

Please indicate County where your project is located here:

Yolo

MAIL FORM AND ATTACHMENTS TO:
State Water Resources Control Board
DIVISION OF WATER RIGHTS
P.O. Box 2000, Sacramento, CA 95812-2000
Tel: (916) 341-5300 Fax: (916) 341-5400
http://www.waterboards.ca.gov/waterrights

STATE WATER RESOURCES CONTROL BOARD
2016 JUN 21 PM 1:20
DIV OF WATER RIGHTS SACRAMENTO

PETITION FOR CHANGE

Separate petitions are required for each water right. Mark all areas that apply to your proposed change(s). Incomplete forms may not be accepted. Location and area information must be provided on maps in accordance with established requirements. (Cal. Code Regs., tit. 23, § 715 et seq.) Provide attachments if necessary.

- Point of Diversion, Point of Rediversion, Place of Use, Purpose of Use, Distribution of Storage, Temporary Urgency, Instream Flow Dedication, Waste Water, Split, Terms or Conditions, Other
Application 30358, Permit 20281, License, Statement

I (we) hereby petition for change(s) noted above and described as follows:

Point of Diversion or Rediversion - Provide source name and identify points using both Public Land Survey System descriptions to 1/4-1/4 level and California Coordinate System (NAD 83).

Present: See Attachment 1
Proposed: See Attachment 1

Place of Use - Identify area using Public Land Survey System descriptions to 1/4-1/4 level; for irrigation, list number of acres irrigated.

Present: See water-right Permit 20281
Proposed: No changes to the existing authorized places of use are requested.

Purpose of Use

Present: See water right Permit 20281
Proposed: No changes to the existing authorized purposes of use are requested.

Split

Provide the names, addresses, and phone numbers for all proposed water right holders.

No split of Permit 20281 is requested.

In addition, provide a separate sheet with a table describing how the water right will be split between the water right holders: for each party list amount by direct diversion and/or storage, season of diversion, maximum annual amount, maximum diversion to offstream storage, point(s) of diversion, place(s) of use, and purpose(s) of use. Maps showing the point(s) of diversion and place of use for each party should be provided.

Distribution of Storage

Present: Not applicable.
Proposed: Not applicable.

Temporary Urgency

This temporary urgency change will be effective from to

Include an attachment that describes the urgent need that is the basis of the temporary urgency change and whether the change will result in injury to any lawful user of water or have unreasonable effects on fish, wildlife or instream uses.

Instream Flow Dedication – Provide source name and identify points using both Public Land Survey System descriptions to ¼-¼ level and California Coordinate System (NAD 83).

Upstream Location:
Downstream Location:

List the quantities dedicated to instream flow in either: cubic feet per second or gallons per day:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Will the dedicated flow be diverted for consumptive use at a downstream location? Yes No
If yes, provide the source name, location coordinates, and the quantities of flow that will be diverted from the stream.

Waste Water

If applicable, provide the reduction in amount of treated waste water discharged in cubic feet per second.

Will this change involve water provided by a water service contract which prohibits your exclusive right to this treated waste water? Yes No

Will any legal user of the treated waste water discharged be affected? Yes No

General Information – For all Petitions, provide the following information, if applicable to your proposed change(s).

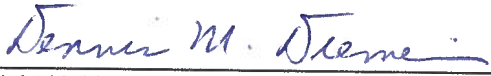
Will any current Point of Diversion, Point of Storage, or Place of Use be abandoned? Yes No

I (we) have access to the proposed point of diversion or control the proposed place of use by virtue of:
 ownership lease verbal agreement written agreement

If by lease or agreement, state name and address of person(s) from whom access has been obtained.

Give name and address of any person(s) taking water from the stream between the present point of diversion or rediversion and the proposed point of diversion or rediversion, as well as any other person(s) known to you who may be affected by the proposed change.

All Right Holders Must Sign This Form: I (we) declare under penalty of perjury that this change does not involve an increase in the amount of the appropriation or the season of diversion, and that the above is true and correct to the best of my (our) knowledge and belief. Dated at


Right Holder or Authorized Agent Signature

Right Holder or Authorized Agent Signature

NOTE: All petitions must be accompanied by:
(1) the form Environmental Information for Petitions, including required attachments, available at: http://www.waterboards.ca.gov/waterrights/publications_forms/forms/docs/pet_info.pdf
(2) Division of Water Rights fee, per the Water Rights Fee Schedule, available at: http://www.waterboards.ca.gov/waterrights/water_issues/programs/fees/
(3) Department of Fish and Wildlife fee of \$850 (Pub. Resources Code, § 10005)

ENVIRONMENTAL INFORMATION FOR PETITIONS

This form is required for all petitions.

Before the State Water Resources Control Board (State Water Board) can approve a petition, the State Water Board must consider the information contained in an environmental document prepared in compliance with the California Environmental Quality Act (CEQA). This form is not a CEQA document. If a CEQA document has not yet been prepared, a determination must be made of who is responsible for its preparation. As the petitioner, you are responsible for all costs associated with the environmental evaluation and preparation of the required CEQA documents. Please answer the following questions to the best of your ability and submit any studies that have been conducted regarding the environmental evaluation of your project. If you need more space to completely answer the questions, please number and attach additional sheets.

DESCRIPTION OF PROPOSED CHANGES OR WORK REMAINING TO BE COMPLETED

For a petition for change, provide a description of the proposed changes to your project including, but not limited to, type of construction activity, structures existing or to be built, area to be graded or excavated, increase in water diversion and use (up to the amount authorized by the permit), changes in land use, and project operational changes, including changes in how the water will be used. For a petition for extension of time, provide a description of what work has been completed and what remains to be done. Include in your description any of the above elements that will occur during the requested extension period.

See Attachment 2.

Insert the attachment number here, if applicable:

2

Coordination with Regional Water Quality Control Board

For change petitions only, you must request consultation with the Regional Water Quality Control Board regarding the potential effects of your proposed change on water quality and other instream beneficial uses. (Cal. Code Regs., tit. 23, § 794.) In order to determine the appropriate office for consultation, see: http://www.waterboards.ca.gov/waterboards_map.shtml. Provide the date you submitted your request for consultation here, then provide the following information.

Date of Request

June 20, 2016

Will your project, during construction or operation, (1) generate waste or wastewater containing such things as sewage, industrial chemicals, metals, or agricultural chemicals, or (2) cause erosion, turbidity or sedimentation?

Yes No

Will a waste discharge permit be required for the project?

Yes No

If necessary, provide additional information below:

See WDCWA ASR SEIR, a copy of which is being filed with this petition.

Insert the attachment number here, if applicable:

Local Permits

For temporary transfers only, you must contact the board of supervisors for the county(ies) both for where you currently store or use water and where you propose to transfer the water. (Wat. Code § 1726.) Provide the date you submitted your request for consultation here.

Date of Contact

For change petitions only, you should contact your local planning or public works department and provide the information below.

Person Contacted: Date of Contact:

Department: Phone Number:

County Zoning Designation:

Are any county permits required for your project? If yes, indicate type below. Yes No

- Grading Permit
- Use Permit
- Watercourse
- Obstruction Permit
- Change of Zoning
- General Plan Change
- Other (explain below)

If applicable, have you obtained any of the permits listed above? If yes, provide copies. Yes No

If necessary, provide additional information below:

See Attachment 5.

Insert the attachment number here, if applicable:

Federal and State Permits

Check any additional agencies that may require permits or other approvals for your project:

- Regional Water Quality Control Board Department of Fish and Game
- Dept of Water Resources, Division of Safety of Dams California Coastal Commission
- State Reclamation Board U.S. Army Corps of Engineers U.S. Forest Service
- Bureau of Land Management Federal Energy Regulatory Commission
- Natural Resources Conservation Service

Have you obtained any of the permits listed above? If yes, provide copies. Yes No

For each agency from which a permit is required, provide the following information:

Agency	Permit Type	Person(s) Contacted	Contact Date	Phone Number

If necessary, provide additional information below:

See Attachment 5.

Insert the attachment number here, if applicable:

Construction or Grading Activity

Does the project involve any construction or grading-related activity that has significantly altered or would significantly alter the bed, bank or riparian habitat of any stream or lake? Yes No

If necessary, provide additional information below:

Insert the attachment number here, if applicable:

Archeology

Has an archeological report been prepared for this project? If yes, provide a copy. Yes No

Will another public agency be preparing an archeological report? Yes No

Do you know of any archeological or historic sites in the area? If yes, explain below. Yes No

If necessary, provide additional information below:

See Chapter 3.4-1 of WDCWA ASR SEIR, a copy of which is being filed with this petition.

Insert the attachment number here, if applicable:

Photographs

For all petitions other than time extensions, attach complete sets of color photographs, clearly dated and labeled, showing the vegetation that exists at the following three locations:

- Along the stream channel immediately downstream from each point of diversion
- Along the stream channel immediately upstream from each point of diversion
- At the place where water subject to this water right will be used

See Attachment 6 for Project Photographs.

Maps

For all petitions other than time extensions, attach maps labeled in accordance with the regulations showing all applicable features, both present and proposed, including but not limited to: point of diversion, point of rediversion, distribution of storage reservoirs, point of discharge of treated wastewater, place of use, and location of instream flow dedication reach. (Cal. Code Regs., tit. 23, §§ 715 et seq., 794.)

Pursuant to California Code of Regulations, title 23, section 794, petitions for change submitted without maps may not be accepted.

An Engineer's map of the proposed points of rediversion is being filed with this petition.

All Water Right Holders Must Sign This Form:

I (we) hereby certify that the statements I (we) have furnished above and in the attachments are complete to the best of my (our) ability and that the facts, statements, and information presented are true and correct to the best of my (our) knowledge. Dated at .

Jennifer M. Stearns
Water Right Holder or Authorized Agent Signature

Water Right Holder or Authorized Agent Signature

NOTE:

- **Petitions for Change** may not be accepted unless you include proof that a copy of the petition was served on the Department of Fish and Game. (Cal. Code Regs., tit. 23, § 794.)
- **Petitions for Temporary Transfer** may not be accepted unless you include proof that a copy of the petition was served on the Department of Fish and Game and the board of supervisors for the county(ies) where you currently store or use water and the county(ies) where you propose to transfer the water. (Wat. Code § 1726.)

**Woodland-Davis Clean Water Agency
Petition for Change, Permit 20281 (Application 30358)**

Attachment 1

Location of Existing Point of Diversion

Facility Name	By California Coordinate System of 1983, Zone 2	40-acre subdivision of public land survey or projection thereof	Projected Section	Township	Range	Base and Meridian
WDCWA Sacramento River Diversion	North 2,008,200 feet and East 6,667,300 feet	NE 1/4 of NW 1/4	34	10N	3E	MD

This project would not change the existing point of diversion for Permit 20281.

Locations of Proposed Points of Rediversion from Underground Storage

This petition requests the addition of the following points of rediversion, which are the locations of the proposed Aquifer Storage and Recovery extraction wells:

Facility Name	By California Coordinate System of 1983, Zone 2	40-acre subdivision of public land survey or projection thereof	Projected Section	Township	Range	Base and Meridian
Woodland Well 28	N 2008943 E 6628014	SE ¹ / ₄ of SE ¹ / ₄	29	10 N	02 E	M. D. (021)
Woodland Well 29	N 2010924 E 6624551	SW ¹ / ₄ of SW ¹ / ₄	29	10 N	02 E	M. D. (021)
Woodland Well 30	N 2006106 E 6619909	SE ¹ / ₄ of NW ¹ / ₄	31	10 N	02 E	M. D. (021)
Woodland Well 31	N 2008146 E 6622577	NE ¹ / ₄ of NE ¹ / ₄	31	10 N	02 E	M. D. (021)
Woodland Well 32	N 2008226 E6623559	NW ¹ / ₄ of NW ¹ / ₄	32	10 N	02 E	M. D. (021)
Woodland Well 33	N 2004188 E 6625481	SE ¹ / ₄ of SW ¹ / ₄	32	10 N	02 E	M. D. (021)
Woodland Well 34	N 2006240 E 6630587	SE ¹ / ₄ of NW ¹ / ₄	33	10 N	02 E	M. D. (021)
Woodland Well 35	N 2011934 E 6620752	SW ¹ / ₄ of NE ¹ / ₄	30	10 N	02 E	M. D. (021)
Woodland Well 36	N 2005527 E 6635956	NE ¹ / ₄ of SW ¹ / ₄	34	10 N	02 E	M. D. (021)

**Woodland-Davis Clean Water Agency
Petition for Change, Permit 20281 (Application 30358)**

Attachment 2

1. Woodland-Davis Clean Water Agency and Davis-Woodland Water Supply Project

Woodland-Davis Clean Water Agency (WDCWA) is a joint-powers authority of the Cities of Woodland and Davis. The Davis-Woodland Water Supply Project (DWWSP), which is currently under construction, will divert water from the Sacramento River at an intake on the river, treat that water at a Regional Water Treatment Facility, and deliver the treated water to the Cities of Woodland and Davis and the University of California, Davis.

2. City of Woodland ASR Program

WDCWA and the City of Woodland have developed a proposed aquifer storage and recovery (ASR) program. Under the ASR program, surface water will be stored during periods when excess treated surface water is available for injection into and storage in the groundwater aquifer under the City of Woodland in the Yolo Sub-basin of the Sacramento Valley Groundwater Basin (Sub-basin 5-21.67 in DWR Bulletin 118). The City of Woodland plans to construct and operate ASR wells that will be used to inject water diverted from the Sacramento River through the DWWSP Joint Intake Facility and treated at the DWWSP regional water treatment facility into this sub-basin. The City of Woodland then will extract this water when needed to supply water to its customers. This water will be diverted and used under WDCWA's water-right Permit 20281. This Petition requests the changes to Permit 20281 that are necessary for this ASR program.

3. Proposed Facilities

The City of Woodland will use one existing ASR well and up to six new wells, constructed as replacement wells at the sites of existing municipal wells, or at new well sites, for its ASR program. The locations of nine potential new wells, up to seven of which ultimately will be developed for the ASR program, are listed in [Attachment 1](#). The new wells will be connected to the City of Woodland's water distribution system. The ASR program will use the DWWSP and distribution pipelines to convey treated water to the proposed ASR wells for injection, and will use the same pipeline network to distribute water pumped by the wells from groundwater storage.

4. Project Operations

The total volume of water that will be diverted from the Sacramento River for injection through the ASR program operations will vary from year to year, depending on water supply availability and groundwater conditions. The maximum amount that will be diverted during any year for injection will be 5,700 acre-feet. Water normally will be injected into the aquifer during the fall, winter and spring when the DWWSP has excess diversion and treatment plant capacity.

The City of Woodland will extract stored water from the aquifer when available surface water supplies are not sufficient to meet all of the City's demands. Limited volumes of stored water also will be extracted to support routine testing and maintenance operations of the proposed ASR wells and associated equipment. Assuming a 10 percent loss of the injection volume per year due to advection and dispersion in the aquifer, the City of Woodland's

maximum withdrawal of water from underground storage during any one year will 10,360 acre-feet. After the City extracts water from the aquifer, the City will distribute the extracted water through the City's existing distribution system for municipal and industrial uses. The City also will use the ASR wells for conventional groundwater extractions.

Project operations are described in more detail in Attachment 3, the Underground Storage Supplement, Attachment 4, the West Yost Associates Technical Memorandum with supporting information for the Underground Storage Supplement, and the DWWSP ASR Program Supplemental Environmental Impact Report (State Clearinghouse No. 2015012062), a copy of which is being filed with this petition.

5. WDCWA Water Right Permit and Licenses

WDCWA's water right Permit 20281 authorizes the WDCWA to divert water from the Sacramento River at monthly average rates of up to 80 cubic feet per second (cfs), subject to Standard Permit Term 91 (Term 20 of Permit 20281). This term prohibits WDCWA from diverting any water under this permit when the State Water Project and the Central Valley Project are releasing water from storage in their upstream reservoirs to provide water for users within the Sacramento River watershed or to meet Delta water quality standards. These curtailment periods are typically during the summer months. The maximum authorized annual diversion under Permit 20281 is 45,000 acre-feet.

WDCWA's water right Licenses 904A and 5487A (Applications 1199A and 12073A) authorize WDCWA to divert up to 10,000 acre-feet per year of water from the Sacramento River. These licenses do not contain the State Water Resources Control Board's Standard Permit Term 91. WDCWA will not divert water under these licenses for the ASR program.

6. Requested Changes to Permit 20281

WDCWA requests that the SWRCB add the following new term to Permit 20281:

This term authorizes Permittee's diversions of water from the Sacramento River to underground storage in Yolo Sub-basin (Sub-basin 5-21.67) of the Sacramento Valley Groundwater Basin as defined in the California DWR Bulletin 118 (Yolo Sub-basin) under this Permit, the storage of such water in the Yolo Sub-basin, and the recovery of such stored water. This term does not affect the rights of Permittee's members to extract groundwater from the Yolo Sub-basin.

- a. The cumulative instantaneous rate of diversion to underground storage in the Yolo Sub-basin for all City of Woodland wells shall not exceed 15.6 cubic feet per second.
- b. The maximum amount collected to underground storage in the Yolo Sub-basin for all City of Woodland wells shall not exceed 5,700 acre-feet per year.
- c. The total amount of water that may be held in underground storage in the Yolo Sub-basin for all City of Woodland wells shall not exceed 100,000 acre-feet.

- d. The cumulative instantaneous rate of withdrawal from underground storage in the Yolo Sub-basin for all City of Woodland wells shall not exceed 23.4 cubic feet per second.
- e. The amount of water that may be withdrawn from underground storage in the Yolo Sub-basin for all City of Woodland wells shall not exceed 10,350 acre-feet per year.
- f. Water may be injected into and extracted from the Yolo Sub-basin only at the points of rediversion specified in this permit.
- g. No water may be injected or diverted from underground storage in the Yolo Sub-basin until Permittee has obtained all applicable permits from local and state authorities, including any permit for ASR required by the Central Valley Regional Water Quality Control Board for coverage under the SWRCB's General Order 2012-0010 regarding ASR projects.

**Woodland-Davis Clean Water Agency
Petition for Change, Permit 20281 (Application 30358)**

Attachment 3

Underground Storage Supplement



State Water Resources Control Board



Division of Water Rights

1001 I Street • Sacramento, California 95814 • (916) 341-5300
Mailing Address: P.O. Box 2000 • Sacramento, California • 95812-2000
FAX (916) 341-5400 • <http://www.waterboards.ca.gov/waterrights>

Linda S. Adams
Acting Secretary for
Environmental Protection

Edmund G. Brown Jr.
Governor

APPLICATION NO. _____
(Leave blank)

UNDERGROUND STORAGE SUPPLEMENT TO APPLICATION TO APPROPRIATE WATER BY PERMIT

1. State amount of water to be diverted to underground storage from each point of diversion in item 3b of form APP.

- a. Maximum Rate of diversions (1) 26.7 (2) Not applicable (3) Not applicable cfs
- b. Maximum Annual Amount (1) 7,600 (2) Not applicable (3) Not applicable acre-feet

2. Describe any works used to divert to offstream spreading grounds or injection wells not identified in item 7 of form APP.

From the point of diversion to the points of injection, key facilities include: a river water intake, a raw water pump station and pipeline, a Regional Water Treatment Facility, treated water delivery mains to the cities, existing water distribution systems within each city, and ASR injection wells (see Attachment A for further information).

3. Describe spreading grounds and identify its location and number of acres or location of upstream and downstream limits if onstream.

Not applicable (no spreading grounds are associated with the project).

4. State depth of groundwater table in spreading grounds or immediate vicinity: Not applicable.

_____ feet below ground surface on _____ 19 __ measured at a point located within the _____ ¼ of _____ ¼ of Section _____, T _____, R _____, _____ B&M

Not applicable (no spreading grounds are associated with the project).

5. Give any historic maximum and or minimum depths to the groundwater table in the area.

Location West Woodland Maximum 100 feet below ground surface on Fall 1977 (date)

Location East Woodland Minimum 3 feet below ground surface on Spring 1983 (date)

Attachment A provides a detailed discussion of the depth to groundwater.

6. Describe proposed spreading operation.

Not applicable.

7. Describe location, capacity and features of proposed pretreatment facilities and/or injected wells.

Water diverted under Permit 20281 will be treated at the WDCWA Regional Water Treatment Facility. Treated surface water will be injected and recovered from underground storage using DDW-permitted municipal wells designed for ASR. Detailed descriptions of facilities are provided in Attachment A.

8. Reference any available engineering reports, studies, or data on the aquifer involved.

Key engineering reports and CEQA documentation are provided in Attachment A. Supporting references are cited in Attachment A.

9. Describe underground reservoir and attach a map or sketch of its location.

Yolo Sub-basin (Sub-basin 5-21.67) of the Sacramento Valley Groundwater Basin is defined in the California DWR Bulletin 118 update. A detailed description and map of the basin are provided in Attachment A.

10. State estimated storage capacity of underground reservoir.

The estimated cumulative net storage volume is at least approximately 100,000 acre-feet, based on the hydrogeologic modeling and CEQA analysis documented in Attachment A.

11. Describe existing use of the underground storage reservoir and any proposed change in its use.

Use of the underground storage reservoir is designated for agricultural irrigation and municipal drinking water use. The use of the underground storage reservoir for the proposed project will be for municipal drinking water use. Refer to Attachment A for a detailed discussion of current and future uses.

12. Describe the proposed method and location of measurement of water placed into and withdrawn from underground storage.

Continuous flow measurements of water injected and withdrawn from underground storage will be taken and located at each individual well, as discussed in Attachment A.

Additional copies of this form and water right information can be obtained at www.waterrights.ca.gov.

**Woodland-Davis Clean Water Agency
Petition for Change, Permit 20281 (Application 30358)**

Attachment 4

**West Yost Associates Technical Memorandum Regarding
Underground Storage Supplement**



TECHNICAL MEMORANDUM

DATE: June 16, 2016 Project No.: 376-00-14-09.042
SENT VIA: EMAIL EMAIL

TO: Dennis Diemer, General Manager, Woodland-Davis Clean Water Agency

FROM: Kenneth Loy, PG, #7008

REVIEWED BY: Chris Malone, PE, RCE #51009

SUBJECT: Supporting Information for Underground Storage Supplement for Woodland-Davis Clean Water Agency Water Right Permit 20281 (Application 30358)

Water Right Permit 20281 (Application 30358) was issued to the Woodland-Davis Clean Water Agency (WDCWA) by the State Water Resources Control Board (State Board) on April 14, 2011. Permit 20281 authorizes diversions of water from the Sacramento River for beneficial uses in the Cities of Woodland and Davis and the University of California, Davis (UC Davis). This technical memorandum (TM) provides supporting information for the Underground Storage Supplement to Application to Appropriate Water by Permit that will be included in WDCWA's petition to change Permit 20281 for the City of Woodland's Aquifer Storage and Recovery (ASR) program.

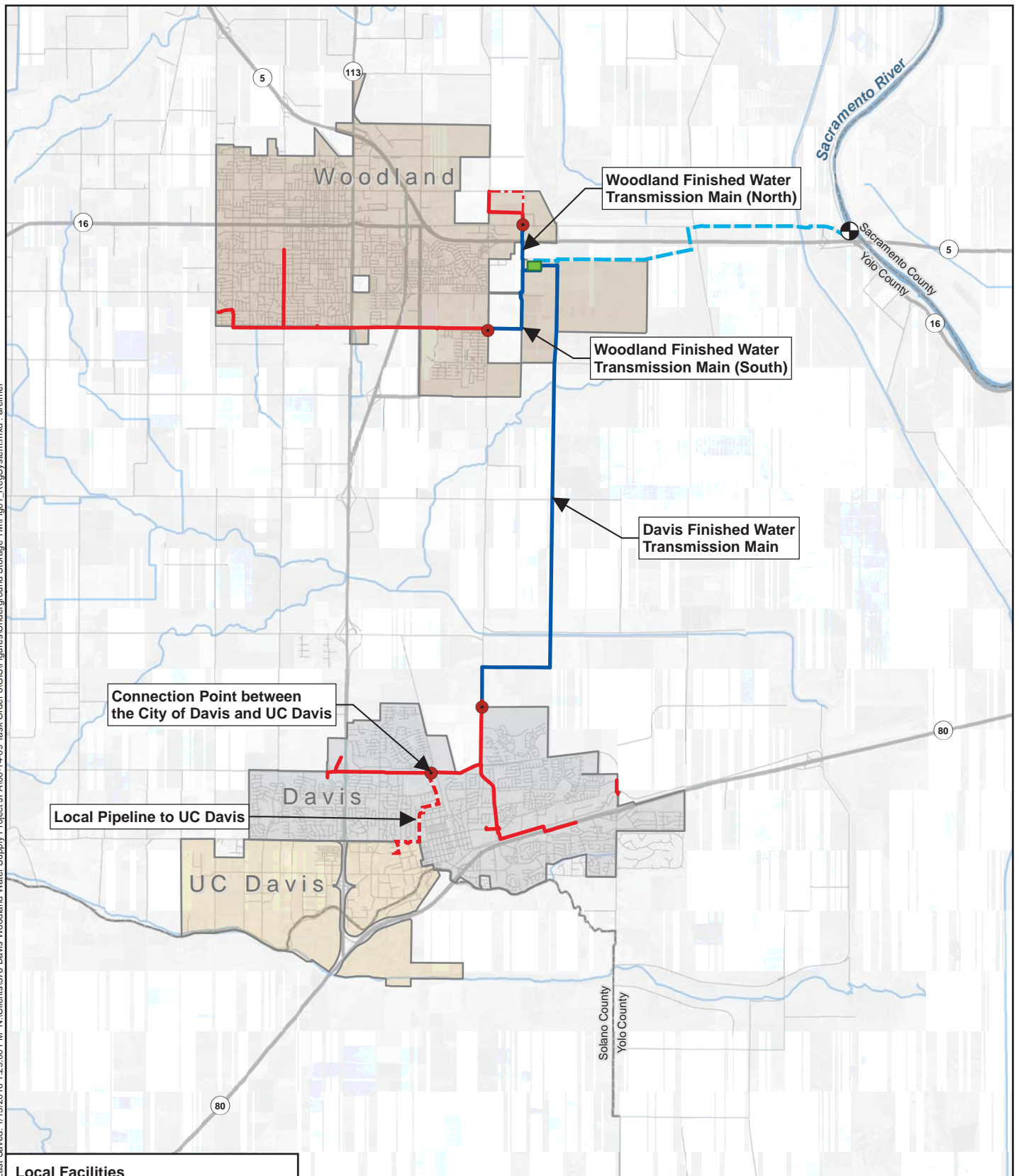
WDCWA WATER SYSTEM

The WDCWA Regional Water System (RWS) consists of the following key facilities, which are shown on Figure 1:

1. Intake pumping station located on the west bank of the Sacramento River just north of the Interstate 5 (I-5) bridge. This facility is shared with Reclamation District 2035.
2. Raw water transmission pipeline conveying water from the intake to the new Regional Water Treatment Facility (RWTF).
3. RWTF, which has a capacity of 30 million gallons per day (mgd) and is located on the eastern outskirts of the City of Woodland just south of I-5.
4. Delivery mains and associated pumping facilities that deliver treated water to the Cities of Woodland and Davis and UC Davis.

Of the 30 mgd of RWTF capacity, 18 mgd is dedicated to the City of Woodland, 10.2 mgd is dedicated to the City of Davis, and 1.8 mgd is dedicated to UC Davis. It is currently planned that the RWTF capacity will be expanded to 34 mgd in 2035, with the additional 4-mgd capacity to be dedicated to the City of Woodland.

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- Local Facilities**
- Local Pipeline
 - - - Local UC Davis Pipeline
 - · - · Alternative Local Pipeline
- Regional Facilities**
- Intake Pumping Station
 - Connection Point
 - Regional Water Treatment Facility
 - Raw Water Transmission Pipeline
 - Regional Pipeline

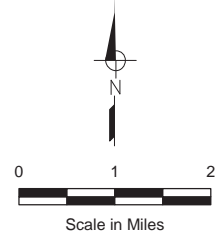


Figure 1
WDCWA Regional Water System
 Woodland-Davis Clean Water Agency
 Underground Storage Supplement TM

ASR PROGRAM

The City of Woodland has worked with WDCWA to develop an ASR program that will help Woodland address its water supply needs during periods of peak demand and drought. ASR involves the storage of treated surface water in a suitable aquifer or aquifers during times when such water is available and recovery of that water when needed for beneficial uses at a later time. Although the City of Davis may also decide to develop its own ASR program in the future, that potential future program is not analyzed in this TM.

The ASR program will use water diverted from the Sacramento River under Permit 20281 and treated at the RWTF. Treated water will be conveyed along the RWS treated water pipelines to the City of Woodland, and then routed through the City's potable water distribution systems to ASR wells located within the City's service area. Treated surface water will be injected into the subsurface aquifer and stored there until needed for subsequent extraction and use.

When needed to supplement the City's other water supplies, water stored in the aquifer will be extracted using the City's ASR wells. The extracted water will then be chlorinated to meet required chlorine residual requirements, and pumped back into the City's distribution system for municipal uses.

Figure 2 shows the locations of existing, planned, and potential ASR wells in the City of Woodland. The City of Woodland has one existing ASR well and is currently constructing two additional ASR wells. The three wells are scheduled to be operational in late 2016. The City of Woodland plans to have up to seven ASR wells in the future. Two alternative well sites are also shown on Figure 2.

INFORMATION REQUIRED IN UNDERGROUND STORAGE SUPPLEMENT

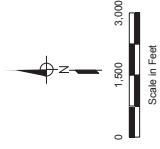
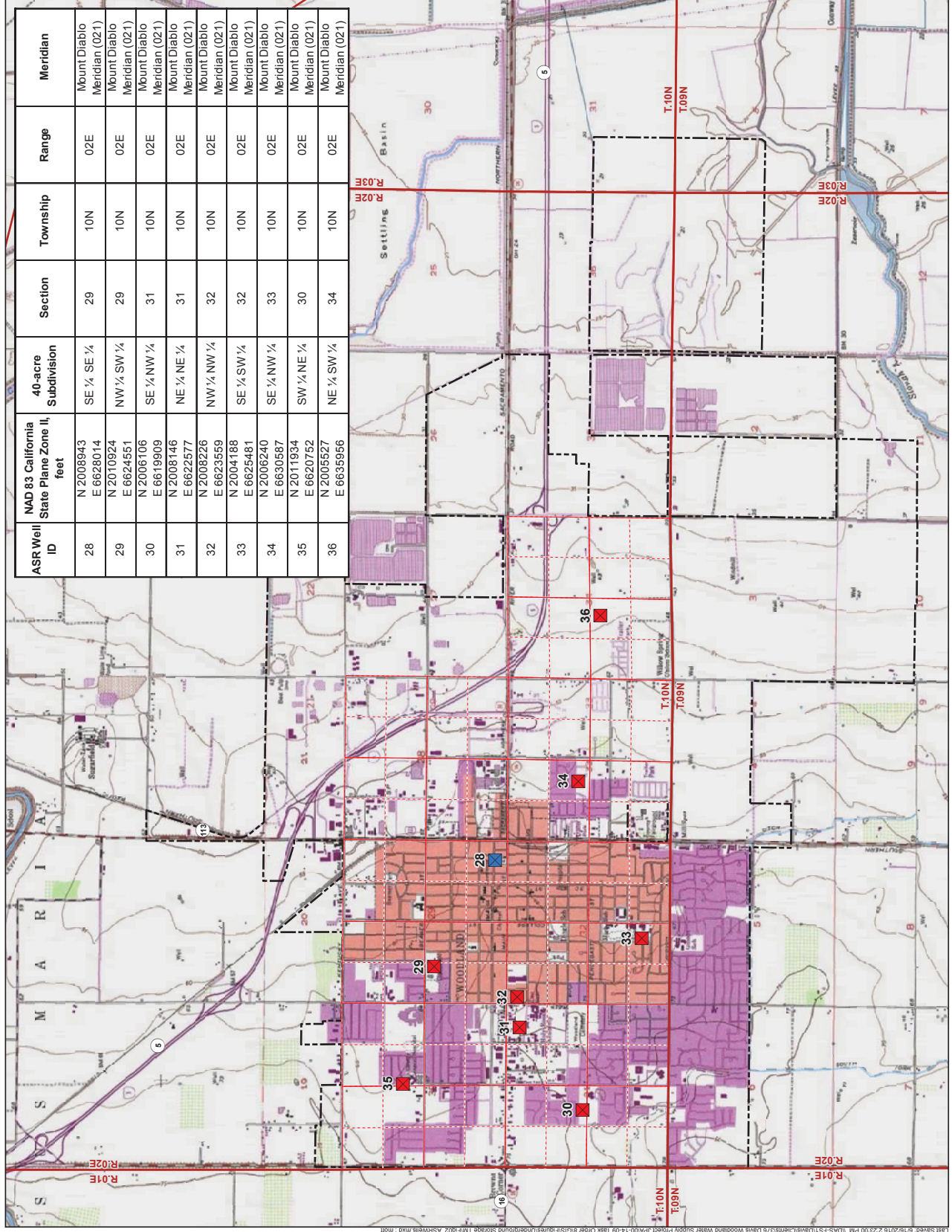
This section provides supporting information for the Underground Storage Supplement form that WDCWA will be filing with its petition to change Permit 20281 for the ASR program.

Item 1: Water to be diverted to Underground Storage from Each Point of Diversion

WDCWA's change petition will request the following maximum authorized rates for diversions to underground storage:

- a. The maximum instantaneous rate of diversions to storage will be 15.6 cubic feet per second (cfs).
- b. The maximum annual rate of diversions to storage will be 5,700 acre-feet.

The maximum instantaneous diversion-to-storage rate of 15.6 cfs is the total ASR injection capacity, assuming that there will be seven ASR wells in the City of Woodland in 2040, and that each well will have an injection capacity of 1,000 gpm, as described in the ASR analysis for the Supplemental Environmental Impact Report (SEIR) for the ASR program (7,000 gpm = 15.6 cfs). (WDCWA, 2015.)



- Symbology**
- Existing ASR Well
 - Proposed ASR Well
 - Township and Range Lines
 - Approximate Quarter Section Lines
 - City of Woodland



Figure 2
City of Woodland
ASR Well Locations
 Woodland-Davis Clean Water Agency
 Underground Storage Supplement TMI

Item 2: Describe Works used to Divert to Injection Wells not identified in Item 7 of Form APP

Figure 1 shows the facilities that will be used to divert, treat and convey Sacramento River water to the City of Woodland for ASR injection. The primary facilities are:

- Intake pumping station located on the west bank of the Sacramento River just north of the I-5 overcrossing.
- Raw water transmission pipeline conveying water from the intake to the RWTF.
- RWTF, which has a treatment capacity of 30 mgd is located on the eastern outskirts of the City of Woodland just south of I-5.
- Delivery mains and associated pumping facilities to deliver treated water to the City.

Item 3: Describe Spreading Grounds

Spreading grounds will not be used for the ASR program.

Item 4: State Depth of Groundwater Table at Spreading Grounds and Vicinity

Spreading grounds will not be used for the ASR program.

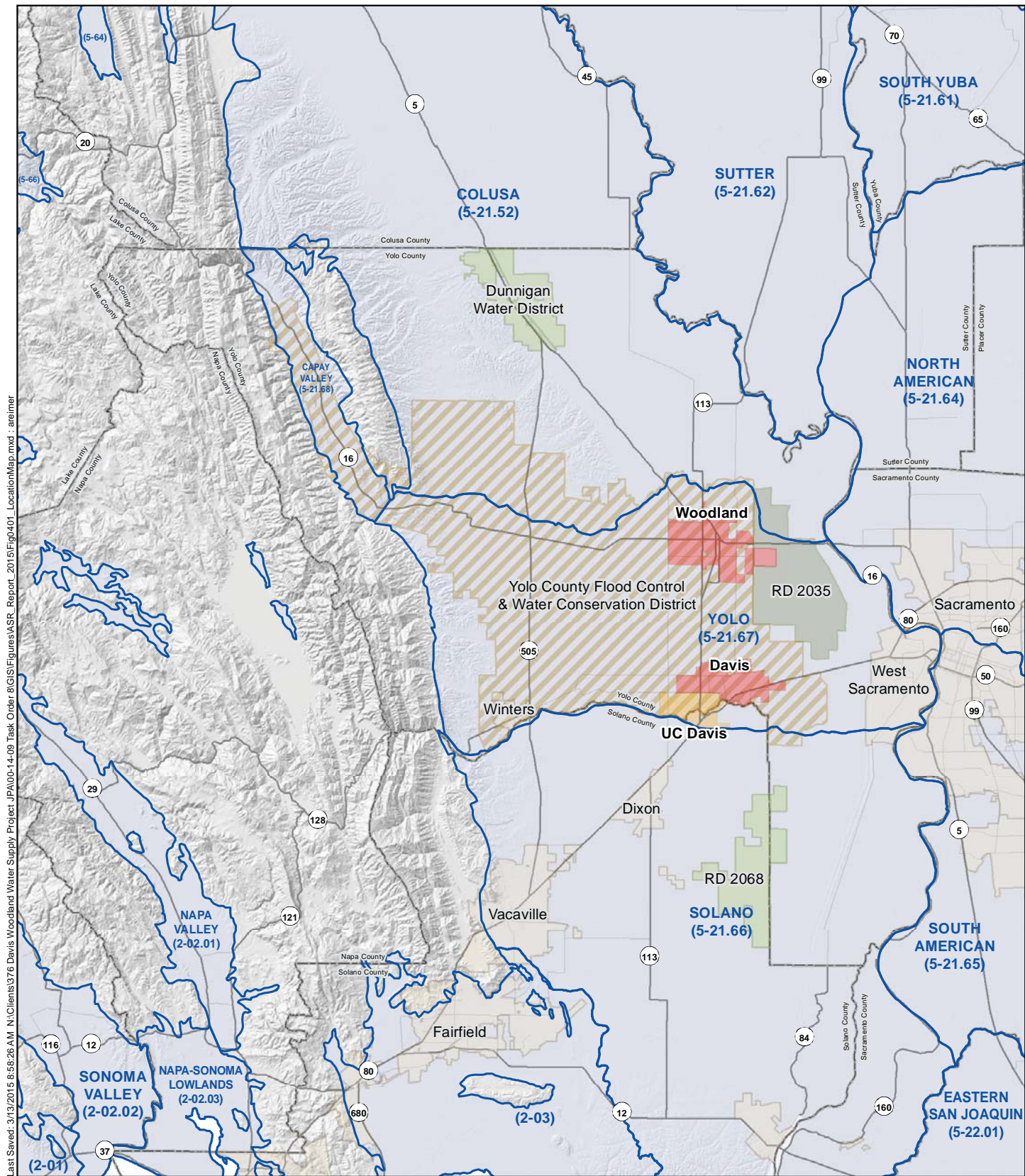
Item 5: Give Historic Maximum and Minimum Depths to Groundwater

The City of Woodland is located in the Yolo Sub-basin (Sub-basin 5-21.67) of the Sacramento Valley Groundwater Basin as defined in the California DWR Bulletin 118 update (DWR, 2003). Figure 3 shows the location of the City in relation to the groundwater basin boundaries, other nearby cities, major topographical features, and surface water bodies. The Yolo Sub-basin is bounded by Cache Creek on the north; the Sacramento River on the east; Putah Creek on the south; and the Coast Range on the west (DWR, 2004).

Generally, groundwater flow is from the margins of the Sacramento Valley toward the Sacramento River and then southward towards the Sacramento-San Joaquin Delta. Groundwater pumping in several areas has created cones of depression that disrupt this pattern. Historically, groundwater elevations in the region have ranged from roughly -40 feet to 50 feet mean sea level (msl). The base of fresh groundwater occurs at a depth of approximately 2,500 feet below msl, implying that the fresh water aquifer is about 2,500 feet thick.

Groundwater level measurements have been recorded in the area for over 50 years and are available through the DWR Water Data Library at <http://wdl.water.ca.gov>. Historical data show that depths to groundwater generally increased from the 1950s to the 1970s. Depths to groundwater decreased and stabilized thereafter, in response to regional water supply projects implemented by Yolo County Flood Control & Water Conservation District. More recently depths to groundwater have increased in response to ongoing drought conditions.

Depth to groundwater contour maps depicting the range of groundwater elevations in the vicinity of the City of Woodland are shown on Figures 4 and 5.



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- Bulletin 118 Groundwater Basin
- Participating Agency**
- City of Davis and City of Woodland
- UC Davis

- Other Agency**
- Yolo County Flood Control & Water Conservation District
- Dunnigan Water District
- Reclamation District 2068
- Reclamation District 2035
- Neighboring Municipality

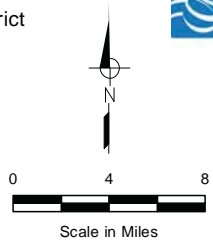
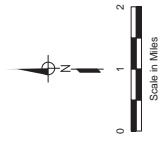
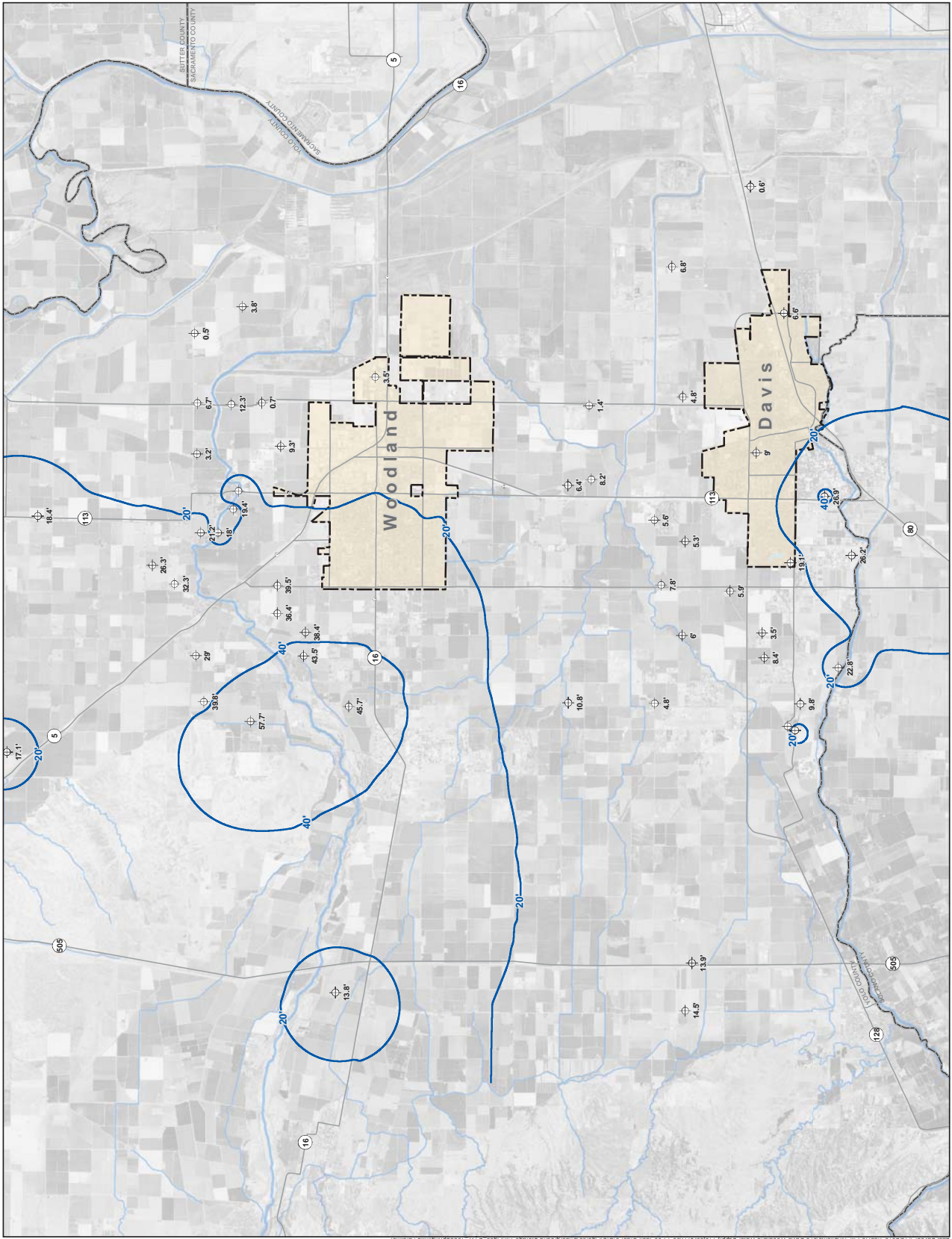


Figure 3
Groundwater Basin Location Map
 Woodland-Davis Clean Water Agency
 Underground Storage Supplement TM



Symbology
 DWIR Monitoring Well with Depth to Groundwater Measurement (feet)
 Groundwater Elevation Contour (20-foot Interval)



Source:
 1. California Department of Water Resources (DWR) Water Data Library (WDLI). Obtained January, 2016.



Figure 5
Spring 1983
Groundwater Depth Contours
 Woodland-Davis Clean Water Agency
 Underground Storage Supplement TMI

The maximum depths to groundwater, corresponding to severe drought conditions in fall 1977, are shown on Figure 4. The area experienced multiple years of below normal precipitation in 1975 through 1977, 1987 through 1991, and in 2011 through 2015. The maximum historical depths to groundwater occurred in fall 1977. Depth to groundwater in fall 2015 was probably similar to fall 1977, but only limited data are available at this time in the DWR water data library for fall 2015.

Figure 5 shows the minimum depths to groundwater, which were recorded in spring 1983.

Table 1 lists the approximate historical minimum and maximum depths to groundwater beneath the City of Woodland, based on the depth to groundwater contours shown on Figures 4 and 5.

Table 1. Historical Depths to Groundwater		
Location^(a)	Fall 1977 Maximum Depth to Groundwater, feet, msl	Spring 1983 Minimum Depth to Groundwater, feet, msl
East Woodland	45	3
West Woodland	100	30
^(a) Locations and depths are approximate.		

Hydrogeologic characterization of the groundwater basin beneath the City confirms that permeable zones in the approximately 350- to 500-foot depth range have adequate permeability to support ASR. The permeable zones are confined by low permeability, fine-grained zones. Because of this aquifer configuration, ASR operations will mainly displace native groundwater in the permeable zones and will result in relatively modest increases in water-table elevations. The aquifer configuration also means that the injected water will be mostly contained within the targeted zones.

The potential for movement of the injected water will be minimized by the relative lack of any other pumping in the targeted 350- to 500-foot depth range. With implementation of the RWS, the City will not use intermediate depth wells for municipal purposes, except in emergency situations. Most groundwater production for agricultural irrigation purposes is from depths less than the depth interval targeted for ASR.

Changes in the depth to groundwater as the result of the ASR program were evaluated in the ASR studies documented in ASR Technical Studies Report (West Yost Associates, 2015), and the WDCWA SEIR for the ASR program (WDCWA, 2015). Comparison of baseline groundwater level monitoring to groundwater level monitoring conducted during injection testing in the City of Woodland showed no changes in groundwater levels at the water table. Numerical modeling of the ASR project for current and future levels of demand over a 33-year hydrologic record showed that ASR operations will increase the magnitude of seasonal fluctuations in groundwater elevations in the targeted ASR aquifer interval and to a lesser extent in adjacent confined zones. Seasonal fluctuations in groundwater elevations in the shallowest part of the groundwater system are not expected to increase because of ASR, but water-table elevations are expected to rise, mostly in response to implementation of the WDCWA RWS and the resulting reduction in the City’s groundwater pumping. Shallow groundwater may rise to near the ground surface in the winter or spring of the wettest years due to ASR operations, especially in low lying

areas. Because this effect is expected to occur during the wettest years when surface water supplies are likely to be plentiful, it is possible that ASR injections may be reduced, if necessary, to help control high groundwater elevations.

Item 12, below, discusses ASR monitoring and mitigation measures.

Item 6: Describe Proposed Spreading Operation

Spreading grounds will not be used in the ASR program.

Item 7: Describe Location, Capacity and Features of Proposed Pretreatment Facilities and Injection Wells

Treatment Facilities

Figure 1 shows the location of the WDCWA RWS, including the RWTF. Before underground injection, water diverted from the Sacramento River will be treated to drinking water standards at the RWTF, under a Division of Drinking Water (DDW) Permit to Operate. DDW has assigned the following numbers to the WDCWA RWS:

- Public water system number (PWS No. 5710012)
- Raw source water code (PS CODE 5710012-001)
- Finished water code (pending)

The Permit to Operate and finished water code are anticipated to be issued by DDW in Summer 2016. Figure 6 is a schematic of the RWTF. The facility has the ability meet highly fluctuating turbidity levels using coagulant and polymer-assisted sand filtration. The RWTF is expected to meet all existing drinking water standards and anticipated future standards using filtration followed by intermediate ozonation, activated carbon filtration and chlorination.

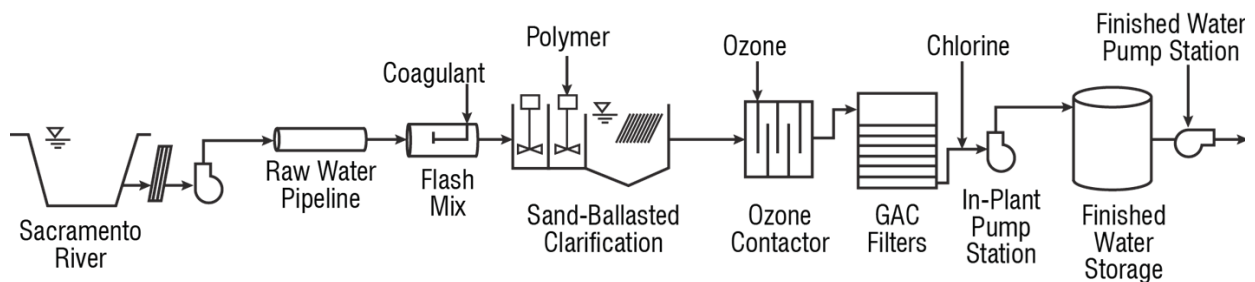


Figure 6. Schematic Diagram of WDCWA RWTF

Of the 30 mgd of RWTF capacity, 18 mgd of capacity is dedicated to the City of Woodland, 10.2 mgd of capacity is dedicated to the City of Davis, and 1.8 mgd of capacity is dedicated to UC Davis. Current plans call for increasing the RWTF capacity to 34 mgd in 2035, with the additional 4-mgd capacity being dedicated to the City of Woodland.

Injection Wells

Underground storage will be accomplished using DDW-permitted ASR wells designed and constructed as municipal drinking water sources. Figure 2 shows the locations of existing, under-construction and planned ASR wells in the City of Woodland. The DDW has assigned the following numbers to the City of Woodland ASR wells:

- Well 28
 - PS Code 5710006-052, Raw Groundwater
 - PS Code 5710006-052, Treated (Disinfected) Groundwater
- Well 29
 - Source ID Pending
 - Site approved by DDW
- Well 30
 - Source ID Pending
 - Site approved by DDW

The typical construction of ASR wells will consist of 18- to 20-inch diameter 304 stainless steel casing and screen constructed in a 30- to 32-inch diameter borehole drilled to an approximate depth of 500 feet below ground surface (bgs). The wells will be screened using wire-wrapped screen extending from approximately 350 feet to 500 feet bgs, depending on well location. The wells will be gravel packed with an engineered sand or manufactured silica-lithium glass. All wells will have sanitary seals from the ground surface down to at least 100 feet bgs.

Item 8: Available Engineering Reports, Studies or Data on the Aquifer Involved

ASR technical studies are documented in the ASR Evaluation Report prepared for the WDCWA (West Yost Associates, 2015). These studies included:

- Groundwater Monitoring Network Installation
- Baseline Groundwater Level and Quality Monitoring
- Evaluation of Geochemical Interactions
- Short-Term Injection Testing
- Modeling of ASR Scenarios

The ASR Evaluation Report is included in Appendix C to the WDCWA ASR SEIR (WDCWA, 2015).

Item 9: Description of Underground Reservoir

The City of Woodland is located over the Yolo Sub-basin (Sub-basin 5-21.67) of the Sacramento Valley Groundwater Basin as defined in the California DWR Bulletin 118 update (DWR, 2003). Figure 3 shows the location of the groundwater basin.

The Tehama Formation is the primary water-bearing stratigraphic unit in the area and will be used for underground storage in the ASR program. The Tehama Formation consists of up to 2,500 feet of moderately compacted silt, clay, and silty fine sand enclosing discontinuous lenses of sand and gravel. The Tehama Formation is overlain by the late Pleistocene age Riverbank and Modesto Formations. These formations consist of up to 200 feet of loose to moderately compacted silt, silty clay, sand and gravel deposited in alluvial depositional environments (DWR, 2004).

At the depths that will be used for underground storage in the ASR program, groundwater occurs under semiconfined to confined conditions in a single heterogeneous aquifer system, composed of predominantly fine grained sediments enclosing discontinuous lenses of sand and gravel. Water will be stored in the sand and gravel.

Hydrogeologic characterization of the groundwater basin beneath the City of Woodland confirms that permeable zones in the approximately 350- to 500-foot depth range have adequate permeability to support ASR. The permeable zones are confined by low permeability, fine-grained zones. Because of this aquifer configuration, ASR operations will mainly displace native groundwater in the permeable zones and will result in relatively modest increases in water table elevations. The aquifer configuration also means that the injected water will be mostly contained within the targeted zones.

Item 10: Estimated Storage Capacity of Underground Reservoir

As documented in the ASR Technical Report (West Yost Associates 2015), six ASR scenarios were evaluated using the Yolo County IWF. These scenarios were:

- Scenario 1: Existing Conditions without ASR
- Scenario 2: Existing Conditions with ASR; No Capacity Transfer
- Scenario 3: Existing Conditions with ASR; Woodland-to-Davis Capacity Transfer
- Scenario 4: Future Conditions without ASR
- Scenario 5: Future Conditions with ASR; No Capacity Transfer
- Scenario 6: Future Conditions with ASR; Woodland-to-Davis Capacity Transfer

All of the above scenarios were based on a 33-year hydrologic period (water years 1971 through 2003). Existing conditions incorporated current (2014) water demands, and future conditions incorporated future (2040) water demands. Scenarios 1 and 4 represent existing and future conditions without the ASR project. Because only the City of Woodland is proceeding with an ASR program now, Scenarios 2 and 5 represent existing and future conditions with the ASR program. This modeling indicates that there would be a net increase in treated surface water storage

in the aquifer beneath the City of Woodland ranging from approximately 30,000 acre-feet to 100,000 acre-feet storage over a 33-year period.

The numerical modeling of the ASR project for current and future levels of demand over a 33-year hydrologic record showed that ASR storage will increase the magnitude of seasonal fluctuations in groundwater elevations in the targeted ASR interval and to a lesser extent in adjacent confined zones. However, seasonal fluctuations in groundwater elevations in the shallowest part of the groundwater system are not expected to increase because of ASR, but groundwater elevations are expected to rise. Shallow groundwater may rise to near the ground surface in the winter or spring of the wettest years due to ASR operations, especially in low lying areas. Because this effect is expected to occur in the wettest years when surface water supplies are likely to be plentiful, it is possible that ASR injections may be reduced, if necessary, to control high groundwater elevations.

These levels of storage were evaluated in the WDCWA SEIR for the ASR program and found to not have a significant effect on the environment.

Item 12, below, discusses ASR monitoring and mitigation measures.

Item 11: Existing Use of the Underground Storage Reservoir

Groundwater from the Yolo Sub-basin is used for agricultural, municipal and industrial purposes. Groundwater has been the exclusive municipal supply for the Cities of Woodland and Davis throughout the history of both Cities. When the RWS becomes operational in 2016, both Cities will transition to the use of treated surface water for substantial portions of their water supplies.

When the RWS becomes operational, the City of Woodland will use the portion of the groundwater basin beneath its service area for ASR operations, and will use water pumped under the ASR program to supplement treated surface water from the RWS. Three existing municipal wells, Wells 16, 24 and 26, located near the City of Woodland RWS transmission main will be used for municipal supply. Groundwater from these three wells will be pumped into the RWS transmission main and blended with treated surface water. The use of all other existing municipal wells for drinking water supply will cease, although several wells will be maintained as emergency backup wells.

Both Cities will continue to use groundwater pumped from relatively shallow depths for irrigation of parks and other public spaces within City limits. When feasible, existing municipal wells will be converted to serve this purpose.

Each City has an ordinance requiring water users within City limits be connected to the City water service. Each City also has, or is developing, an ordinance requiring a City-authorized permit to drill a new well. These ordinances will significantly limit the operations of non-City owned wells within City limits, thereby limiting groundwater use within City limits to the municipal uses listed in this section.

Item 12: Proposed Methods and Location of ASR Measurements

Both Cities employ SCADA to monitoring groundwater levels and flow from their municipal wells. The ASR wells will also be SCADA-connected to monitor rates of injection and extraction of ASR water on a real-time, virtually continual basis.

In addition, Mitigation Measure 3.5-6 of the adopted WDCWA SEIR for the ASR program states,

The Cities of Woodland and Davis will deploy a groundwater level monitoring program consistent with California State Groundwater Elevation Monitoring (CASGEM) guidelines to establish baseline groundwater level conditions in their service areas during Project operations. The program will include measurement of groundwater levels using the Cities' existing network of groundwater monitoring wells. The groundwater monitoring program will continue in the City of Woodland during ASR operations and in the City of Davis, if the City of Davis implements ASR operations. During ASR injection cycles, groundwater level data will be collected on a monthly basis, and on a weekly basis during wet periods. In the event that the water table rises to less than 10 feet bgs at any ASR well site in response to ASR injections occurring concurrent with the water table rise, as determined by comparison to of water table trends measured during the baseline and ASR pilot and demonstration periods, ASR injections at that well will be reduced sufficiently to cause the water table at the ASR well site to fall to a depth of 10 feet or greater bgs, in order to minimize potential surfacing of groundwater.

REFERENCES

California Department of Water Resources (DWR), 1978 Evaluation of Groundwater Resources: Sacramento Valley, Bulletin 118-6, prepared in cooperation with the U.S. Geological Survey, August.

DWR, 2003, California's Groundwater, Bulletin 118 Update 2003, October.

DWR, 2004, California's Groundwater, Bulletin 118, Sacramento Valley Groundwater Basin, Yolo Sub-basin, February 27.

West Yost Associates, 2015, ASR Evaluation Report, prepared for the Woodland-Davis Clean Water Agency, June (copy included in Appendix C in WDCWA, 2015).

Woodland-Davis Clean Water Agency, 2015, Supplemental Environmental Impact Report for the Davis Woodland Water Supply Project (DWWSP), Aquifer Storage and Recovery Project, September.

**Woodland-Davis Clean Water Agency
Petition for Change, Permit 20281 (Application 30358)**

Attachment 5

Anticipated Regulatory Requirements and Permits for Project Implementation

The following page is a copy of page 2-12 of the WDCWA ASR Draft SEIR. Table 2-4 on this page lists the anticipated regulatory requirements and permits for the ASR program.

DAVIS-WOODLAND WATER SUPPLY PROJECT AQUIFER STORAGE AND RECOVERY

Supplemental Environmental Impact Report
State Clearinghouse No. 2015012062

Prepared for
Woodland Davis Clean Water Agency

July 2015



Trustee agencies under CEQA are designated public agencies with jurisdiction over natural resources that are held in trust for the people of California and that would be affected by a proposed project, whether or not the agencies have authority to approve or implement the proposed Project.

Regulatory agencies (responsible or trustee agencies) that may rely on the EIR for issuing permits and/or approvals are identified in **Table 2-4**. Table 2-4 also lists federal, state, local, and other permits and approvals that could be required for construction and operation of proposed facilities. Each City would also obtain coverage for ASR operations under SWRCB Water Quality Order 2012-0010, General Waste Discharge Requirements for Aquifer Storage and Recovery Projects that Inject Drinking Water into Groundwater. This order will be implemented by the CVRWQCB.

**TABLE 2-4
ANTICIPATED REGULATORY REQUIREMENTS AND PERMITS FOR PROJECT IMPLEMENTATION**

Agency	Type of Approval
Federal Agencies	
No Permits Anticipated	N/A
State Agencies	
State Water Resources Control Board	Amended Appropriative Water Right Permit 20281 Coverage under SWRCB Water Quality Order 2012-0010, General Waste Discharge Requirements for Aquifer Storage and Recovery Projects that Inject Drinking Water into Groundwater
Central Valley Regional Water Quality Control Board	National Pollutant Discharge Elimination System Construction Storm Water Permit
State Water Resources Control Board Division of Drinking Water	Drinking Water Treatment Plant Permit
Local/Other Agencies	
Yolo County Environmental Health	Well Abandonment and Construction Permits
Cities of Woodland and Davis	Building Permit Road Encroachment Permits

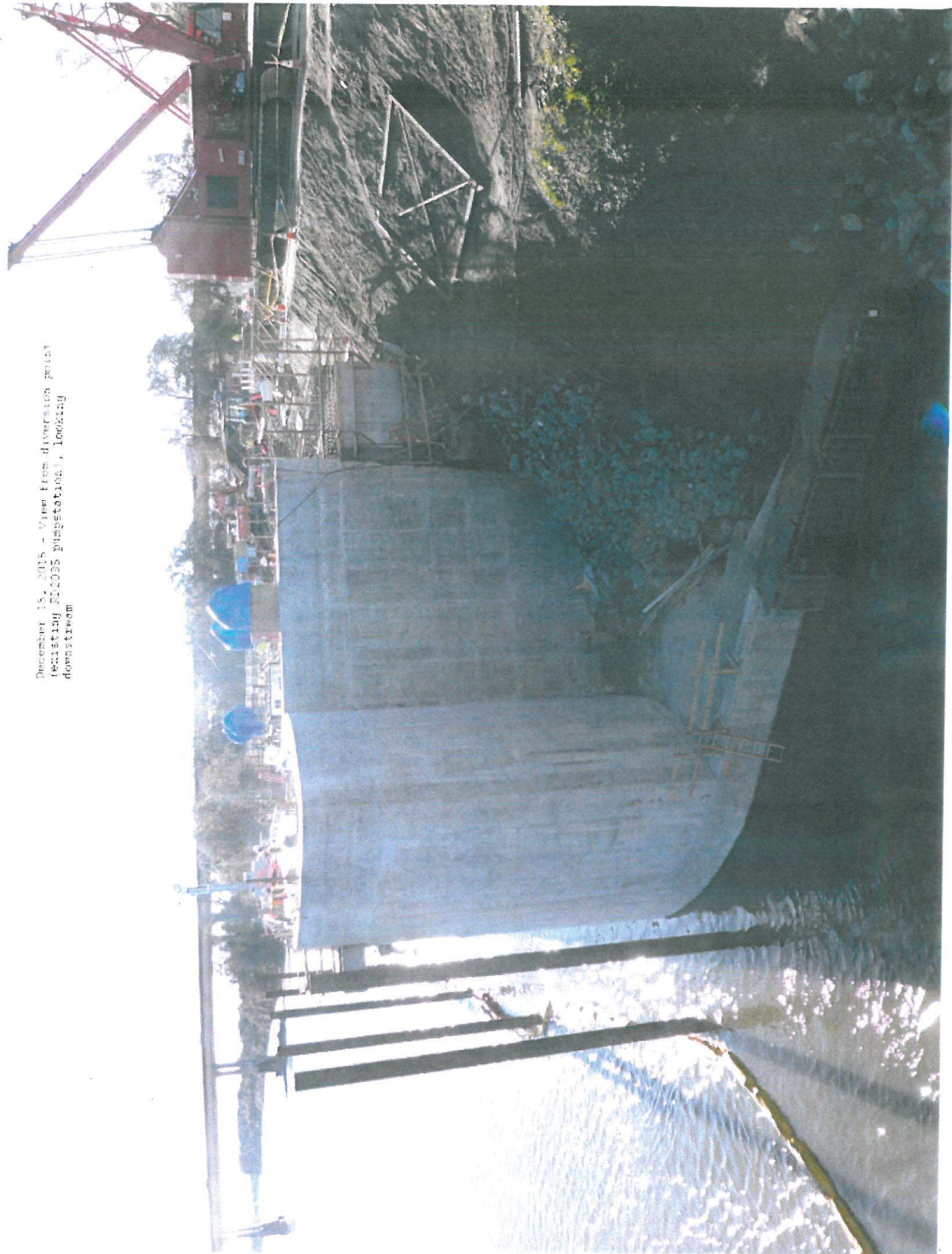
**Woodland-Davis Clean Water Agency
Petition for Change, Permit 20281 (Application 30358)**

Attachment 6

Project Photographs

The following photographs show: (a) Joint Intake Facility on the Sacramento River, looking downstream; (b) the Sacramento River, looking upstream from the Joint Intake Facility; and (c) a representative view of the place of use in the City of Woodland.

December 15, 2015 - View from Diversion point
(existing 50,000 pipe station), looking
downstream



November 17, 2015 - View from diversion
point (existing FD035 pumpstation), looking
upstream.



DOWNTOWN
← Fabulous First
← Victorian Loop
← Gable Mansion
→ City Hall
→ Library

