells and the drinking water well are completed into the same major aquifer zone (Upper or Lower). If the nearest drinking water well is reliably completed in a different major aquifer zone than the Ag-ASR well, a buffer zone of 300 feet was proposed. Proposed Ag-ASR wells will not be approved if drinking water wells are inside of the buffer exclusion zone. Additional future monitoring and modeling data may prove this criteria to be excessively conservative in which case the District may petition the RWQCB to allow new criteria.

Well Conversions to Ag-ASR Operation. Well owners will file requests with the District to be included in the Ag-ASR Program. The District will provide approved participants with a notice of acceptance in the Program and operational and monitoring requirements. Wells will be permitted for the recharge usage if they satisfy the buffer zone criteria for separation from drinking water wells, have the appropriate monitoring instrumentation, and satisfy construction standards.

Appendix A, from the ROWD, is a draft of the Initial Ag-ASR Well Design, Operations, and Monitoring Plan. This plan provides initial guidance in design, operations, and operational monitoring. After outreach and coordination with well owners, a full Design, Operations and Monitoring Standards Plan will be subsequently prepared with more complete details on Ag-ASR well design, operations, and operational monitoring.

Standards for wells and wellhead facilities are discussed in Appendix A. This section assumes that existing wells will be converted to the Ag-ASR Program, but any new wells should have characteristics as stated in the appendix plus additional construction considerations for optimizing performance and providing enhanced longevity. It is recognized that required modifications and additional equipment for accepted wells may vary depending on the characteristics of each individual well.

Figure 2 showed an example of installed equipment and related facilities from the Ag-ASR Pilot Study. The surface area of disturbance for the Pilot Study was about 800 square feet with minor subsurface excavation required. This would be a worst case as many wells will likely not require all the equipment used in the Pilot Study. Wellhead facilities and equipment would include agricultural sand media filtration, control valves, liquid chlorine injection, provisions for other chemical injection (such as acid or other

treatments), and monitoring instrumentation. Chemical storage tanks will be provided and double lined if required. This equipment has been shown in the Pilot Study as being necessary to prevent and mitigate downhole plugging of well filter pack and formation.

The sand media filtration removes a portion of the suspended solids in the supply water. Periodic chlorination of the well kills and oxidizes biological slime growths. Acid and other treatments may be used on occasions to dissolve other constituents that may have built up in the well filter pack or to stabilize the formation near the well. Frequent monitoring of groundwater levels during recharge is necessary to determine optimal times for well backflushing and the need for any chemical treatment.

Monitoring and Operations

Appendix A also addresses operational monitoring and control instrumentation, general Ag-ASR maintenance recommendations, and water quality testing. Water quality testing will be specified in compliance with the Monitoring and Reporting Plan to be issued by the RWQCB. Parameters proposed for monitoring were generally selected for demonstrating protection of water quality. Additional monitoring may be implemented by the District for initial Ag-ASR wells. The District will also establish a groundwater level monitoring program through the GSA that will satisfy GSP criteria.

Ag-ASR Program Management

The District plans to manage the Ag-ASR Program and allocate groundwater credits through GSA authority for participants, gather well and monitoring data, maintain protection for drinking water wells, and provide reports to regulatory authorities. The well and monitoring data will be used for:

- Determination of aquifer characteristics from aquifer pumping tests
- Determination of horizontal groundwater velocity to estimate travel time to drinking water wells
- Evaluation of water recovery pattern based on intrinsic tracers
- Monitoring and analysis of supply and recovery water quality to verify protection of beneficial uses and to demonstrate adequate removal of bio-indicators
- Monitoring drinking water wells to verify adequate attenuation of biological materials
- Additional water quality monitoring specified in Waste Discharge Requirements (WDRs)

- Providing recharge and recovery volume data to the GSA for compliance with relevant groundwater management policies

- Providing groundwater elevation to the GSA for evaluating groundwater level changes

Evaluation of data from the Ag-ASR Program could provide a basis for future Program modifications including relaxation of the initial buffer exclusion zone recommendations.

10. Surrounding Land Use

Westlands service area includes 614,700 acres of prime farmland in Fresno and Kings Counties on the west side of the San Joaquin Valley. Figure 4 illustrates specific agricultural land uses in the Subbasin. This information was compiled from land use data from the District, counties, DWR, and the United States Department of Agriculture as part of the development of the Ag-ASR conceptual hydrologic model.

11. Other Public Agencies Whose Approval is Required

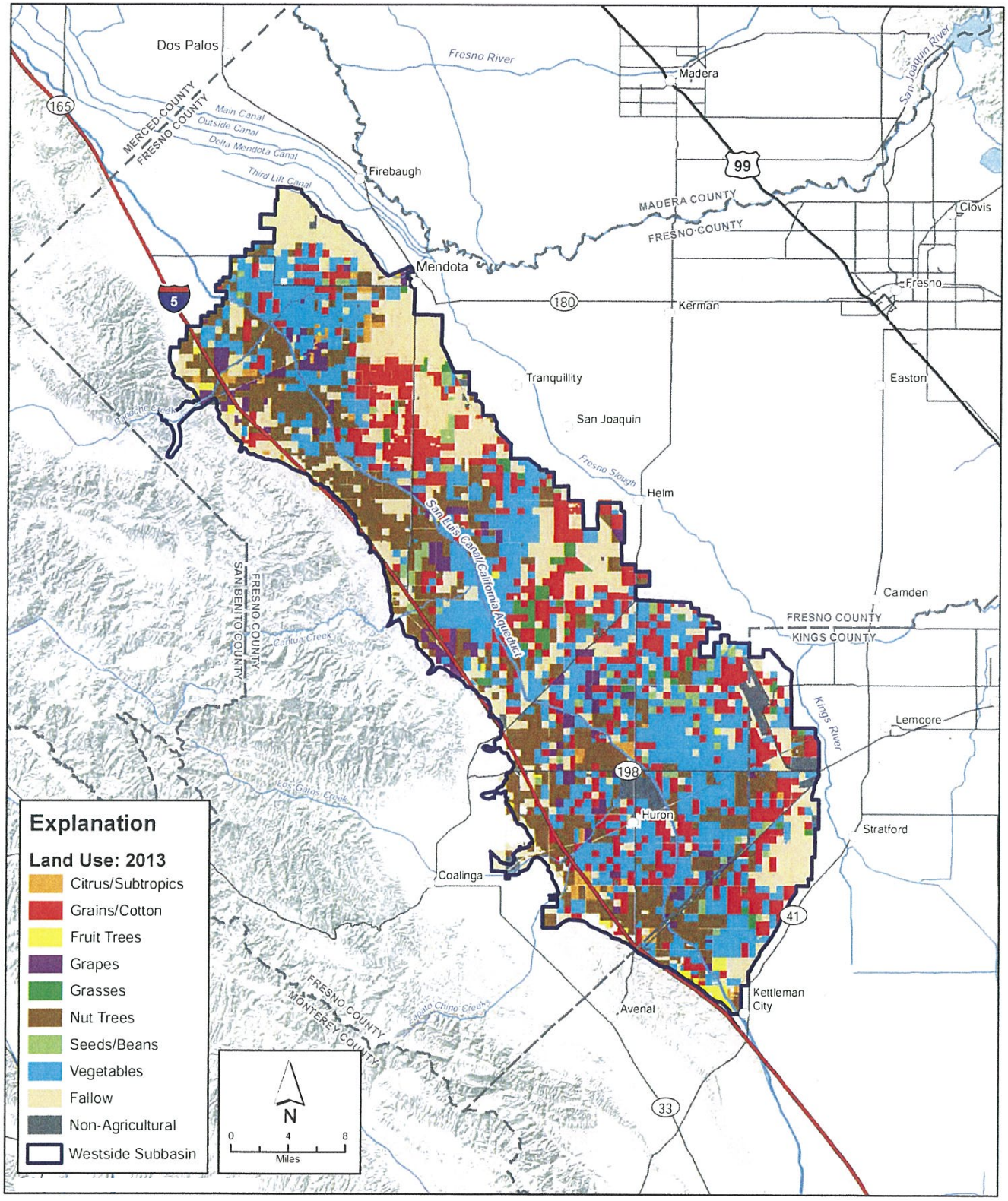
- RWQCB – Approval of ROWD, issuance of programmatic Waste Discharge Requirements

- USEPA – ASR projects regulated by the Regional Board are consistent with Class V of the federal Underground Injection Control program and must comply with current USEPA permit by rule requirements. Direct review and approval by USEPA is not required.

12. Purpose of this IS

This IS/MND has been prepared for Westlands' Ag-ASR Program in compliance with the California Environmental Quality Act (CEQA) requirements. This document provides a program-level assessment of the potential environmental consequences of adoption and implementation of the proposed Ag-ASR Program.

As discussed earlier, modeling for the Program assumed a conservatively high target of 400 operational Ag-ASR wells by the 2037 model year. To reach this target level, WWD expects to incrementally add well conversions each year until landowners and the District achieve sufficient capacities based on market and water availability factors. Thus, the Ag-ASR Program is a series of actions that can be characterized as one large project which will be implemented over a period of time. Section 15168 of the CEQA Guidelines provides for preparation of a programmatic CEQA documents for such circumstances. With a thorough description and analysis of the program, many later



Source: ROWD, Reference 13

Figure 4. Land Use within the WWD

activities which include adding a number of well conversions per year can be found to be within the scope of the Program described in this programmatic CEQA document, and no further environmental documentation would be required. If only minor changes or additions occur in the future which are outside the scope of the Program discussed herein, then a simple Addendum may suffice. If new significant issues arise, then additional environmental analyses may be necessary.

13. Consultation with Native American Tribes

Pursuant to AB 52 and in accordance with Public Resources Code 21080.3.1, subd (b), the Dumna Wo Wah Tribal Government on August 23, 2017 and the Santa Rosa Rancheria Tachi Tribe on August 8, 2016, provided requests for formal notifications of and information on proposed projects for which Westlands serves as Lead Agency under CEQA. That information was provided to the tribes on July 22, 2019. No responses were received during the 30-day review period.

14. Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this Program, involving at least one impact that is "Less than Significant with Mitigation Incorporated" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture / Forestry Resources	☐ Air Quality
☒ Biological Resources	☒ Cultural Resources	☐ Energy
☐ Geology / Soils	☐ Greenhouse Gas Emissions	☐ Hazards and Hazardous Materials
☒ Hydrology / Water Quality	☐ Land Use / Planning	☐ Mineral Resources
☐ Noise	☐ Population / Housing	☐ Public Services
☐ Recreation	☐ Transportation	☐ Tribal Cultural Resources
☐ Utilities / Service Systems	☐ Wildfire	☐ Mandatory Findings of Significance

CHAPTER 2

DETERMINATION

On the basis of this initial evaluation:

☐ I find that the proposed Project **COULD NOT** have a significant effect on the environment and a **NEGATIVE DECLARATION** will be prepared.

☒ I find that although the proposed Project could have a significant effect on the environment, there **WILL NOT** be a significant effect in this case because revisions in the Project have been made or agreed to by the Project proponent. A **MITIGATED NEGATIVE DECLARATION WILL BE PREPARED.**

☐ I find that the proposed Project **MAY** have a significant effect on the environment, and an **ENVIRONMENTAL IMPACT REPORT** is required.

☐ I find that the proposed Project **MAY** have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An **ENVIRONMENTAL IMPACT REPORT** is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed Project could have a significant effect on the environment, because all potentially significant effects (1) have been analyzed adequately in an earlier **EIR** or **NEGATIVE DECLARATION** pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier **EIR** or **NEGATIVE DECLARATION**, including revisions or mitigation measures that are imposed upon the proposed Project, nothing further is required.

Russ Freeman — 8/26/19

Russ Freeman
Deputy General Manager of Resources

Date

CHAPTER 3

DISCUSSION OF ENVIRONMENTAL CHECKLIST

A discussion of the environmental checklist is included below. In general, the format followed includes a discussion of the setting and an impact analysis for each resource category. Reference and information resources for the checklist are included in Chapter 4. As appropriate, Initial Study (IS) mitigation measures are included to reduce impacts to less than significant levels. The Mitigation Monitoring and Reporting Plan is included in Appendix B.

A. AESTHETICS

SETTING

The proposed Agricultural Aquifer Storage and Recovery (Ag-ASR) Program is located within the service area of the Westlands Water District (Westlands or District) which consists of 614,700 acres of prime agricultural land. Communities within the service area include the communities of Mendota, Five Points, Huron, Tranquility, Firebaugh, Three Rocks, Cantua Creek, Helm, San Joaquin, Kerman, Lemoore, and Coalinga. The service area is characterized by vast expanses of agricultural land with scattered residences and buildings. The large farms and ranches emphasize the rural and farming heritage of Fresno and Kings counties and provide unrestricted views of the landscape within the Ag-ASR Program area. Interstate 5 is a Fresno County-Designated Scenic Highway.[15]

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
A. AESTHETICS						
Except as provided in Public Resources Code Section 21099, would the Project:						
1) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒	☐	24
2) Substantially damage scenic resources, including, but not limited to, trees, rock, outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒	☐	24

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
3) Substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☐	☒	☐	24
4) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒	☐	24

No Impacts: Criteria A1-A4

The only above-ground feature of the Ag-ASR Program are discussed in Chapter 1 and shown on Figure 2. These features will be located throughout the Ag-ASR Program area at the site of converted injection wells and include tanks, piping, and miscellaneous equipment. These necessary improvements will be low-lying, occupy only up to about 800 square feet of area at the most, will be visually unobtrusive, and will be consistent with agricultural operations in the area. No impacts relative to Criteria A1-A4 will occur.

B. AGRICULTURE AND FORESTRY RESOURCES

SETTING

Land uses within the Program area are shown on Figure 4 and consist of a variety of agricultural crops. The current general plans for Fresno and Kings counties show these lands to be primarily Prime Farmland and Farmland of Statewide Importance, based on the Farmland Mapping and Monitoring Program of the California Department of Conservation Division of Land Resource Protection.[15, 16] In addition, the majority of these lands are held under the Williamson Act, also known as the California Land Conservation Contract of 1965. This Act enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agriculture or open space in exchange for lower property tax assessments.

IMPACT ANALYSIS

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
B. <u>AGRICULTURE AND FOREST RESOURCES</u> In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the Project:						
1) 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 non-agricultural use?	☐	☐	☐	☐	☒	15, 16
2) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☐	☒	15, 16
3) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)) or timberland (as defined in Public Resources Code section 4526); or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	☐	☐	☐	☒	☐	24

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
4) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒	☐	24
5) Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☐	☒	24

Beneficial Impacts: Criteria B1, B2, B5

These criteria relate to conversion of agricultural land to non-agricultural use, and conflicts with existing zoning or a Williamson Act contract. The proposed Ag-ASR Program involves diversion of surface water during times when water is available, injecting it into underlying aquifers of the Westlands Subbasin, and recovery and use of the extracted groundwater when it is needed, such as during drought periods. This supplemental source of water will benefit local agriculture, reduce the potential for conversion to other land uses, and help maintain the Williamson Act contracts already in place. Those impacts related to Criteria B1, B2, and B5 are beneficial.

No Impacts: Criteria B3, B4

There is no designated forest land within the Program area so Criteria B3 and B4 do not apply.

C. AIR QUALITY

SETTING

The District's proposed Ag-ASR Program lies within the San Joaquin Valley Air Basin (SJVAB), the second largest air basin in the state. The SJVAB is under the jurisdiction of the San Joaquin Valley Air Pollution Control District (SJVAPCD). Despite many challenges, the SJVAPCD is making progress in attaining the state and federal ambient air quality standards and improving public health for Valley citizens.[17]

The SJVACPD has published guidance on determining CEQA applicability, significance of impacts, and potential mitigation of significant impacts in its Guidance for Assessing and Mitigating Air Quality Impacts.[18] In the interest of streamlining CEQA requirements, the SJVAPCD has also developed guidance on assessing small projects (Small Project Analysis Level [SPAL]).[19] Using project type and size, SJVAPCD has pre-quantified emissions and determined a size below which it is reasonable to conclude that a project would not exceed applicable thresholds of

significance for criteria pollutants. Further discussion of SPAL is provided in the impact analysis below.

IMPACT ANALYSIS

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
C. AIR QUALITY						
Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the Project:						
1) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐	☐	19
2) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☐	☒	☐	☐	19
3) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	☒	☐	24
4) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☐	☒	☐	24

No Impacts: Criteria C3, C4

The proposed Ag-ASR Program has no operational emission sources and negligible construction emission sources. The injection well conversions will occur within large expanses of agricultural land without sensitive receptors that could be exposed to construction activities (Criterion C3). Odor is not an issue with the proposed Ag-ASR Program (Criteria C4).

Less Than Significant Impacts: Criteria C1, C2

As indicated above, the proposed Ag-ASR Program would have no operational emission sources and negligible construction emission sources. Based on discussion in Chapter 1, each well conversion could have a surface area disruption of up to 800 square feet which is quite conservative as not all well conversion equipment would be needed at each well. The majority of converted wells can be supplied by 200 feet of new pipeline to the District turnout locations. With up to 20 wells to be converted per year, the total square feet of disruption becomes an estimated maximum of 16,000 square feet per year.

The SJVAPCD guidance for SPAL lists project sizes by various land use categories, including residential, commercial, office, institutional and industrial. While the proposed Ag-ASR Program doesn't fit clearly into any of the categories, industrial would be most appropriate. Relevant project sizes for SPAL are as follows:

- Trips/day – 1,506
- Square footage – 510,000
  (General Light Industry)

The proposed Ag-ASR Program would require only a few trips/day for construction activities and the annual surface area of disruption of up to about 16,000 square feet is well below the threshold of 510,000 square feet. As provided for SPAL guidance, the proposed Ag-ASR Program with up to 20 well conversions per year would have a less than significant impact on air quality (Criterion C2). Using this approach, the District could convert all projected 400 wells at once without triggering a more detailed air quality analysis. The Ag-ASR Program would also not conflict with or obstruct implementation of California Air Resources Board and SJVAPCD air planning efforts (Criterion C1).

D. BIOLOGICAL RESOURCES

SETTING

The proposed Ag-ASR Program area is an intensely cultivated agricultural area in western Fresno and King Counties. General Plans for these counties provide information on biological resources within the planning areas, which includes the Ag-ASR Program area.[15, 16] Data sources for this information include the California Natural Diversity Database, California Native Plant Society, U.S. Fish & Wildlife Service, and Fresno and Kings Counties. Data is provided on special status plant and animal species, wetlands and mapped waters, and critical habitat areas. Further information on the biological resources within the Ag-ASR Program area is provided in Bureau of Reclamation's (Reclamation) recent Environmental Assessment (EA) for the Central Valley Project Interim Renewal Contracts for Westlands, Santa Clara Valley Water District, and the Pajaro Valley Water Management Agency 2016-2018.[20]

Existing Conditions

In the Fresno County portion of the Ag-ASR Program area, isolated occurrences of special status plant and animal species are documented, but there is no designated critical habitat identified. Wetlands and mapped waters consisting mostly of fresh water ponds are shown. In the Kings County portion of the Ag-ASR Program area, no sensitive plant and critical habitats have been reported, though several occurrences of sensitive wildlife have been reported along the California Aqueduct alignment. Two occurrences of wetlands and mapped waters, consisting of lake/flood basins, have been identified.

Since most of the lands within Westlands are either croplands or in urban development, and no critical habitat exists, the EA for the Central Valley Interim Renewal Contracts states that none of the special-status species potentially present can regularly use these lands except for the following: [20]

- Western Burrowing Owl – protected under the Federal Migratory Bird Treaty Act and State Fish and Wildlife Code sections. Habitat requirements include low-stature vegetation, usually grassland or arid shrubland, in an area generally open without too much tree or grass cover. Owls require burrows dug by mammals such as ground squirrels or badgers, or they may use man-made cavities that provide similar refuge. Owls sometimes use canal rights-of-way, which may have ground squirrel burrows and are often bare of vegetation.

- Swainson's Hawk – designated as threatened under the California Endangered Species Act (ESA). According to the EA, more than 85 percent of Swainson's hawk territories in the Central Valley are in riparian systems adjacent to suitable foraging habitats. Suitable nest sites may be found in mature riparian forest, lone trees or groves of oaks, other trees in agricultural fields, and mature roadside trees. Swainson's hawks require large, open grasslands with abundant prey in association with suitable nest trees. Suitable foraging areas include native grasslands or lightly grazed pastures, alfalfa and other hay crops, and certain grain and row croplands.

- San Joaquin Kit Fox – designated as endangered under the Federal ESA and threatened under the California ESA. San Joaquin kit foxes primarily inhabit grassland and scrubland communities. They also inhabit oak woodland, alkali sink scrubland, and vernal pool and alkali meadow communities. Foraging habitat includes grassland, woodland, and open scrub. Denning habitat includes open, flat areas with loose, generally sandy or loamy soils. Kit foxes excavate their own dens, or use other animals and human-made structures (culverts, abandoned pipelines, and banks in sumps or roadbeds). Although lands adjacent to natural habitats may be used for occasional foraging, agricultural lands are generally not suitable for long-term occupation by kit foxes. There is some suitable and some sub-optimal San Joaquin kit fox habitat present within Westlands; however, these areas remain between the western boundary of Westlands and Interstate 5, a

fairly narrow band of land. Fallowed lands may also provide habitat for the San Joaquin kit fox, particularly if left fallow for more than one year and located near natural lands.

There are other special-status species which may occur on an isolated or occasional basis within Westlands. According to the EA, blunt-nosed leopard lizards and San Joaquin wooly-threads may occur in small areas of native lands along the western edge of Westlands. The giant garter snake may potentially occur within drainages, including the San Luis Drain in Westlands. In addition, California least tern may occur in Westlands as it was observed foraging at the sewage ponds at Lemoore Naval Air Station in 1997 and 1998; however, no nesting has been documented at this location to date. At Westlake Farms in the San Joaquin Valley, California least terns have not been seen since June 7, 2001 (one pair) and have not nested there since 2010.

Regulatory Overview

Special-status plants and animals are legally protected under the State and/or Federal Endangered Species Acts. Further protection is provided by the Federal Migratory Bird Treaty Act. Wetlands are protected under Section 401 and 404 of the Federal Clean Water Act, the Porter-Cologne Act, and Sections 1600-1607 of the State Fish and Wildlife Code.

IMPACT ANALYSIS

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
D. <u>BIOLOGICAL RESOURCES</u>						
Would the Project:						
1) 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 & Game or U.S. Fish and Wildlife Services?	☐	☒	☐	☐	☐	15, 16, 20
2) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐	☐	15, 16, 20

	RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
3)	Have a substantial adverse effect on federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☒	☐	☐	☐	15, 16, 20
4)	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?	☐	☒	☐	☐	☐	24
5)	Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒	☐	24
6)	Conflict with provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒	☐	24

No Impacts: Criteria D5, D6

The proposed Ag-ASR Program would not remove any trees and would not conflict with a tree preservation policy or ordinance (Criterion D5), and there is not an adopted Habitat Conservation Plan or Natural Community Conservation Plan that covers the Ag-ASR Program area (Criterion D6).

Less than Significant with Mitigation Incorporated: Criteria D1-D4

An important benefit of the proposed Ag-ASR Program is that the majority of infrastructure needed to convey and inject surface water is already in place, thus avoiding construction impacts which may otherwise occur. As discussed in Chapter 1, the limited excavation needed for each converted well would be limited for needed improvements around each well (Figure 2). In addition, the vast majority of Ag-ASR Program wells will be within 200 feet of the District turnouts, thus only limited new subsurface pipelines will be needed to convey the surface water from the District's closest turnout to the injection well.

The Ag-ASR Program area is highly disturbed due to past and ongoing agricultural operations. The District anticipates converting up to 20 wells per year for the Ag-ASR Program after the first full year of operation, and up to a projected conservatively high target of 400 wells over a 20-year period. New wells may be constructed but would need to undergo the permitting process

of the respective county jurisdiction. Given that wells and pipelines should be located in disturbed areas and along roadways and any construction activities would be consistent with agricultural operations of the land, the Ag-ASR Program should not impact biological resources. However, the process of well conversions will occur over time and the specific details and locations of site improvements have not yet been identified. Additionally, background conditions related to the presence of biological resources over an extended planning period can change. Thus, the possibility of an impact cannot be totally discounted and there remains a remote possibility that the process of well conversions, or construction of new wells, could significantly impact biological resources. This is a significant adverse impact which can be mitigated to less than significant levels through implementation of the following mitigation measures.

Mitigation Measures

The District shall implement the following mitigation measures.

BIO-1. During the well application process with the landowners, the District shall review the locations of the wells and needed improvements. If the wells and improvements are within or along roadways and disturbed areas, no further action is needed. Otherwise, Mitigation Measure BIO-2 shall be implemented.

BIO-2. If the wells and needed improvements are in close proximity to any natural areas, the District will then engage a qualified biologist who will assess the well conversion, conduct a field study if deemed necessary, and develop siting or construction-related mitigation to address the issue at hand.

E. CULTURAL RESOURCES

SETTING

Fresno and Kings counties contain numerous historical resources including those listed as National Register of Historic Places, California State Historical Locations, and others as Points of Interest. The Ag-ASR Program area within the Westside Subbasin is an actively farmed area with many ongoing planting and harvesting operations and contains none of these resources.[15,16] Both counties continue to identify potential archaeological and historical resources and assure their protection through land development and application review and compliance with the California Environmental Quality Act (CEQA).

IMPACT ANALYSIS

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
E. <u>CULTURAL RESOURCES</u>						
Would the project:						
1) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☒	☐	☐	☐	15, 16
2) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☒	☐	☐	☐	15, 16
3) Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☒	☐	☐	☐	24

Less than Significant with Mitigation Incorporated: Criteria E1-E3

The proposed Ag-ASR Program area is highly disturbed owing to past and ongoing farming operations. While the level of disturbance associated with new Program facilities will be minimal and the risk of encountering historical and archaeological resources or human remains is remote, the potential for encountering such resources cannot be discounted entirely. Potentially significant adverse impacts can be mitigated to less than significant levels through implementation of the following mitigation measures which address inadvertent discovery of cultural resources.

Mitigation Measures

The District shall implement the following mitigation measures.

ARCH-1. Should archaeological materials be discovered during excavation, work in the immediate vicinity of the find shall halt until WWD retains a qualified archaeological consultant to assess the find. If the archaeologist determines the materials to belong to a potentially significant archaeological or historic resource, a treatment plan shall be developed in consultation with WWD, tribal representatives (in the event of a prehistoric site), the Fresno County Department of Public Works and Planning for discoveries in Fresno County, or the Kings County Community Development Agency for discoveries in Kings County.

ARCH-2. If human remains are encountered, the following procedures will be implemented:

a. Per the stipulations of the California Health and Safety code 7050.5(b), the Fresno or Kings Counties Coroner's Office will be contacted immediately.

b. The Coroner's Office has two working days in which to examine the identified remains. If the Coroner determines that the remains are Native American, then the Office shall notify the Native American Heritage Commission (NAHC) within 24 hours of the determination.

c. Following receipt of the Coroner's Office notice, the NAHC will contact a Most Likely Descendant (MLD). The MLD may, with the permission of the landowner or authorized representative, inspect the site and make recommendations regarding the treatment and/or a re-interment of the human remains and any associated grave goods within 48 hours of being granted access to the site.

d. Appropriate treatment and disposition of Native American human remains and associated grave goods will be collaboratively determined in consultation between the MLD, the consulting archaeologist, and the landowner or authorized representative. The treatment of human remains may potentially include the preservation, excavation, analysis and/or reburial of those remains and any associated artifacts.

e. If the remains are determined not to be Native American, the Coroner, archaeological research team, and WWD will collaboratively develop a procedure for the appropriate study, documentation, and ultimate disposition of the historic human remains.

F. ENERGY

IMPACT ANALYSIS

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
F. <u>ENERGY</u>						
Would the project:						
1) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☐	☐	☒	24
2) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒	☐	24

Beneficial Impact: Criterion F1

The energy consumption required for construction of needed improvements will be negligible and the vast majority of Westlands' conveyance system is pressurized, which allows water to be injected without additional pumping and energy consumption. In instances where pressure is not sufficient, some booster pumping may be needed. It should be noted that the proposed Ag-ASR Program will recharge groundwater and increase static groundwater levels which will reduce pumping and energy consumption otherwise needed. This is a beneficial impact

No Impacts: Criterion F2

The proposed Ag-ASR Program will have no conflicts with state or local plans for renewable energy or energy efficiency.

G. GEOLOGY AND SOILS

IMPACT ANALYSIS

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
G. GEOLOGY AND SOILS						
Would the project:						
1) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:						
a) 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.	☐	☐	☐	☒	☐	21
b) Strong seismic ground shaking?	☐	☐	☐	☒	☐	24
c) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒	☐	24
d) Landslides?	☐	☐	☐	☒	☐	24

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
2) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☒	☐	24
3) Be located on a geologic 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?	☐	☐	☐	☒	☐	24
4) 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?	☐	☐	☐	☒	☐	24
5) 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?	☐	☐	☐	☒	☐	24
6) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☒	☐	☐	15, 16

No Impacts: Criteria G1-G5

The proposed Ag-ASR Program features direct injection of surface water into underlying aquifers, and recovery at a later time when needed. Most of the infrastructure to support the Program is already in place. As discussed in Chapter 1, only minor improvements would be needed at each injection well and short pipeline segments would need to be installed to convey water surface from the District's turnout facilities to the wells.

No portion of the Program area is located in an Alquist-Priolo Earthquake Fault Zone and no known active fault traces traverse the area.[21] The Ag-ASR Program does not involve construction of habitable structures and would not expose people or structures to seismic or other geologic hazards (Criteria D1, D2). The Program area is characterized by very gradual slopes and construction activities would not result in substantial soil erosion (Criterion D2). There would be no substantial risk to life or property due to any presence of expansive soils (Criterion G4). Septic tanks or alternative wastewater disposal systems are not an issue associated with the Program (Criterion G5).

Less Than Significant Impacts: Criterion G6

Criterion G6 addresses destruction of a unique paleontological resource or unique geologic feature. Paleontological resources, also known as fossils, are the remains, traces, or imprints of once living organisms preserved in rocks or sediments. Paleontological resources are not found in "soil" but are contained within consolidated or unconsolidated geologic deposits or bedrock that underlies the soil layer.

Quarternary alluvial fan (Qf) and basin deposits (Qb) of Holocene and latest Pleistocene age are widespread along the center and west-central margin of the San Joaquin Valley.[15, 16] Holocene deposits are generally considered too young to contain fossilized remains, but shallowly overlie older Pleistocene deposits that have the potential to yield paleontological resources at depth.

As discussed in Chapter 1, the proposed Ag-ASR Program area is highly disturbed and subject to ongoing agricultural operations, including plowing and ripping to a 3-foot depth. Given that the Ag-ASR Program construction activities are minimal and shallow in nature in an area which has a low sensitivity for paleontological resources and without unique geologic features, the impact relative to Criterion G6 is less than significant and no mitigation is required.

H. GREENHOUSE GAS EMISSIONS

SETTING

Greenhouse gas (GHG) emissions include exhaust with such chemicals as carbon dioxide, methane, and nitrous oxide. According to the EPA, the primary sources of GHG emissions in the United States are transportation, electricity production, industry, commercial and residential, and agriculture.[22]

Regulations addressing GHG emissions are primarily driven by the State beginning with AB 32, the Global Warming Solutions Act of 2006. AB 32 directs the California Air Resources Board (CARB) to reduce the state's global warming emissions to 1990 levels by 2020. Since that time, CARB, the California Energy Commission, the California Public Utilities Commission, and the California Building Standards Commission have all been developing regulations that will help meet the goals of AB 32.

In August 2008, the SJVAPCD adopted the Climate Action Plan (CCAP).[23] The CCAP has various goals including establishing SJVAPCD processes for assessing the significance of project specific GHG impacts for projects permitted by SJVAPCD; assisting local land use agencies, developers, and the public by identifying and quantifying GHG emissions for development projects; and other goals related to streamlining evaluation of project specific GHG effects, collateral emissions, and assisting Valley businesses. On December 17, 2009, the SJVAPCD adopted Guidance for Valley Land Use Agencies in Addressing GHG Emissions Impacts for New Projects under CEQA.[25]

Neither Fresno or Kings Counties have Climate Action Plans, but local programs are in place that assist in addressing effects related to climate change. The Fresno County General Plan and the 2035 Kings County General Plan contain goals, objectives, and policies related to minimizing air pollution, related public health effects, and potential climate change impacts within the counties.[16, 26]

IMPACT ANALYSIS

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
H. GREENHOUSE GAS EMISSIONS						
Would the Project:						
1) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐	☐	24
2) Conflict with any applicable plan, policy or regulation of an agency adopted for the purposes of reducing the emissions of greenhouse gases?	☐	☐	☒	☐	☐	24

No impacts: Criteria H1, H2

Less Than Significant Impacts: Criteria H1, H2

The proposed Ag-ASR Program would have a less than significant impact related to GHG emissions (Criterion H1). As discussed in Section C Air Quality, construction emissions associated with each well conversion would be negligible as the area of disturbance for needed improvements for each well conversion would be minimal. As noted in Section 3, using SJVAPCD SPAL guidance for small projects, the Ag-ASR Program would have a less than significant impact on air quality relative to criteria pollutants.

Operational GHG emissions could be associated with increased energy use. However, as discussed in Section F Energy, the District's conveyance system is pressurized, which allows water to be injected without additional pumping and energy consumption. Some booster pumping may be needed in instances where pressure is insufficient. However, the Ag-ASR Program will recharge groundwater and increase static groundwater levels which will reduce pumping and energy consumption otherwise needed. Based on the above discussion, the

proposed Ag-ASR Program would not conflict with applicable plans, policies, or regulations (Criterion H2).

I. HAZARDS AND HAZARDOUS MATERIALS

IMPACT ANALYSIS

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
I. <u>HAZARDS AND HAZARDOUS MATERIALS</u>						
Would the Project:						
1) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☒	☐	24
2) 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?	☐	☐	☐	☒	☐	24
3) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒	☐	24
4) 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?	☐	☐	☒	☐	☐	13

	RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
5)	For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the Project result in a safety hazard or excessive noise for people residing or working in the Project area?	☐	☐	☐	☒	☐	24
6)	Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒	☐	24
7)	Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☐	☒	☐	24

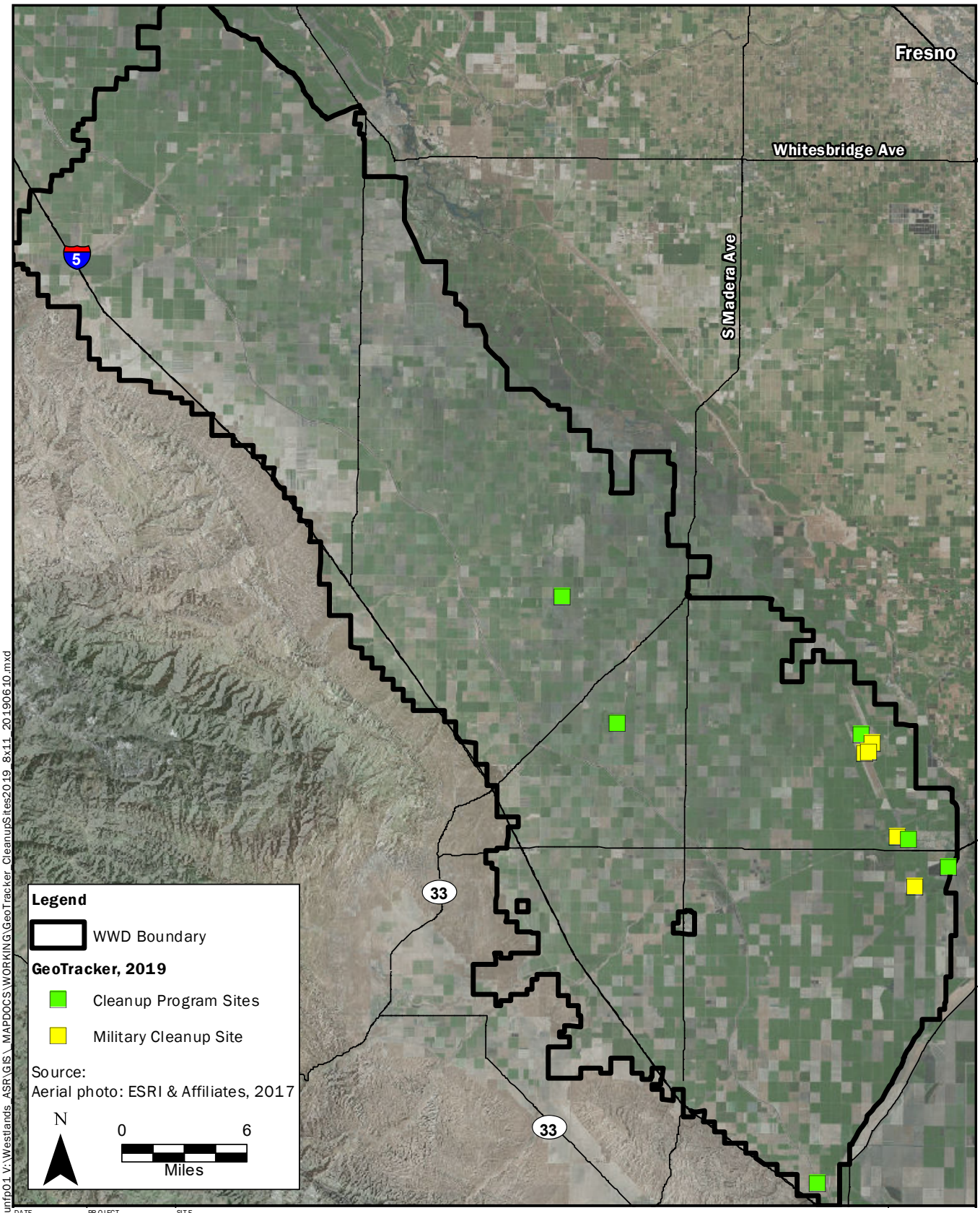
No Impacts: Criteria I1-I3, I5-I7

Criteria I1 and I2 address the use of hazardous chemicals and the impacts to the public or the environment that may occur. The Ag-ASR Program wells will involve use of sodium hydrochlorite, or pool chlorine, for control of slime buildup in wells. This chemical is a strong oxidant but is already in use by landowners because of the extensive use of drip irrigation in the Ag-ASR Program area and the need to control slime buildup. Another chemical, magnesium chloride, may be used to normalize the cation balance in the water but it is not hazardous in nature. Thus, there are no impacts associated with Criteria I-1 and I-2. Similarly, there are no impacts associated with Criteria I3 as chemicals would not be handled within 1/4 mile of a school.

The Ag-ASR Program has no issues associated with airport safety (Criterion I5), response or evacuation plans (Criterion I6), and would not expose people or structures to wildland fires (Criterion I7).

Less Than Significant Impacts: (Criterion I4)

Criterion I4 addresses whether a project site is on a list of hazardous materials sites and whether hazards to the public or environment would occur. There are no known areas of contamination in the Program areas.[13] There are localized sites throughout the District that are identified as part of the Leaking Underground Storage Tank Program or other cleanup programs (see Figure 5). All of the sites involve only shallow groundwater. As the Ag-ASR Program will only include wells screened more than 200 ft. bgs, the Ag-ASR Program would have



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Source: ROWD, Reference 13

DATE 6/10/2019 PROJECT 152731 SITE

TITLE

Westlands Water District Ag-ASR ROWD

Active Cleanup Sites

Figure 2-4

Figure 5. Active Cleanup Sites within the WWD

no significant effect on the migration of any remaining contaminants at these sites. If anything, recharge of deeper groundwater would tend to reduce the downward hydraulic gradient and would correspondingly reduce the rate of any downward migration of dissolved contaminants.

J. HYDROLOGY AND WATER QUALITY

SETTING

The Ag-ASR Program is planned for the Westside Subbasin, which is coincident with the boundaries of Westlands in the central western portion of the San Joaquin Valley. The subbasin was identified as critically overdrafted by the Department of Water Resources (DWR) in 2016. [4]

Hydrogeology

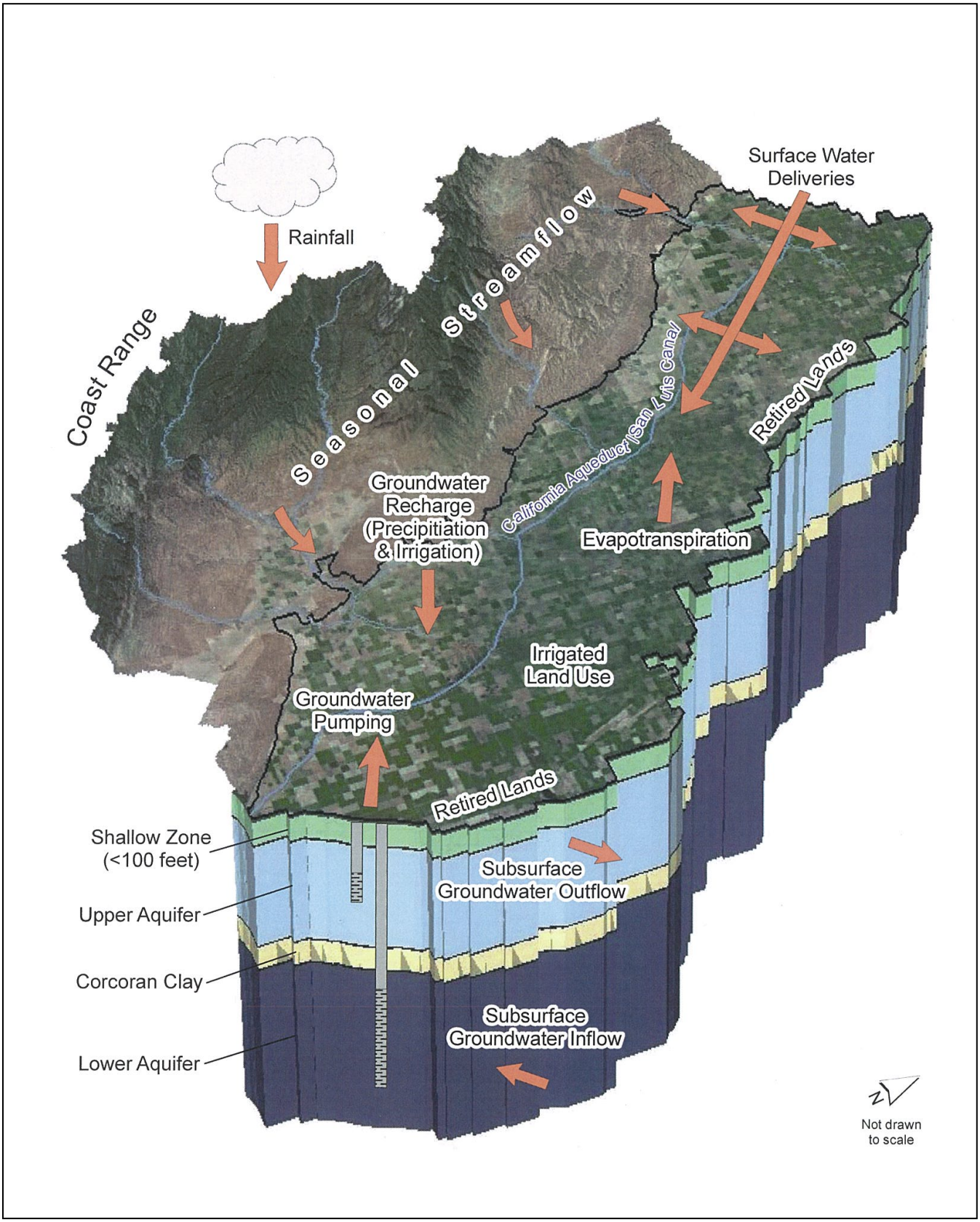
The hydrogeology of the Westside Subbasin was described in detail in the recent Hydrogeologic Conceptualization Report by Luhdorff & Scalmanini Consulting Engineers (LSCE).[27] The report addressed hydrogeologic conditions, overdraft, salinity, and management areas. LSCE presented numerous geologic cross sections prepared as part of previous studies and as part of the conceptual hydrogeologic model they developed. The major water resource and hydrogeologic system components are shown in Figure 6.

According to LSCE, the alluvial geology consists of:[27]

> Coalescing alluvial fans have formed along the sides of the valley created by the continuous shifting of distributary stream channels over time. This process has led to the development of thick fans of generally coarse texture along the margins of the valley and a generally fining texture towards the axis of the valley. Lacustrine and floodplain deposits also exist closer to the valley axis as thick silt and clay layers. Lakes present during the Pleistocene epoch in parts of the San Joaquin Valley deposited great thicknesses of clay sediments.

The prominent geologic formation in the Subbasin is the Tulare Formation, which extends to the base of freshwater throughout most of the area, extends to as much as 2,400 feet deep in parts of the Subbasin, and is comprised of stratigraphic layers of clays, silts, sands, and gravels. The Westside Subbasin contains of two general water-bearing zones identified in DWR Bulletin 118:[4]

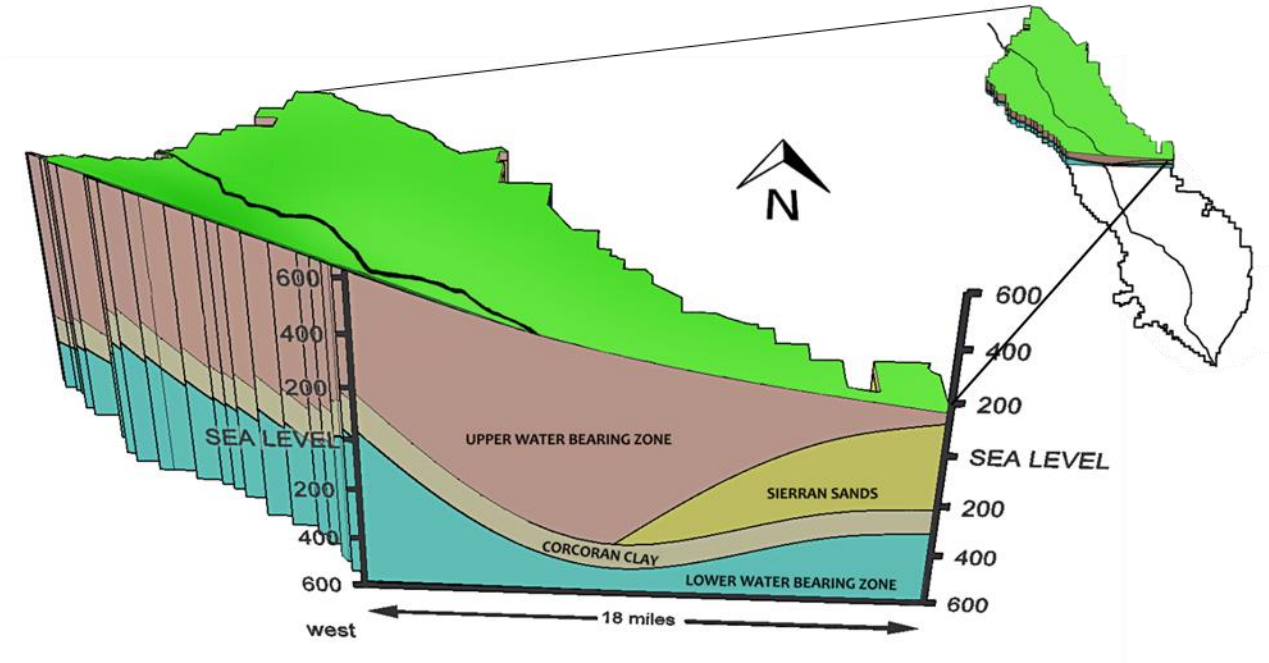
(1) an Upper Aquifer above a nearly impervious Corcoran Clay layer containing the Coastal and Sierran aquifers and (2) a Lower Aquifer below the Corcoran Clay containing the Sub-Corcoran aquifer.[28] An east-west conceptual cross section showing these water-bearing zones is provided in Figure 7. Most studies also differentiate a “shallow zone”, arbitrarily designated as the upper 100 feet of soil and geologic materials in the Subbasin. The Upper Aquifer deposits are up to 800 feet thick with the thickest portions of the Upper Aquifer near the Coast Range.



Source: ROWD, Reference 13

Figure 6. Conceptual Illustration of the WWD Hydrogeologic System

The Lower Aquifer deposits overlie and may interfinger with the last marine deposits of the isolated marine embayment of the San Joaquin Formation. The depositional model for the Lower Aquifer is of two source areas; one from the east from the Sierra Nevada and the second from the west from the Diablo Range.



Source: Westlands, 2016

Figure 7. Generalized Hydrogeological Cross Section for Westlands Water District

The Upper Aquifer and Lower Aquifer are recharged by subsurface inflow from the west, east and northeast, the compaction of water-bearing sediments, percolation from irrigation with pumped groundwater, and percolation from imported and natural surface water. Recharge for the Lower Aquifer comes generally from east of the District, below the Corcoran Clay. Recharge of the Lower Aquifer also occurs during streamflow events in areas on the western edge of the District, near the coast range, where the boundary of the Corcoran Clay is irregular.[28] Numerous wells penetrate the Corcoran Clay, allowing for partial interaction between the upper and lower aquifer zones.[29]

Groundwater Quality

Most wells in the very shallow (< 100 feet) groundwater zone have high salinity, with total dissolved solids (TDS) concentrations typically above 2,000 milligrams per liter (mg/L). TDS concentrations in Upper Aquifer wells are generally lower than for those in the shallow groundwater. Most of the groundwater of the Lower Aquifer is of the sodium sulfate type.[4]

Brackish or saline water underlies the base of fresh water in the Lower Aquifer. The Upper Aquifer appears to have some broad areas with salinity concentrations above 2,000 mg/L, primarily in the northeastern quadrant of the Subbasin. TDS concentrations are generally below 2,000 mg/L in Upper Aquifer wells in the south. Lower Aquifer salinity is generally higher in the northeastern quadrant of the Subbasin as compared to other portions of the Subbasin.

Some Upper Aquifer wells in the north have decreasing long term salinity trends, while there is gradually increasing salinity in the southern-middle portion of the Subbasin. Many of the wells in the Lower Aquifer indicate a trend of stable TDS concentrations with either very small change or mildly increasing or mildly decreasing concentrations. There is no overall discernable significant salinity trend in the Deeper Zone.[29]

Values for major mineral constituents for both District Canal Integration Program (CIP) wells and Groundwater Ambient Monitoring and Assessment (GAMA) wells are shown in Table 3.

Table 3. Major Minerals Summary for CIP and GAMA Wells

Parameter	Units	CIP Average	GAMA Average	Max[a]
Ph	STD	NA	8.16	8.6
EC	umhos/cm	1,140	1,519	2,950
Calcium	mg/L	NA	121	570
Chloride	mg/L	50	89	250
Magnesium	mg/L	NA	15	53
Nitrate (as NO3)	mg/L	9	8.7	38
Sodium	mg/L	NA	199	287
Sulfate	mg/L	413	554	1,730
TDS	mg/L	791	1,130	2,780

a. NA = not applicable

b. Max represents the maximum values for CIP and GAMA wells for the data period.

Source: ROWD, reference 13.

Concentrations of minor mineral constituents measured by the GAMA program with values over half of maximum contaminant levels (MCLs) are shown in Table 4.

Table 4. Minor Minerals Summary for GAMA Program Wells

Parameter	Units	Average	Max	MCL
Arsenic	ug/L	2.9	7.8	10
Boron	mg/L	0.89	1.35[a]	1.0[b]
Manganese	ug/L	49	144	50
Selenium	ug/L	4.8	34.9	50
Vanadium	ug/L	7.1	33.5	50[a]

Note: Only constituents with maximum values over ½ the MCL or notification limit are shown.
a. Avg. boron for CIP wells was 0.88 mg/L, max. was 2.1 mg/L
b. Notification Limit
Source: ROWD, reference 13.

Additional local and regional water quality information was provided in the Groundwater Quality Assessment Report[29] and the ASR Pilot Study Work Plan.[30] The Groundwater Quality Assessment Report also addressed nitrate concentrations, which are generally only a concern in the shallow zone.

Surface Water

Imported surface water use within the Subbasin is derived largely from Central Valley Project (CVP) water deliveries from the San Luis Canal, flood flows on the Kings, and from other sources such as water transfers and exchanges. The District has an annual contract entitlement from the United State Bureau of Reclamation CVP of 1,196,948 acre feet,[29] although CVP allocations are often much lower. Imported water from outside the Subbasin ranged from 170,000 to 1,200,000 acre feet/yr over the GSP base study period for an average annual amount of 830,000 acre feet/yr. Based on initial modeling, the Ag-ASR program is expected to provide an average of 29,000 acre feet/yr of additional groundwater recharge.

The salinity of surface water used for recharge is expected to be relatively low because injection will take place during wet hydrologic periods. TDS for water from the San Luis Canal is expected to average approximately 220 mg/L, while TDS for Kings River water is expected to have only approximately 50 mg/L TDS. Turbidity is expected to be higher than the historical averages for the Kings River based on experience during the ASR Pilot Study. Concentrations of other mineral constituents are expected to be lower than the existing groundwater concentrations.

The vast majority of the Ag-ASR Program area is not within the 100-year floodplain. Scattered occurrences of the floodplain occur near Huron and in the central portion of the Program area.

Hydrology and Groundwater Modeling

The District contracted with LSCE to develop and apply a numerical groundwater flow and particle tracking model used to evaluate the aquifer storage and recovery program.[31] The purpose of this modeling was to evaluate groundwater travel times from Ag-ASR wells to

drinking water supply wells in the subbasin. Based on historical data, amounts of imported surface water were projected and assigned based largely on projected federal deliveries to each water district within the domain through the CVP. Characteristics of groundwater aquifers were based on information from previous models and studies. A maximum of three consecutive years with injection was modeled based on historical hydrology and assumptions. A total of 400 Ag-ASR wells were assumed to be operational.

Results of the particle tracking show a wide range in total travel distance from the source of injection. Particle travel distance ranges from less than one foot to over 750 feet in the wells evaluated. Including the distance from the well to the starting location of the particles, a maximum travel distance of approximately 1,800 feet would be anticipated from injection in the proposed ASR program.

Regulatory Overview

Water Code Section 13264 prohibits dischargers from initiating new discharges (including operation of an injection well) before a complete RWD is filed pursuant to Water Code Section 13260, and before the Board either issues waste discharge requirements or certain timelines expire (provided that the discharge does not create or threaten to create a condition of pollution or nuisance). After review of the Report of Waste Discharge filed by Westlands on July 3, 2019, the Regional Water Board provided the following response:

> "Therefore, Westlands Water District has submitted a RWD that has satisfied Water Code, Section 13260. However, due to the uniqueness and complexity of the project, further information/demonstrations may be requested in the future to ensure the protection of groundwater quality."

ASR projects regulated by the Regional Board are consistent with Class V of the federal Underground Injection Control program and must comply with current US EPA permit by rule requirements.

The Water Quality Control Plan for the Tulare Lake Basin (Basin Plan), in which the Ag-ASR Program is located addresses antidegradation policy:[9]

> "The antidegradation directives of State Water Board Resolution No. 68-16 (Appendix 2) require that high quality waters of the State be maintained "consistent with the maximum benefit to the people of the State."

For groundwater, the Basin Plan (Table 2-2 of the Basin Plan) identifies beneficial uses for the Westside Basin DAU 244 as Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), and Industrial Service Supply (IND). Shallow groundwater in a small portion of the southern end of DAU 244 between Stratford and Kettleman City has been de-designated for MUN and AGR beneficial uses (see Basin Plan Figure 2-3). The District can provide surface

water for MUN groundwater users within the District. Therefore, the locations of MUN beneficial uses are strictly defined and can be kept consistent with District plans and policies.

Constituents of Concern and Water Quality Objectives

The Basin Plan specifies that for "ground waters designated MUN, the concentration of total coliform organisms over any 7-day period shall be less than 2.2 most probable number (MPN)/100 milliliter (ml)." This would be assumed to apply to any locations of current or future municipal wells allowed by the District. Compliance with this would require that Ag-ASR program operation not cause the total coliform objective to be exceeded at drinking water well locations.

Although not part of Basin Plan objectives, municipal or other wells with designation as a direct drinking water supply would also need to meet state and federal requirements to prove that they are not providing groundwater under the direct influence of surface water (California Code of Regulations Title 22 §64651.50).

Based on the Basin Plan and other guidelines or requirements discussed above, the list of constituents of concern and water quality objectives most relevant to the District's Ag-ASR Program are summarized in Tables 5 and 6.

Table 5. Water Quality Objectives and Current Groundwater Quality

Parameter	Units	Average Background Groundwater	Primary MCL	Secondary MCL	Ag Criteria
Arsenic	ug/L	2.9[d]	10	-	-
Boron	mg/L	0.89	-	-	0.5, 2.0
Chloride	mg/L	50	-	250/500/600[b]	175, 350
EC	umhos/cm	1350		900/1,600/2,200[b]	1,000, 3,000
Hex. Chrome	ug/L	NA	50, 10[a]	-	-
Iron	mg/L	0.04[d]	-	0.3	-
Manganese	mg/L	0.036	-	0.050	-
Nitrate (as NO3)	mg/L	7.9	45	-	-
Selenium	ug/L	4.8[d]	50		-
Sodium	% base constituents	54%		-	60%, 75%
Sulfate	mg/L	485	-	250/500/600[b]	-
TDS	mg/L	960	-	500/1,000/1,500[b]	700, 2,000
Uranium	ug/L	11[d]	30[c]	-	-
Vanadium	ug/L	7.1[d]	50		-

Notes:
Averages of Measurements, not volume-weighted.
All constituents measured as dissolved phase.
Maximum concentrations for existing groundwater shown previously in Tables 3 and 4.
NA = not applicable

a. 50 ug/L Total Cr California MCL; 10 ug/L recent Hex. Cr California MCL (limit currently suspended)
b. Recommended/Short Term/Long Term
c. USEPA MCL and approx. equal to California MCL
d. From GAMA wells data. Other values are averages of GAMA and CIP wells.
Source: ROWD, reference 13

Table 6. Other Trace and Biological Groundwater Quality Objectives

Parameter	Units	Average Background Groundwater	Primary MCL	Surface Water Rule
Total Coliform	MPN/100 mL	< 2.2/100 ml	< 2.2/100 ml	-
Giardia and Cryptosporidium	Count / 100 gal	ND	ND	ND
Primary Bio-indicators	Count / 100 gal	ND	-	10 – 25[a]
Total THMs	ug/L		80	-
Total HAA5	ug/L		60	-

Notes:
ND = non-detect
a. Rare category ranges from 10 for diatoms to 25 for plant debris.
Source: ROWD, reference 13

IMPACT ANALYSIS

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
J. HYDROLOGY AND WATER QUALITY						
Would the Project:						
1) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☒	☐	☐	☐	8, 9, 12, 27-31
2) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☐	☐	☒	24

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
3) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:						
a) result in a substantial erosion or siltation on- or off-site;	☐	☐	☐	☒	☐	24
b) substantially increase the rate or amount of surface runoff in a manner which could result in flooding on- or off-site;	☐	☐	☐	☒	☐	24
c) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	☐	☒	☐	24
d) impede or redirect flood flows?	☐	☐	☐	☒	☐	24
4) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒	☐	24
5) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	☐	☒	24

Beneficial Impacts: Criteria J2, J5

Beneficial impacts are associated with Criteria J2 and J5. Based on modeling results,[31] groundwater elevations in most of the Subbasin are affected in a beneficial manner. The far northeastern portion of the Subbasin shows the least effects, especially in the Upper Aquifer. In much of the rest of the Subbasin, groundwater elevations rise approximately 60 ft in the Upper Aquifer and 80 feet in the Lower Aquifer when comparing model result before and after the three year model period with peak Ag-ASR recharge.

The Ag-ASR Program would provide direct groundwater recharge and therefore improve sustainable groundwater management of the subbasin. The increases in piezometric pressure in the groundwater aquifers would not cause any significant impediment to additional groundwater recharge proposed using percolation ponds or shallow wells in the western alluvial fans.

The Ag-ASR Program is expected to improve mineral quality of groundwater, which is consistent with the Basin Plan. Over time, improved groundwater quality will enhance beneficial uses.

The recharge will contribute to sustainability of groundwater as a source of water in dry periods. The program is explicitly listed as a recharge component of the Westside Subbasin Groundwater Sustainability Plan.

No Impacts: Criteria J3a-J3d, J4

Criteria J31-J3d and J4 address surface drainage alteration impacts and the release of pollutants due to project inundation. The District's existing conveyance system consists of buried pressurized distribution for supply water and no additional disturbance of drainage courses is expected for construction or operation of Ag-ASR facilities. The Ag-ASR wells will utilize temporary small localized retention berms for backflush water control, but these will have no adverse impacts on drainage patterns in the area. There will be no impact relative to impeding or redirecting flood flows. As most of the Ag-ASR Program area is not within a flood plain and any chemicals will be stored pursuant to industry standards, there is no impact due to release of pollutants from Project inundations. Backflush water may have some residual free chlorine, but the chlorine residual will rapidly dissipate and break down, posing no significant threat to water quality during a flooding event.

Less Than Significant Impacts with Mitigation Incorporated: Criterion J1

Evaluation of Criterion J1 includes the consideration of Basin Plan water quality objectives, Antidegradation Policy, and Surface Water Treatment Rule requirements.

Water Quality Objectives and Antidegradation Policy. The anticipated quality of surface water for the Ag-ASR program is shown in Table 7 along with comparison values for average groundwater quality. The historical source water quality values are based on San Luis Canal water quality during 2009 through 2014 and Kings River quality during 2010 through 2015. During the ASR Pilot Study,[12] the salinity of source water was significantly lower than the average historical values because of the wet hydrological period during the study. It is also expected that future recharge will occur more during wet hydrological periods. The estimated typical injection water quality is therefore reflective of wetter than average conditions.

Table 7. Anticipated Concentrations of Groundwater and Recharge Water Constituents

Constituent	Approx. Average Groundwater	San Luis Canal		Kings River	
		Measured[a]	Estimated Typical for Recharge Periods[d]	Measured[b]	Estimated Typical for Recharge Periods[d]
TDS (mg/L)	960	150 – 451	220	16 – 54; 36 - 56	50
Sodium (mg/L)	200	17 – 112	40		8
Calcium (mg/L)	120	14 – 31	20		5

Table 7. Anticipated Concentrations of Groundwater and Recharge Water Constituents

Constituent	Approx. Average Groundwater	San Luis Canal		Kings River	
		Measured[a]	Estimated Typical for Recharge Periods[d]	Measured[b]	Estimated Typical for Recharge Periods[d]
TOC (mg/L)	0.3	0.8 – 8.9	5	1 - 3.3 (DOC); 3.3	3
Magnesium (mg/L)	15	7 – 20	10		3
Sulfate (mg/L)	480	16 – 137	30	NA;1.2 – 3.0	10
Chloride (mg/L)	70	18 – 133	40	NA;1.1	10
Manganese (dissolved, ug/L)	36	<5 – 11	5	na ;4 - 61	20
Boron (mg/L)	1.1	0.1 – 0.4	0.2	0.05 – 0.08; <0.1 (ND)	0.08
Bicarbonate (mg/L)	132	50	50	10	10
Hardness mg/L as CaCO3	140	72 – 159	90	8.5 – 28.7; NA	25
pH	8.1	5.9 – 9.0	7.8	6.4 – 8.2; 7.92	7.5
Nitrate (as NO3)	7	0.2 – 5.9	1	0.03 – 0.29; 1.6	0.25
EC (umhos/cm)	1,349	257 – 806	400	25 – 71.3; 157	70
Temperature (C)	30	7.8 – 24.9	15	9.8 – 25.8; 24.4	20
Dissolved Oxygen (mg/L)	<1	5.5 – 13.4	8.5	5.8 – 11.2; 10.6	8.5
TSS (raw)		0 – 20	4	9 – 13; NA	5
Turbidity, NTU (raw)		0.6 – 24	10	1 – 7.6; 70.2	18

Notes:
ND = non-detect
NA = not applicable

a. Data from 2009 – 2014 California Aqueduct data for Turnout 21, station KA017226.
b. Data before semicolon is from CEDEN, 2010 – 2012 Irrigated Lands Program data for Kings River at Stinson and Crescent Weirs.
   Data after semicolon is from Westlands 2011 and 2017 samples from Mendota Pool
c. Coplen and Kendal, 2000.
d. Estimates based on historical measurements and pilot study results.

Source: ROWD, reference 13

As summarized in Table 7, expected mineral water quality for recharge water sources is substantially better than existing groundwater quality for all constituents, with dramatic improvements in total salinity and major salt ions. This indicates that the Ag-ASR Program complies with Antidegradation Policy and will most likely have beneficial impacts for those constituents. Expected recharge mineral water quality is also well below MUN and AGR water quality objectives listed in the Basin Plan.

Geochemistry Effects. In addition to a straight comparison of recharge water quality, geochemistry effects also need to be considered for constituents that could possibly be mobilized from aquifer materials. The geochemistry related water quality results from the ASR Pilot Study were summarized as follows:

> "Recovered water was of much higher quality than background groundwater for both irrigation and municipal usage. Mobilization of arsenic, chromium, and uranium were not problematic. Some elevated manganese was detected late in recovery, but that was most likely reflective of background groundwater conditions."

Although the Pilot Study showed no significant mobilization of trace constituents of concern, other municipal ASR projects have shown that this can be a risk depending upon site-specific geochemistry. While the use of intermittent rather than continuous chlorination will lessen the potential for mobilization of arsenic or other susceptible constituents, the impact associated with mobilization of trace constituents of concern remains significant. This impact can be reduced to less than significant levels by recovery of the recharge water by the landowner as discussed below.

In addition, mitigation is provided below for ongoing monitoring of constituents with the potential for mobilization as part of the Ag-ASR Program which would provide additional data on geochemical effects in different areas of the Subbasin, potentially leading to Program modifications if needed.

Disinfection Byproducts and Microbial Impacts. Disinfection byproduct concentrations in groundwater reaching drinking water wells would need to be compliant with the Basin Plan and drinking water Maximum Contaminant Limits (MCLs; see Table 6). Under Antidegradation Policy, concentrations would also need to be low enough that they would not significantly contribute to an MCL exceedance by a drinking water provider that chlorinated water from the drinking water well.

The results of the Ag-ASR Program would be expected to be similar to the results of the ASR Pilot Study, which concluded:

- The intermittent chlorination and backflush recovery did not result in disinfection byproduct concentrations of any significance.

- After only one day of recovery pumping, the recovered water was essentially free of microbes and bio-indicators. This would indicate that the risk of migration of pathogenic microbes was very low for the aquifer tested.

For disinfection byproducts, the use of only intermittent chlorination immediately prior to backflush pumping of injection wells greatly minimizes the potential amounts of disinfection byproducts produced and allows them to be extracted during backflush pumping. Therefore, disinfection byproduct concentrations are not expected have a significant risk of impacts to drinking water wells.

To be compliant with the Basin Plan and with the Surface Water Treatment Rule, the impact from the Ag-ASR program should not cause an exceedance of objectives listed above in Table 6.

The Pilot Study results indicate that the combination of factors including removal of microbial constituents by aquifer material within approximately 50 feet of the well, chlorination in the immediate vicinity of the well screen, and 9 day rest period essentially completely removed all microbial components and bio-indicators. These results would indicate that the initial buffer zone recommendations based on the particle trace model results are extremely conservative for the protection of drinking water wells.

Other studies on riverbank filtration show removals of microbes and bio-indicators versus travel distances. Using surrogate data studies on giardia and cryptosporidium removal, Berger (2002) concluded that riverbank filtration should be capable of achieving at least 1.0 log removal in 16 meters (~50 feet) of travel. The California groundwater recharge reuse policy applies a virus inactivation credit of one log per month of aquifer residence time.

Based on the Pilot Study results and other research, the risk of microbial impacts to drinking water wells is low with sufficient separation distance and groundwater travel time between Ag-ASR wells and drinking water wells but remains significant. Establishment of buffer exclusion zones around drinking water wells has been proposed as a mitigation measure for potential microbial impacts.

MITIGATION MEASURES

Microbial and geochemistry impacts from Ag-ASR wells operated close to drinking water wells are potentially significant adverse impacts. The District shall implement the following mitigation measures.

Mitigation Measure HWQ-1: Establishment of Exclusion Buffer Zones

Exclusion buffer zones shall be established for drinking water wells within WWD. Based on the particle trace model results, a base buffer exclusion of 1,300 feet in the direction opposite or

perpendicular to the regional gradient and an exclusion buffer of 2,600 feet in the direction of the regional gradient was recommended in the ROWD to protect for worst case conditions. Exclusion buffer zones would apply to Ag-ASR wells screened in the same aquifers as the drinking water supply well. The conversion and operation of Ag-ASR wells will be prohibited in the exclusion buffer zones. Exclusion buffer zones may be modified by WWD with RWQCB approval based on monitoring and operational experience.

Mitigation Measure HWQ-2: Recovery of Injected Water

Well owners shall recover the amounts of water recharged, thus recovering mobilized constituents in irrigation water.

Mitigation Measure HWQ-3: Performance Tests, Monitoring, and Program Modifications

Initial well performance and aquifer characteristics testing will be performed on newly enrolled wells. This will include drawdown and recovery testing. This will provide data that could indicate if there is a higher than expected risk of constituent transport to drinking water wells. Initial water quality sampling will include sampling and analyzing water from the Ag-ASR well, other nearby wells, and any nearby monitoring wells. Ongoing monitoring shall be as included in the ROWD or as required by the RWQCB. Well and aquifer testing and ongoing monitoring shall be used as a basis for Ag-ASR Program modifications.

K. LAND USE AND PLANNING

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
K. LAND USE AND PLANNING						
Would the Project:						
1) Physically divide an established community?	☐	☐	☐	☒	☐	24
2) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒	☐	16, 19

No Impacts: Criteria K1, K2

The proposed Ag-ASR Program will not divide an established community (Criterion K1). The Program is consistent with the State and Federal regulatory framework for ASR projects (Criterion K2). Additionally, the Ag-ASR Program is consistent with the Fresno and Kings Counties General Plans which contain goals, policies and objectives to ensure long-term sustainable water supplies for the region. [16, 19]

L. MINERAL RESOURCES

SETTING

In Fresno County, lands along the San Joaquin River and Kings River are mapped as Mineral Resource Zone 2 which means mineral resources are present and available in these areas. These areas are northeast and southeast of Fresno and well outside of the Ag-ASR Program area.[15] Few commercial mining and mineral extraction activities occur in Kings County.[16]

IMPACT ANALYSIS

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
L. MINERAL RESOURCES						
Would the Project:						
1) 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?	☐	☐	☐	☒	☐	15, 16
2) 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?	☐	☐	☐	☒	☐	15, 16

No Impacts: Criteria L1, L2

The proposed Ag-ASR Program includes excavation activities which are limited in area/extent and depth in highly disturbed agricultural areas. No impacts to mineral resources will occur.

M. NOISE

IMPACT ANALYSIS

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
M. NOISE Would the project result in:						
1) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☐	☒	☐	24
2) Generation of excessive groundbourne vibration or groundborne noise levels?	☐	☐	☐	☒	☐	24
3) For a project located within the vicinity of a private airstrip or 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?	☐	☐	☐	☒	☐	24

No Impacts: Criteria M1-M3

The proposed Ag-ASR Program includes minor construction activities within large expanses of agricultural land without the presence of sensitive receptors or airports. Increased construction noise will be short-term and negligible and operational noise associated with injecting surface water into underground aquifers will be indistinguishable from current operations. No impacts relative to noise or vibration will occur.

N. POPULATION AND HOUSING

IMPACT ANALYSIS

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
N. <u>POPULATION AND HOUSING</u>						
Would the Project:						
1) 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)?	☐	☐	☐	☒	☐	24
2) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒	☐	24

No Impacts: Criteria N1, N2

The proposed Ag-ASR Program has no issues associated with inducement of unplanned population growth (Criterion N1) or displacement of people or housing (Criterion N2).

O. PUBLIC SERVICES

IMPACT ANALYSIS

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
O. <u>PUBLIC SERVICES</u>						
Would the Project:						
1) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, the construction of which would cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:						
a) Fire protection?	☐	☐	☐	☒	☐	24
b) Police protection?	☐	☐	☐	☒	☐	24
c) Schools?	☐	☐	☐	☒	☐	24
d) Parks?	☐	☐	☐	☒	☐	24
e) Other public facilities?	☐	☐	☐	☒	☐	24

No Impacts: Criterion N1

The proposed Ag-ASR Program does not require new or physically altered governmental facilities and no impacts will occur.

P. RECREATION

IMPACT ANALYSIS

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
P. RECREATION						
Would the Project:						
1) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒	☐	24
2) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒	☐	24

No Impacts: Criteria P1, P2

The proposed Ag-ASR Program has no issues associated with recreation and no impacts will occur.

Q. TRANSPORTATION

IMPACT ANALYSIS

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
Q. <u>TRANSPORTATION</u>						
Would the Project:						
1) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☐	☒	☐	24
2) Conflict or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b)?	☐	☐	☐	☒	☐	24
3) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment)?	☐	☐	☐	☒	☐	24
4) Result in inadequate emergency access?	☐	☐	☐	☒	☐	24

No Impacts: Criteria Q1-Q4

There will be a few vehicle trips per day necessary for conversion of the injection wells, and an occasional trip for equipment maintenance. There will be no conflicts with programs or plans (Criterion Q1), no conflict with CEQA Guidelines (Criterion Q2), safety hazards will not be increased (Criterion Q3), and no impact to emergency access (Criterion Q4).

R. TRIBAL CULTURAL RESOURCES

IMPACT ANALYSIS

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
R. TRIBAL CULTURAL RESOURCES						
1) Would the Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code § 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe and that is:						
a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☐	☐	☒	☐	34
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resource Code § 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code § 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☐	☐	☒	☐	34

No Impacts: Criteria R1a, R1b

The NAHC was consulted regarding the pressure of any sites within the Ag-ASR Program area which may be deemed sacred by members of the local Native American community. A response from the NAHC indicated that the records search of the Sacred Lands File was negative.[34]

As discussed in Chapter 1, pursuant to AB 52 requests, both the Dumna Wo Wah Tribal Government and the Santa Rosa Rancheria Tachi Tribe were provided information on the Ag-ASR Program on July 22, 2019. No responses were received during the 30-day review period.

S. UTILITIES AND SERVICE SYSTEMS

IMPACT ANALYSIS

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
S. <u>UTILITIES AND SERVICE SYSTEMS</u> Would the Project:						
1) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☐	☒	☐	24
2) Have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☐	☒	☐	24
3) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒	☐	24
4) Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☐	☒	☐	24
5) Comply with federal, state, and local statues and regulations related to solid waste?	☐	☐	☐	☒	☐	24

No Impacts: Criteria S1-S5

The proposed Ag-ASR Program involves the diversion of surface water from established sources during times of abundant supply and conveyance to retrofitted wells where the water will be injected into underlying aquifers, stored, and recovered for later use. There will be no impacts relative to Criteria S1-S5.

T. WILDFIRE

SETTING

In Fresno County, fire hazard severity zones have been identified and are located in the foothills east of Fresno and west of I-5.[32] Moderate to very high fire hazard severity zones exist in Kings County in the foothills west of I-5.[33]

IMPACT ANALYSIS

Significance Criteria

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
T. WILDFIRE If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:						
1) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒	☐	24, 32, 33
2) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒	☐	24, 32, 33
3) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒	☐	24

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
4) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, and as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒	☐	24

No Impacts: Criteria T1-T4

The Ag-ASR Program area is not located within or near lands classified as very high fire hazard severity zones and no impacts relative to Criteria T1-T4 will occur.

U. MANDATORY FINDINGS OF SIGNIFICANCE

IMPACT ANALYSIS

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
U. <u>MANDATORY FINDINGS OF SIGNIFICANCE</u>						
1) Does the project have the potential to substantially 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, substantially 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?	☐	☒	☐	☐	☐	15, 16, 24, 25

RESOURCE CATEGORY / SIGNIFICANCE CRITERIA	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Beneficial Impact	Information Sources
2) Does the Project have impacts that 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)?	☐	☒	☐	☐	☐	8, 9, 12 27-32
3) Does the Project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☒	☐	24

Criterion U1. The Ag-ASR Program will not eliminate important examples of the major periods of California history or prehistory. The Ag-ASR Program area consists of vast expanses of agricultural land and thus highly disturbed due to cultivation, planting and harvesting operations. There remains a remote possibility that sensitive biological resources could be encountered during the well application process, and there is also a remote possibility of inadvertent discovery of cultural resources or human remains during excavation activities. BIO-1, BIO-2, ARCH-1, and ARCH-2 address these issues and reduce impacts to less than significant levels.

Criterion U2. The Ag-ASR Program includes the incremental addition of recharge wells on an annual basis up to a projected maximum of 400 wells over a 20-year period. As discussed in Section J, a numerical groundwater flow and particle tracking model was used to evaluate the Ag-ASR Program at full development, thus providing a measure of cumulative impacts. The Ag-ASR Program will provide many beneficial impacts for groundwater resources and improve sustainable groundwater management of the subbasin. Mitigation measures HWQ-1 through HWQ-3 will address microbial and geochemistry impacts from Ag-ASR wells operated close to drinking water wells.

Criterion U3. The Ag-ASR Program will not cause substantial adverse effects on human beings. Protection of drinking water wells will be provided as discussed under Criterion U2. Several chemicals will be used at the recharge well locations but these are either already used in the Program area or do not pose any unusual worker exposure risks.

CHAPTER 4

CHECKLIST AND INFORMATION SERVICES

1. https://wwd.ca.gov

2. https://wwd.ca.gov/water-management/water-supply

3. https://water.ca.gov/sgma

4. https://water.ca.gov/Programs/Groundwater-Management/Bulletin-118/Critically-Overdrafted-Basins

5. SWRCB. Water Quality Order 2012-0010, General Waste Discharge Requirements for Aquifer Storage and Recovery Projects That Inject Drinking Water into Groundwater. 2012.

6. SWRCB. Draft Mitigated Negative Declaration for the Statewide General Waste Discharge Requirements for Aquifer Storage and Recovery Projects That Inject Drinking Water into Groundwater. 2012.

7. https://codes.findlaw.com/ca/water-code

8. SWRCB. Antidegradation Policy Resolution 68-16. 1968.

9. RWQCB Central Valley Region. Water Quality Control Plan for the Tulare Lake Basin. Second Edition. January 2015.

10. Westlands Water District. Groundwater Management Plan. Adopted September 16, 1996.

11. Schmidt, K. Groundwater Conditions Beneath District-Owned Lands in the Westlands Water District. April 2009.

12. Brown and Caldwell. Aquifer Storage and Recovery Pilot Study Results. May 2018.

13. Brown and Caldwell. Final Report of Waste Discharge and Technical Report. July 3, 2019.

14. Robert Beggs. Brown and Caldwell. July 2019.

15. Fresno County General Plan Background Report, Public Review Draft. December 2017.

16. 2035 Kings County General Plan, adopted on January 26, 2010.

17. SJVAPCD. 2018 PM 2.5. Plan for the San Joaquin Valley. Adopted November 15, 2018.

18. SJVAPCD. Guidance for Assessing and Mitigating Air Quality Impacts. March 19, 2015.

19. SJVAPCD. Small Project Analysis Level (SPAL). March 1, 2017.

20. Bureau of Reclamation. Final Environmental Assessment, Central Valley Project Interim Renewal Contracts for Westlands Water District, Santa Clara Valley Water District, and the Pajaro Valley Water Management Agency 2016-2018. May 2017.

21. California Geological Survey Department of Conservation. Fault Rupture Zones in California. Special Publication 42. Interim Revision 2007.

22. https://www.epa,gov/ghgemissions/sources

23. SJVAPCD. Climate Change Action Plan. Adopted August 2008.

24. Professional judgment and expertise of the environmental specialist preparing this assessment, based upon a review of the Project site and surrounding conditions, and a review of engineering documents.

25. SJVAPCD. Guidance for Valley Land Use Agencies in Addressing GMG Impacts for New Projects under CEQA. Adopted December 17, 2009.

26. Fresno County General Plan, Comprehensive General Plan Review and Revision, Public Review Draft. December 2017.

27. Luhdorff & Sealmanini. Hydrogeology: Conceptualizatiion Report–Westside Subbasin. August 2018.

28. Westlands. Water Management Plan 2012. April 19, 2013.

29. Carollo & Luhdorff & Sealmanini. Groundwater Quality Assessment Report for the Western Tulare Lake Basin Area. February 2015.

30. Brown & Caldwell. ASR Pilot Study Work Plan. May 5, 2016.

31. Luhdorff & Sealmanini. Particle Tracking Analysis of Injected Water for Proposed Aquifer Storage and Recovery Program in WWD. May 2019.

32. CAL-FIRE. Hazards Severity Zones Map for Kings County. November 6, 2007.

33. CAL-FIRE. Fire Hazards Severity Zones Map for Fresno County. November 7, 2007.

34. NAHC. Sacred Lands Research Results for WWD Ag-ASR Program, email to Scheidegger & Associates August 21, 2019.

APPENDIX A

Initial ASR Design, Operations, and

Monitoring Standards Plan

Initial ASR Design, Operations and Monitoring Standards Plan

Prepared for
Westlands Water District
Fresno, CA
July 2019

Initial ASR Design, Operations and Monitoring Standards Plan

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Westlands Water District
Fresno, CA
July 2019

Project No. 152731

Brown AND Caldwell
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Table of Contents

List of Figures

List of Tables

Acronyms and Abbreviations

Ag-ASR	agricultural aquifer storage and recovery
Cl	Chlorine
CVP	Central Valley Project
District	Westlands Water District
EC	electrical conductivity
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
ppm	parts per million
psi	pounds per square inch
PVC	polyvinyl chloride
ROWD	Report of Waste Discharge
WDRs	Waste Discharge Requirements
Westlands	Westlands Water District

Section 1

Introduction

The primary purpose of this initial plan is to provide details on the proposed monitoring program for protecting groundwater quality for an agricultural aquifer storage and recovery (Ag-ASR) program for Westlands Water District (Westlands or District) to serve as an Appendix to the programmatic Report of Waste Discharge (ROWD). This plan also provides initial guidance on design, operations and operational monitoring. After outreach and coordination with well owners, a full Design, Operations and Monitoring Standards Plan will be subsequently prepared with more complete details on Ag-ASR well design, operations, and operational monitoring.

Section 2

Overall Ag-ASR Program

Imported surface water from the Central Valley Project (CVP) through the San Luis Canal, flood flows on the Kings and San Joaquin Rivers, and water from other sources such as water transfers and exchanges will be used as the water supplies for the Ag-ASR program. Diversion points will be current District diversion locations from the San Luis Canal and from the District's inlet canal from the Mendota Pool.

Water will be distributed to approved Ag-ASR wells throughout the District as requested by well owners and scheduled by the District. The District in collaboration with the Westside Subbasin Groundwater Sustainability Agency will follow a management program.

Overall program management by the District is proposed to include:

- Developing Ag-ASR well standards;
- Developing monitoring standards consistent with Ag-ASR program permit requirements;
- Permitting individual Ag-ASR wells through the Groundwater Sustainability Agency (GSA);
- Providing technical assistance to individual well owners;
- Collecting physical and construction data for individual wells;
- Collecting additional hydrogeologic data from individual wells;
- Collecting and managing Ag-ASR operational and water quality data; and
- Providing required reports as specified in the Ag-ASR program permit.

2.1 GSA and District Approval Process Outline

Wells will be permitted by the Westside Subbasin GSA and the District for recharge usage if:

- The well satisfies the buffer zone criteria for separation from drinking water wells;
- The well meets construction standards;
- The well has the appropriate monitoring instrumentation;
- The well owner agrees to provide required monitoring data; and
- The well owner complies with other relevant requirements of the Ag-ASR program.

Well owners will file requests with the District to be included in the Ag-ASR program. District will evaluate initial and ongoing compliance with program criteria. The District will provide approved participants with a notice of acceptance in the program and operational and monitoring requirements. The District will have some flexibility for adaptation to site-specific conditions at individual wells as long as groundwater quality is protected, GSA criteria are met, and conditions of the program level discharge permit are followed.

2.2 Buffer Zone Criteria

As per the modeling results presented in the Report of Waste Discharge, a base buffer exclusion of 1,300 feet in the direction opposite or perpendicular to the regional gradient and an exclusion buffer of 2,600 feet in the direction of the regional gradient will initially be utilized. This would apply if the Ag-ASR wells and the drinking water well are completed into the same major aquifer zone (Upper or

Lower). For situations where the nearest drinking water well is reliably completed in a different major aquifer zone than the Ag-ASR well, a buffer zone of 300 feet would be applied. Proposed Ag-ASR wells will not be approved if drinking water wells are inside the buffer exclusion zone.

Additional future monitoring and modeling data may prove this criteria to be excessively conservative. In that case, the District may petition the Regional Water Board to allow new criteria.

Section 3

Standards for Wells and Wellhead Facilities

Most of this section assumes that existing wells are being converted to Ag-ASR operation. New ASR wells should have characteristics described herein plus additional construction considerations for optimizing performance and providing enhanced longevity. Information requirements for wells that are to be enrolled in the Ag-ASR program are also listed in this section.

3.1 Characteristics of Wells Suitable for Conversion to ASR

The best wells for conversion to ASR will be wells that are structurally sound, intersect zones with high hydraulic conductivity, and have surface facilities and features that would be compatible with conversion to ASR operation. Some of the basic desirable characteristics are as follows:

- The well screens should be located below the deepest anticipated pumping water level.
- The well pump should be located in blank casing or installed with a shroud if installed in a section of screened casing to prevent damage to the casing, gravel pack, or near-well formation during backflush pumping;
- If injection tubes are expected to be used, well should have adequate annular space between pump column pipe and well casing for injection tubes;
- Well screens should be louver or mill-slot to enable aggressive well rehabilitation if necessary;
- Well should be cased from ground surface to the well bottom (no open hole construction);
- Permanent pump capacity should be at least twice the injection rate for effective backflushing;
- Total length and open area of well screen should be sufficient to result in low injection flow entrance velocity (including potential plugging considerations); and
- If injection tubes are expected to be used, the well pump head and discharge piping should be able to be modified to accommodate injection tubes.

Available water supply pressure at the proposed well should generally be above 20 pounds per square inch (psi) to provide for losses in filters and valves. Injection pressure downstream of filters and control valves can be as low as 5 psi or even partial vacuum if suitable valves and controls are in place. Booster pumps may be required to provide necessary pressure.

The wellhead configuration should include space to accommodate the following:

- Access to the annular space of the well for installation of injection tube(s) or for a control line for a downhole control valve;
- Access through a gravel fill port or in the annular space for a water level sounding tube; and
- Space around the well and upstream for valves, filters, chemical tanks, instrumentation, and possibly a booster pump if needed.

3.2 Well and Pump Modifications

Conversion of existing wells to have ASR capabilities requires modifications and additional equipment.

3.2.1 Pump Output Flow Control

When the pump motor is a fixed speed (rpm), the pump production capacity should be at least twice the injection flow rate to allow for effective backflushing. A pump motor controlled by a variable frequency drive is ideal for backflushing since the pump's production output can be easily varied from low to very high capacities. The objective during intermittent backflush operation during recharge periods is to be able to pump water from the well at varying rates up to full pumping capacity.

3.2.2 Pump Discharge

The pump's above ground discharge piping should include a combination air release/vacuum breaker, flow meter, sample tap, pressure gauge, gate valve and pump-to-waste piping to a suitable discharge point for backwash water.

3.2.3 Water Level Measuring Tube and Data Logger

To monitor the Ag-ASR well's water level while injecting or extraction pumping, a permanent sounding pipe should be available or attached to the well pump column pipe and installed in the well. Although not required, a level transducer and data logger can provide helpful operational data.

3.2.4 Injection Tube(s)

One method to maintain a positive injection pressure and avoid air entrainment resulting from cascading water is to inject water through one or more injection tubes installed in the Ag-ASR well. The injection tube(s) ideally should be steel or schedule 80 polyvinyl chloride (PVC) and sized to handle the anticipated maximum flow rate. If multiple tubes are used, the bottom depths should be staggered by approximately 20 feet. All tubes should extend below the lowest expected pumping drawdown level in the well. Valves upstream of the tube(s) along with pressure/vacuum combination gauges can be used to control flow rates.

Injection and wellhead pipe and fittings shall have air-tight joints and connections to prevent the introduction of air if vacuum conditions develop at the wellhead during injection activities. The downward velocity of injection water in the open casing should be less than 1.0 feet/sec to prevent any air bubbles from entering the well screen. An alternative to injection tubes is to inject down the pump column pipe if factors such as well screen depth, injection rate, well pump size and setting depth, and well water levels are suitable.

3.2.5 Down Hole Control Valves

Water can be injected directly down the pump column if there is adequate means for injection flow control and prevention of air entrainment. ASR control valves are commercially available that attach to the pump intake and provide controlled throttling for flow control. They also provide back pressure to prevent cascading water and air entrainment.

3.3 Well Construction Data

Well construction and drilling log data will be furnished to the District. This will be used for reporting purposes and to verify which aquifer zones are being utilized by the well. The data will include:

- Well construction information (including casing and screen materials, depths and diameters; seal locations; overall bore hole diameter; screen opening specification; gravel pack specification, and other relevant information);
- Pump specifications and condition;
- Well age and indications of deterioration from corrosion;
- Lithology from the drilling log;
- Geophysical logs, if available;
- Test pumping data and/or power company pump efficiency tests;
- A photo of the wellhead (pump discharge head, motor, discharge piping near wellhead);
- Well completion report; and
- Most recent video log, if available.

3.4 New Ag-ASR Well Rehabilitation, Development and Testing

The first steps in preparing a well for recharge using surface water is to remove the well pump, conduct a downhole TV survey, and remove any fill material and debris from the well bottom by bailing.

Additional well rehabilitation, development and testing procedures are then recommended to prepare the well for surface water recharge;

1. **Horizontal borehole velocity measurements** – For the first Ag-ASR wells in an area or Ag-ASR wells near drinking water wells, it would be advantageous to obtain horizontal borehole velocity measurements using a colloidal borescope to verify regional groundwater flow directions and trends. This could be done after removing the pump and before rehabilitation.
2. **Scratching** – Louver or mill slot style well perforations can be cleaned of mineral deposition with a steel wire scratcher.
3. **Acid Treatment** – Inhibited hydrochloric acid and an acid enhancer should be placed in equal doses throughout the well's perforations using a tremie pipe and the well water agitated using a line swab. The acid products are specifically designed to dissolve any additional mineral deposits and biofilm on the well perforations and in the gravel pack that surrounds the perforations.
4. **Air-lift Swab the Well Perforations** – Following the acid treatment, the well perforations should be air-lift swabbed from top-to-bottom and then from bottom-to-top. Air-lift swabbing is used to focus well development efforts on a small portion of the well screen.
5. **Post-rehabilitation TV survey** – A downhole TV survey should be conducted to evaluate the effectiveness of the rehabilitation activities and to assess the condition of the blank casing and louvered well screen. The survey can be used to identify potential problems such as poorly welded casing joints and small holes in the casing, which would need to be repaired.
6. **Test pump development and test pumping** – After rehabilitation and any required repair(s), the well should receive additional development by surging and over-pumping the well. When well development with the test pump are finished, pumping tests should be performed. The pumping tests should generally include an 8-hour step-drawdown pumping test, an 8-hour constant-rate pumping test, and a recovery test. The collective results of the pump tests can

be used to establish pre-recharge hydraulic properties of the well, aquifer characteristics, and well efficiency at varying flow rates.

7. **Develop Recharge Parameters** - Well recharge capacities will be estimated and aquifer characteristics can be calculated from the test pumping results.

3.5 Wellhead Facilities

Wellhead facilities and equipment should include agricultural sand media filtration, control valves, liquid chlorine injection, provisions for other chemical injection (such as acid or other treatments), and monitoring instrumentation (Section 4.1).

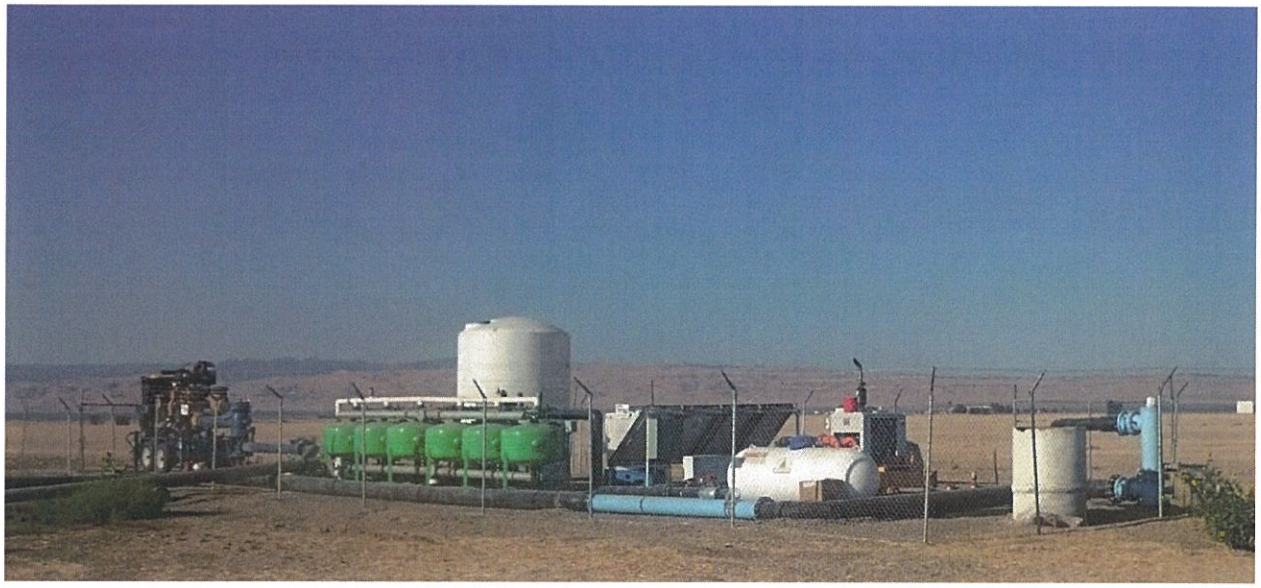

Figure 3-1. Example of Installed Equipment and Related Facilities from the Ag-ASR Pilot Study (Brown and Caldwell, 2018)

3.5.1 Filtration

In general, drip irrigation sand media filters sized for the normal irrigation pump flow rate can provide reasonable filtration for recharge water. Since the recharge rate is generally half or less of the normal pump forward flow, the actual hydraulic loading rate on the filters during recharge should be less than half of the nominal filter capacity rating. Operation at 10 gallons per minute per square foot or less of filter surface area using #20 filter sand is generally recommended for recharge water filtration.

3.5.2 Air Release

It is important to remove as much dissolved air as possible from water prior to recharge to prevent air-locking of the formation. A low velocity bubble release chamber with a continuously acting air vent should be installed downstream of the filters and upstream of the flow meter.

3.5.3 Pressure Control Valves

A pressure reducing valve is recommended immediately downstream of the filters to provide stable pressure for recharge flow control.

3.5.4 Chemical Injection

Facilities should be provided for short term chlorination using sodium hypochlorite once every three weeks or more often at concentration of approximately 100 – 300 parts per million (ppm) free Chlorine (Cl). Chlorine is injected prior to backflushing so that most of the chlorine residual can be recovered during backflushing. Chlorine should be injected downstream of the filters to allow the filter sands to biologically ripen for better capture of fine suspended solids.

Other amendments (such as magnesium chloride for clay interlayers stabilization or acid for well rehabilitation from scale) may also be considered in special situations.

The pumps utilized should be peristaltic or diaphragm pumps with compatible materials for the solutions to be injected and be rated for continuous operation. Corresponding chemical storage tanks should also be provided. The chlorine tank can be a large replaceable tote.

3.6 Corrosion Protection

Well casing corrosion is accelerated by the high redox surface water and periodic chlorination. Sacrificial anode or impressed current protection should be considered for conversion of existing wells to Ag-ASR operation. A removable PVC inner liner could also be considered where appropriate. Detailed corrosion protection recommendations will be provided in the future full Design, Operations and Monitoring Standards Plan.

Section 4

Monitoring and Operations

4.1 Operational Monitoring and Control Instrumentation

The major online monitoring instrumentation is listed in Table 4-1.

Table 4-1. Recommended Major Monitoring Instrumentation

Parameter Category	Measurement
Recharge Operation	Flow (required), pressures, turbidity, EC (required)
Recharge Well Water Level	Level transducer or sounder
Recovery Water Quality	EC (required)

Electrical conductivity (EC) (after filtration) should be monitored using a continuous sampling turbidity meter and an EC probe in a flow-through pipe sleeve. Although not mandatory, recharge water turbidity should also be monitored to provide important data for operation and backwash frequencies. Flowmeter readings will provide both important operational data and the volumetric measurements required by the GSA. Water level will need to be read continuously using a transducer or measured frequently if using a sounder. Pressures can be measured continuously using transducers or checked periodically. An example of the instrumentation shed used for the ASR Pilot Study is shown in Figure 4-1. Data can be relayed for cloud based data storage and access.

Figure 4-1. Example of EC and Turbidity Instruments used in Pilot Study

4.2 General ASR Maintenance Recommendations

Along with general equipment maintenance, Ag-ASR wells require periodic backflushing and chemical injection to maintain optimal recharge capacity.

4.2.1 Backflushing

In a recharge well, the aquifer material near the well gradually accumulates solids from the recharge water and plugs over time. Backflush pumping is used to remove accumulated solids.

- Having extra well pump capacity for higher flows is helpful for backflushing.
- Plan on backwashing as often as every 5 days to maintain optimal recharge capacities.
- Ramping up backflush flows to as high as 3 times the recharge flow and surging are helpful for maximum backflush effectiveness.

Backflushing effectiveness is determined by flow rates to the pumping water depth, and the removal of material based on backflush water turbidity.

The drawdown and backflushing flow rate should be recorded during backflushing operations to allow the tracking of specific capacity through the life of the well. Monitoring the trend of specific capacity can be used to schedule rehabilitation and maintenance activities at the well.

4.2.2 Chemical Injection

Intermittent chlorination at least once every 3 weeks or more often is practice that for prevents bioslime development in the well. Some level of chlorination prior to every backflush would be ideal. As mentioned previously, 100 – 300 ppm free Cl can be used as an initial target. Dosing rates for individual wells can be developed based on residual chlorine measured during backflushing.

4.2.3 Rehabilitation

If backflushing effectiveness and recharge capacity decreases over time, well rehabilitation may be required. Rehabilitation can include liquid carbon dioxide injection to maximize the breakup and removal of any plugging materials.

4.3 Water Quality Testing

Water quality testing will be specified in compliance with the Monitoring and Reporting Plan to be issued by the Regional Water Board. Water quality sampling ports should be installed downstream of the recharge flow meter. The proposed parameters for testing, reason, and testing frequency are shown in Table 4-2. These are in addition to the recommended operational parameters shown in Table 4-1.

Parameters proposed for monitoring were generally selected for demonstrating protection of water quality. Electrical conductivity and sulfate are also specified because they can be used as intrinsic tracers to provide data for better understanding of the fate and transport of recharged water.

Additional monitoring may be implemented by the District for initial Ag-ASR wells. The District will also establish a groundwater level monitoring program through the GSA that will satisfy Groundwater Sustainability Plan (GSP) criteria.

Table 4-2. Recommended Water Quality Monitoring

Parameter	Supply Water[a]		Recovered Water		Nearby Drinking Water Wells[d]
	Frequency	By	Frequency[b]	By	Frequency
Arsenic	Monthly	District	At 1 month	Owner	Annually
Boron	Quarterly	District	-	-	Annually
Calcium	Quarterly	District	-	-	-
Chloride	Monthly	District	-	-	-
EC	Monthly; cont.	District; Owner	Monthly or cont.	Owner	Annually
Total Chrome	Quarterly	District	At 1 month	Owner	-
Magnesium	Quarterly	District	-	-	-
Manganese (dissolved)	Monthly	District	At 1 month	Owner	-
Nitrate (as NO3)	Quarterly	District	-	-	-
Sodium	Quarterly	District	-	-	-
Sulfate	Monthly	District	At 1 and 3 months	Owner	Annually
TDS	Monthly	District	At 1 and 3 months	Owner	Annually
Uranium	Quarterly	District	Select wells[c] – at 1 and 3 months	District	-
Vanadium	Quarterly	District	Select wells – at 1 and 3 months	District	-
Total Coliform	Monthly	District	Select wells – at 1 and 3 months	District	Annually
Giardia and Cryptosporidium	Monthly	District	Select wells – at 1 and 3 months	District	3 Years[e]
Primary Bio-indicators	Monthly	District	Select wells – at 1 and 3 months	District	3 Years[e]
Total THMs	Monthly	District	Select wells – at 1 and 3 months	District	3 Years

a. *Only during periods of substantial deliveries for recharge. District samples will be taken at San Luis Canal and/or Mendota Pool/Kings River diversions.*

b. *"At ...." means time after recovery pumping has commenced*

c. *Wells nearest to drinking water wells and of special interest for monitoring geochemistry effects*

d. *Drinking water wells would be sampled by the District, if allowed by owner, or optionally by Drinking Water Well owner*

e. *If intrinsic tracer trends indicate significant influence from Ag-ASR well recharge on drinking water wells, MPA bio-indicators will be analyzed annually for 3 years to verify adequate protection.*

Section 5

Data Management and Reporting

The District will collect and organize data from participating well owners. Acceptable data formats will be provided in the future full Design, Operations and Monitoring Standards Plan. Operations data and water quality data from participants will be provided in Excel or through web data forms in formats developed by the District.

5.1 Data Usage

The District will use the data for:

- Determination of aquifer characteristics from aquifer pumping tests
- Determination of horizontal groundwater velocity to estimate travel time to drinking water wells
- Evaluation of water recovery pattern based on intrinsic tracers
- Monitoring and analysis of supply and recovery water quality to verify protection of beneficial uses and to demonstrate adequate removal of bio-indicators.
- Monitoring drinking water wells to verify adequate attenuation of biological materials
- Additional water quality monitoring specified in Waste Discharge Requirements (WDRs)
- Providing recharge and recovery volume data to the GSA for compliance with relevant groundwater management policies.
- Providing groundwater elevation to the GSA for evaluating groundwater level changes

Evaluation of data from the Ag-ASR program could provide a basis for future relaxation of the initial buffer exclusion zone recommendations.

Section 6

References

Brown and Caldwell, 2018. Aquifer Storage and Recovery Pilot Study Results. Prepared for Westlands Water District, Fresno, CA. May.

APPENDIX B

Mitigation Monitoring and Reporting Plan

MITIGATION MONITORING AND REPORTING PLAN

The following mitigation measures shall be implemented to reduce the impact to less than significant levels.

Potential Impact	Mitigation Measure	Responsibility	Action	Completion Date
D. Biological Resources				
D1-D4. Impact to Special-Status Species and Natural Communities	**BIO-1.** During the well application process with the landowners, the District shall review the locations of the wells and needed improvements. If the wells and improvements are within or along roadways and disturbed areas, no further action is needed. Otherwise, Mitigation Measure BIO-2 shall be implemented.	WWD	Review well locations	During well application process.
	BIO-2. If the wells and needed improvements are in close proximity to any natural areas, the District will then engage a qualified biologist who will assess the well conversion, conduct a field study if deemed necessary, and develop siting or construction-related mitigation to address the issue at hand.	WWD	Retain biologist	During well application process.
E. Cultural Resources				
E1, E2, E3. Inadvertent Discovery of Cultural Resources or Human Remains	**ARCH-1.** Should archaeological materials be discovered during excavation, work in the immediate vicinity of the find shall halt until WWD retains a qualified archaeological consultant to assess the find. If the archaeologist determines the materials to belong to a potentially significant archaeological or historic resource, a treatment plan shall be developed in consultation with WWD, tribal representatives (in the event of a prehistoric site), the Fresno County Department of Public Works and Planning for discoveries in Fresno County, or the Kings County Community Development Agency for discoveries in Kings County.	Landowner, WWD	Retain Archaeologist, evaluate find	During excavation
	ARCH-2. If human remains are encountered, the following procedures will be implemented: a. Per the stipulations of the California Health and Safety code 7050.5(b), the Fresno or Kings Counties Coroner's Office will be contacted immediately. b. The Coroner's Office has two working days in which to examine the identified remains. If the Coroner determines that the remains are Native American, then the Office shall notify the Native American Heritage Commission	WWD	Follow requirements of Health and Safety Code	During excavation

Potential Impact	Mitigation Measure	Responsibility	Action	Completion Date
	(NAHC) within 24 hours of the determination. c. Following receipt of the Coroner's Office notice, the NAHC will contact a Most Likely Descendant (MLD). The MLD may, with the permission of the landowner or authorized representative, inspect the site and make recommendations regarding the treatment and/or a re-interment of the human remains and any associated grave goods within 48 hours of being granted access to the site. d. Appropriate treatment and disposition of Native American human remains and associated grave goods will be collaboratively determined in consultation between the MLD, the consulting archaeologist, and the landowner or authorized representative. The treatment of human remains may potentially include the preservation, excavation, analysis and/or reburial of those remains and any associated artifacts. e. If the remains are determined not to be Native American, the Coroner, archaeological research team, and WWD will collaboratively develop a procedure for the appropriate study, documentation, and ultimate disposition of the historic human remains.			
J. Hydrology and Water Quality				
J1. Microbial and Geochemistry Impacts From Ag-ASR Wells Operated Close to Drinking Water Wells	**HWQ-1: Establishment of Exclusion Buffer Zones** Exclusion buffer zones shall be established for drinking water wells within WWD. Based on the particle trace model results, a base buffer exclusion of 1,300 feet in the direction opposite or perpendicular to the regional gradient and an exclusion buffer of 2,600 feet in the direction of the regional gradient was recommended in the ROWD to protect for worst case conditions. Exclusion buffer zones would apply to Ag-ASR wells screened in the same aquifers as the drinking water supply well. The conversion and operation of Ag-ASR wells will be prohibited in the exclusion buffer zones. Exclusion buffer zones may be modified by WWD with RWQCB approval based on monitoring and operational experience.	WWD	Establish exclusion buffer zones	Prior to start of Ag-ASR Program
	HWQ-2: Recovery of Injected Water Well owners shall recover the amounts of water recharged, thus recovering any mobilized constituents in irrigation water.	Landowner	Recover amounts of water recharged	During operation

Potential Impact	Mitigation Measure	Responsibility	Action	Completion Date
	HWQ-3: Performance Tests, Monitoring, and Program Modifications Initial well performance and aquifer characteristics testing will be performed on newly enrolled wells. This will include drawdown and recovery testing. This will provide data that could indicate if there is a higher than expected risk of constituent transport to drinking water wells. Initial water quality sampling will include sampling and analyzing water from the Ag-ASR well, other nearby wells, and any nearby monitoring wells. Ongoing monitoring shall be as included in the ROWD or as required by the RWQCB. Well and aquifer testing and ongoing monitoring shall be used as a basis for Ag-ASR Program modifications.	WWD	Monitor well performance and aquifer characteristics, modify Program as needed During operation	During operation