USCID

U.S. Committee on Irrigation and Drainage

The U.S. Society for Irrigation and Drainage Professionals

President's Message

Dear USCID Members,

I am thrilled to share the resounding success of our 2024 Fall Conference, held in the vibrant city of Sacramento, California. This year's event brought together around 100 professionals from across the irrigation and drainage industry, fostering an environment of collaboration, innovation, and learning. The diverse range of presentations, field tours, and networking opportunities provided invaluable insights and sparked meaningful discussions on the future of our field.

One of the highlights of the conference was the address by Dr. Les Harder, HDR Inc., who shared his involvement in the investigation of the Oroville Dam spillway failure, and engineering in the reconstruction. His presentation and photographs of the event were a captivating draw for all members, especially as a preview in preparation for the dam tour on Friday.

The success of this event would not have been possible without the dedication and hard work of our planning committee, volunteers, exhibitors and sponsors. I extend my heartfelt gratitude to each of you for your contributions. Your efforts have not only made this conference a memorable experience but have also strengthened our community.

Looking ahead, I am excited to announce that the 2025 USCID Fall Conference will be held in the biggest little city of Reno, Nevada, from October 20-23. Mark your calendars and consider your travel arrangements for what

Continued on page 2

2025 USCID Conference

October 20-23 in Reno, Nevada

Join us next fall! As details become available, we will post them on the USCID website - www.uscid.org/events

Fall 2024
Issue No. 1006

Continued from page 1

promises to be another exceptional event filled with cutting-edge research, innovative solutions, and unparalleled networking opportunities.

As we begin preparations for the 2025 conference, we are seeking enthusiastic volunteers to join our conference planning committee. This is a fantastic opportunity to contribute to the success of our event, connect with industry leaders, and gain valuable experience in event planning. Whether you have a background in logistics, marketing, or technical content, your skills and passion are needed.

If you are interested in volunteering, please reach out to our team at uscid@agamsi.com by January 15, 2025. Together, we can continue to advance the mission of USCID and make the 2025 Fall Conference an even greater success.

Thank you for your continued support and dedication to our organization. I look forward to seeing you in Reno!

Warm regards,

Therese A. Ure Stix
President, USCID

Visit us online!

Register to attend, or sponsor events
Renew your membership online
Find past newsletters and conference proceedings

www.uscid.org

In This Issue...

USCID Newsletter Advertisers

Fall 2024

We would like to thank our advertisers for making this edition of the USCID newsletter possible!

We had a great time at the 2024 USCID Conference in Sacramento!

We had a great time at the 2024 USCID Conference in Sacramento!

We had a great time at the 2024 USCID Conference in Sacramento!

USCID Field Tour to Solano Irrigation District (Vacaville, CA)
October 1, 2024

The USCID 2024 Annual Conference kicked off with a very informative tour hosted by the Solano Irrigation District (SID) in Vacaville, CA. Twenty-five conference attendees participated in the Tuesday morning tour. Starting at the SID offices, we learned about the District and their recent modernization projects.

SID was formed in 1948 and is entitled to 141,000 acre feet of water for agricultural and domestic use. The District delivers water from Lake Berryessa to SID customers, including four cities. Additionally, SID owns and operates a hydroelectric power plant at Monticello Dam. Their stated mission is “Solano Irrigation District’s mission is to provide safe and reliable water to our farms, families, and businesses.” For more information on SID, visit their website at https://www.sidwater.org/.

Following the office presentation, the tour group headed out to see the system in action and a few modernization projects. The SID has installed Rubicon Flumegates to control and measure flow at several locations throughout the canal system. Existing structures have been retro-fit to accommodate the new gates, walkways, and telemetry equipment. Rubicon Slipmeters have also been installed at some locations for flow control. Two locations were visited during the tour.

Photo 1: Updated Check Structure at SID

Photo 2: Updated Check and Turnout at SID

Along the way, we were also treated to seeing walnut and almond groves and learned about how some of the long-term walnut orchard crops are being taken out of production due to lower demand and shipping issues.

Thank you to the staff at Solano Irrigation District for hosting our group and providing the system overview and site tours.

Photo 3: Almond Grove

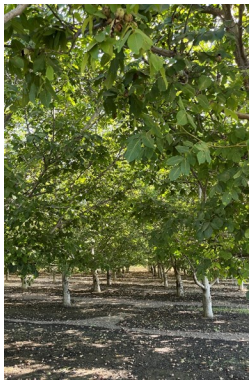


Photo 4: Walnut Grove

2024 USCID Conference Field Tour to Oroville Dam
October 4, 2024

For the last day of the 2024 USCID Sacramento Conference, we drove 75 miles north to visit the 770 foot (235 meters) tall Oroville Dam and and other surrounding facilities.

- *Quick Fact #1: Oroville Dam is the tallest earth fill dam in the United States and was built between 1961 and 1967.*
- *Quick Fact #2: Lake Oroville is the State Water Projects' largest reservoir including a forebay, afterbay, fish hatchery and a visitors center.*

An integral part of the California State Water Project, Oroville Dam is part of a much larger complex, the known as the Oroville-Thermalito Complex. This complex is a storage and pumping operation on the Feather River. The facilities include three power plants (Hyatt Powerplant, Thermalito Diversion Dam Powerplant, and Thermalito Pumping-Generating Plant and the reservoir Lake Oroville complete with a forebay and afterbay, both with regulatory storage reservoirs.

We were fortunate enough to have Mark Rabo, California Department of Water Resources, provide a history of the complex and a presentation on the damage and repair to the main spillway structure caused by the February 2017 Spillway Incident. Massive inflows grew the lake to 901 feet elevation, leading to a news making evacuation by the Butte County Sherriff's office of nearly 200,000 people for fear of flooding communities along the Feather River. The dam itself was not in danger.

Bedrock quality, chute conditions, and more led to concrete slab failure in the **main spillway** during floodgate releases in response to a large storm precipitation inflow. For the first time the **emergency spillway** was activated where more unexpected erosion occurred.

Oroville Dam Tour

The repairs that followed in the tremendous 18-month effort repaired the damage and reinforced both the emergency and main spillways with deep anchors directly into bedrock. Several cameras for inspection have been added to enhance the visual inspections. This over $1 billion improvement by the California Department of Water Resources (DWR) was completed in record time and in stages due to the timing of potential spill releases during the wet season.

Routine Spillway Cleaning and Inspections Underway

Following another wet winter requiring flood control releases from Oroville Dam's main spillway, DWR has begun cleaning activities and routine annual inspections of the concrete spillway chute. We were fortunate to see this maintenance in person the day of our tour.

Editor's note: the spillway structure is so large, and the perspective is hard to capture in photos.

From a public message covering spillway and maintenance work provided by Mike Rabo:

"Annual inspections of the main spillway are conducted by DWR engineers. During the inspections, engineers assess the condition of the spillway's concrete slabs, walls, joint sealant, and dentates (energy dissipators at the base of the spillway structure). Routine maintenance activities are expected this fall based on inspection results and reservoir levels. "

The visitor center was informative, professional, friendly, and organized. Thank you Mark and DWR for a memorable experience.

USCID October 2024 Conference Tour: A Visit to Lundberg Family Farms
October 4, 2024

In October 2024, the United States Committee on Irrigation and Drainage (USCID) hosted a remarkable conference tour to Lundberg Family Farms, a pioneer in organic rice farming located in Richvale, California. This tour provided attendees with an in-depth look at the innovative practices and sustainable methods employed by Lundberg Family Farms, particularly focusing on their drying and storage facilities and water use in rice cultivation.

Drying and Storage Facility
One of the highlights of the tour was the visit to Lundberg's state-of-the-art drying and storage facility. This facility is crucial for maintaining the quality and integrity of the rice from harvest to market. The drying process at Lundberg Family Farms is meticulously managed to ensure that the rice retains its nutritional value and flavor. The facility uses advanced technology to control temperature and humidity levels, which helps in preventing mold and spoilage. This careful management not only preserves the quality of the rice but also extends its shelf life, ensuring that consumers receive the best possible product.

The storage facility is designed to be both efficient and environmentally friendly. It incorporates sustainable practices such as energy-efficient systems and renewable energy sources. These efforts are part of Lundberg's broader commitment to sustainability and reducing their carbon footprint. The tour participants were impressed by the facility's ability to handle large quantities of rice while maintaining high standards of quality and sustainability.

Water Use in Growing Rice
Water management is a critical aspect of rice farming, and Lundberg Family Farms has implemented several innovative practices to use water more efficiently. During the tour, attendees learned about the farm's approach to water conservation and management. Lundberg Family Farms employs a system of checks and balances to monitor water usage and ensure that it is used judiciously.

One of the key strategies is the use of alternate wetting and drying (AWD) techniques. This method involves periodically drying the fields instead of keeping them continuously flooded. AWD not only reduces water usage but also helps in controlling pests and diseases, leading to healthier crops.

The farm also engages in practices that enhance soil health, which in turn improves water retention. Cover cropping and crop rotation are integral parts of their farming practices, helping to maintain soil structure and fertility. These methods contribute to the overall sustainability of the farm and ensure that water resources are used responsibly.

Conclusion
The USCID October 2024 conference tour to Lundberg Family Farms was an enlightening experience for all attendees. It showcased the farm's dedication to quality, sustainability, and innovation in rice farming. The drying and storage facility, with its advanced technology and sustainable practices, and the efficient water use strategies, highlighted Lundberg's commitment to environmental stewardship and agricultural excellence.

Participants left with not only a sampling of the Lundberg Family Farms Organic Rice Cake Minis, but a deeper understanding of the complexities of rice farming and the importance of sustainable practices in ensuring the future of agriculture. Lundberg Family Farms continues to set a high standard in the industry, demonstrating that it is possible to produce high-quality products while caring for the environment. This tour was a testament to the Lundberg family's ongoing efforts to lead by example and inspire others in the agricultural community. A big thank you to the Lundberg family for providing this opportunity!

Lundberg Family Farm

FLOOD WATER DIVERSION IN ALISO WATER DISTRICT

Jose A. Bejarano Padilla[1], Joseph D. Hopkins[2], and Roy Catania[3]

ABSTRACT
Aliso Water District (AWD) is located in western Madera County. AWD encompasses approximately 26,000 acres. AWD's main water supply is groundwater since the District does not currently have surface water supplies. With the passage of the Sustainable Groundwater Management Act (SGMA), AWD recognizes a need to import surface water into the district to balance its overdraft. Fortunately, a state flood bypass system, the Chowchilla Bypass (CBP), passes directly through the district. Unfortunately, floodwater is only available 1 in 4 years based on recent hydrology. Therefore, AWD needs to divert, utilize and recharge as much of this floodwater as possible to mitigate their overdraft in non-flood years. One project to accomplish this goal is the Chowchilla Bypass Turnout (Project). The Project is anticipated to divert up to 10,000 acre-feet (AF) during high flow events on the San Joaquin River to a 75-acre recharge basin. AWD will construct a turnout with a fish screen from the CBP that will send water through a pipeline 1.5 miles east to the recharge site. The Project will allow the District to implement groundwater recharge, in-lieu recharge, and flood relief.
Challenges with this project include funding, environmental permitting, water rights permitting, and landowner coordination. Once complete, this Project will demonstrate that taking advantage of wet years, such as Water Year 2023, to divert unappropriated high-flow waters from the Bypass will allow AWD to operate sustainably. This presentation will discuss the general background, design, permitting, and lessons learned.

[1] *Assistant Engineer, Provost and Pritchard Consulting Group, 455 W. Fir Ave. Clovis, CA 93611 abejarano@ppeng.com*
Principal Engineer, Provost and Pritchard Consulting Group, 455 W. Fir Ave. Clovis, CA 93611 jhopkins@ppeng.com
[3] *President, Aliso Water District, 13991 Ave 7 Madera, CA 93637*
info@alisowdgsa.org

Continued on next page

BACKGROUND AND INTRODUCTION

Aliso Water District (AWD or District) encompasses roughly 26,000 acres. The District was formed in 1978, with the intent to obtain surface water. The District was essentially inactive until the Sustainable Groundwater Management Act (SGMA) in 2014. After the passage of SGMA in 2014, the District became the Groundwater Sustainability Agency to represent the landowners within the District boundary. SGMA motivated the District to protect its ability to pump groundwater. The District land is predominantly agricultural with a majority of the crops in the District being permanent crops; the bulk being nuts and vines with some annual row crops. The District's main water supply is from pumping groundwater since the District currently has no surface water supplies of its own. The District is pursing appropriative water right to divert water from the Chowchilla Bypass (CPB), which is tributary to the Lower San Joaquin River. The District will be able to divert up to 10,000 Acre-Feet (AF) of surface water for on-farm recharge practices (Groundwater recharge basins).

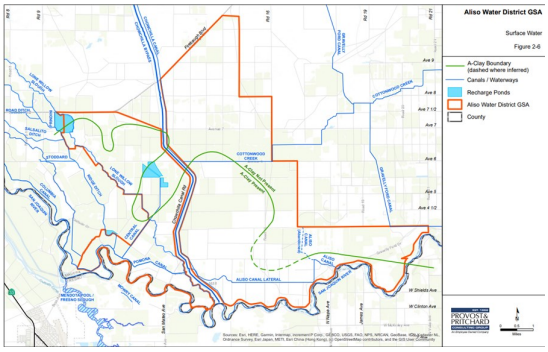


Figure 8. Aliso Water District Vicinity Map

The District is proposing to construct a 100 cubic feet per second (CFS) diversion structure (Project) along the Chowchilla Bypass (CBP) to divert water to a groundwater recharge basin located approximately 1.5 miles east of the diversion structure. The Project is composed of a low water level channel, a reinforced concrete vault to support two (2) 168-inch diameter conical fish screens, a 72 -inch pipe, and a concrete control box with a 72-inch control gate, a 100 CFS pump station and approximately 1.5 miles of 48-inch HDPE into a 75-acres recharge basin. The District estimates it has an annual groundwater deficit of roughly 2,500 AF per year. If the District secures the appropriative water right to divert water from the CBP and divert 10,000 AF, the District should be able to correct their groundwater deficit and achieve sustainability. The project consists of excavating a roughly 320-foot long channel from the invert of the pilot channel and terminate 15 feet away from the inside toe of the levee. At the terminus of that channel, a concrete vault will be constructed to support two (2) 168-inch cone shaped fish screens. The fish screen concrete vault has the following measurements 37' (L) x 20' (W) x 13'-5 1/2" (D). The fish screens will be protected from scouring during flood flows with an 18-inch thick apron of Class II Rip Rap. A 72-inch pipe would connect from the fish screen concrete vault to the control gate box. The control gate box shall be located about 5 feet off the inside top of bank of the Chowchilla Bypass. The control gate box shall be furnished with a 72-inch canal gate to isolate flood system. After the gate control box, the pipe shall pass through the levee and continue until it is outside Central Valley Flood Protection Board property/jurisdiction. Outside of the floodway, the pipeline will terminate into a pump station. The pump station will convey flood water through a 48-inch pipeline to the recharge site. The 72-inch pipeline shall be installed through the floodway and levee using the open cut method.

DESIGN CONSIDERATIONS

The Project design took into account a number of factors such as how quickly water could be placed into the basins and offset the groundwater deficit since the District does not have access to surface water and is dependent solely on groundwater wells to irrigate approximately 26,000 acres. In addition, the District wanted to make the best use of funds available after the passing of a Prop 218 to begin collecting groundwater extraction fees from landowners. The District intent with the Project is a proof-of-concept due to the close proximity to the Chowchilla Bypass. The District recently entered into a long-term lease to develop an approximately an 80-acre groundwater recharge basin. The basin is located 1.5 miles east of the Chowchilla Bypass.

The San Joaquin River bifurcation to the Chowchilla Bypass allows for the diversion of high flows to prevent flooding in urban areas. The San Joaquin River is rated for a maximum flow rate of 4,000 CFS and the Chowchilla Bypass bifurcation structure is rated for 5,500 CFS.

Due to the ever-changing climate pattern in California, the Project facilities were design to act as temporary flood relief system to Chowchilla Bypass. The District will mobilize and demobilize

Continued on next page

the self-priming centrifugal pumps to the turnout location when California experiences a wet year, which appears to be in a pattern of once every 4 years.
The CBP is operated and maintained by Lower San Joaquin Levee District and falls within the District boundary. CBP is a potential source of flood water to Aliso WD as the result of an appropriative water right permit. CBP is primarily a flood-release stream diverting water originating from the Millerton Lake, and is primarily active and contains flow when flow rates in the San Joaquin River are greater than 4,000 CFS. The CBP has a bifurcation structure at the San Joaquin River rated for 5,000 CFS. The District is able to divert flood water from the CBP when the flows in the CBP are above roughly 1,300 CFS.
In 2023 the District installed a temporary diversion system under the California Governors Executive Order N-7-22; during 2023, the District was able to divert approximately 1,300 AF. The District lack of permanent groundwater recharge facilities did not allow the District to divert to the full extent of the Project design. In Water Year 2023 a wet year, there were over 100 days of flood releases from Millerton Lake, The District would have been able to divert close to 20,000 AF at a 100 CFS rate.

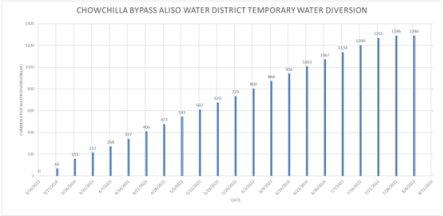


Figure 9. Temporary Water Diversion System by Aliso Water District¶

One of the Project design challenges is the fluctuation of flows and water levels in San Joaquin River and Chowchilla Bypass. In order to combat the fluctuating water level at the Project turnout intake, the District investigated three (3) different alternatives:

1. Vertical Turbine Pump Station Sump that matches the height of the Chowchilla Bypass Levees to prevent overtopping (The pump station sump would be approximately 12 feet above existing ground).

2. Underground Common Suction Header (Requires for pump to be able to prime and bring water up to eye of the impeller).

3. Aboveground Common Suction Header (At high flows and water levels, the pumps will have flooded suction).

The District opted out of Alternative 1 due to the cost to construct a pump station sump of approximately 30 feet (18 feet underground, and 12 feet aboveground). A pump sump with the depth mentioned above was not a feasible option especially when the high flood flows are not guaranteed to run every year.
The District opted out from Alternative 2 since the varying water level in the Chowchilla Bypass did not allow for favorable hydraulic operation of the pumps. Due to the varying water level in the suction header, the pump Net Positive Suction Head Required was greater than the available diminishing the operating range of the pump system. Additionally, the pumps will experience greater wear and tear and reduce the service life of the equipment resulting in a greater investment from the District.
The District is currently analyzing the feasibility of alternative 3. This alternative will allow for the pump to have flooded suction at high flows and high water levels in the Chowchilla Bypass. A check valve will be installed upstream to prevent any backflow allowing for pumps to lose prime and stop pumping. Additionally, the District will be installing an Air-Operated Double Diaphragm (AODD) pump to bring water up to the above ground common suction header in order to have flooded suction for the pump during low to average water levels in the Chowchilla Bypass. This alternative allows for the most flexibility and robust operation of the diversion system by the District.
The Project was sited such that they would:

1. Have geology favorable to groundwater recharge.

2. The turnout to be located in one of the proposed Point of Diversion in the Districts water right application.

3. Be strategically located to divert water from the Chowchilla Bypass and alleviate the flood system from any strain due to high flood flows.

Continued on next page

Flood Water Diversion in Aliso Water District

(Continued)

The site's primary purpose is offset of groundwater overdraft and flood system strain relief as a secondary benefit. A geologic exploration was conducted along the Project and critical location such as the Chowchilla Bypass levee, pump station location, discharge pipeline alignment, and groundwater recharge basin. At the Chowchilla Bypass levee and pump station, the borings holes had a depth of 35 feet to determine levee stability and structural reinforcement required for the structures. Along the discharge pipeline alignment, the boring holes had a depth of 6 feet to determine trench slope requirements and backfill requirements. At the groundwater recharge basin, four borings holes were conducted to verify if the shallow soil profiles would be conducive to recharge. The geologic investigations and infiltration tests have shown the site could sustain recharge rates between 0.75 ft per day. For example, the recharge goal for the Project is 10,000 AF (in anticipation of above average conditions) in the ground in approximately 221 days, or an average of 1,400 AF per month (0.75 feet per day).
Recharge could come in highly irregular flows and short durations. Also, when recharge basins are

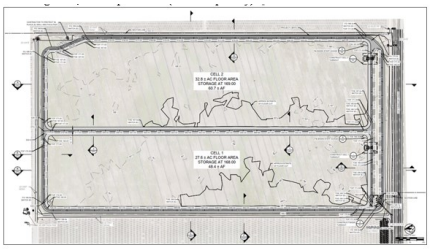


Figure 10. Groundwater Recharge Basin Site Plan¶

being filled for the first time, they will percolate at much higher rates. Recognizing the potential need to take high flows in short time frames, many design features were incorporated. The turnouts to each site were designed for relatively high flows and sediment handling. The site was divided into smaller cells to help manage spreading and evaporation.
Table 1 below lists the sustainable recharge rate, acreage, and delivery inflow for each site. As the table shows, the design inflows are about four times higher than the sustainable recharge flow.

Table 1. Summary of Recharge and Inflow Rates¶

Site¤	Sustainable Recharge Rate (ft/day)¤	Acreage¤	Sustainable Recharge Inflow (cfs)¤	Design Inflow (cfs)¤
Site 1¤	0.75¤	80¤	30¤	100¤

¶

Continued on next page

DISTRICT WATER RIGHTS

The District is in the process of obtaining an appropriate water right of 10,000 AF from the State Water Resources Control (SWRCB). The District has taken a multi-pronged approach, pursuing both a Standard Right as well as a Temporary Right. The Standard Right can take 7-10 years to complete, and the threshold to demonstrate availability of water is much higher. A temporary right takes 4-5 months to complete and was used to flesh out issues with the SWRCB and protesting parties. The District continues to pursue a temporary right on an annual basis. The temporary right only provides 180-day to access the water and has to be done annually as a provision just in case flood water is available, so the District may divert water.

Obtaining both the Temporary and Standard right has proven to be much more difficult that one would expect. Especially considering this is flood water that would otherwise flow to the ocean. On the temporary right, the terms and conditions placed on the permit to satisfy protesting agencies, make the timely response to flood diversions nearly impossible. On the temporary right, the high level of protests (both sincere and obstructive) demonstrates the political challenge of obtaining rights to this river system.

PROJECT PERMITTING

The District is required to secure a variety of State and federal permits to be allowed to construct the Project. The District was required to secure a Minor Alteration Request & Encroachment Permit from

Continued on next page

Continued on next page

Central Valley Flood Protection Board (CVFPB), Lake and Streambed Alteration (Section 1602) from California Department of Fish and Wildlife (CDFW), and compliance with the California Environmental Quality Act (CEQA). The Project must also demonstrate that is exempt from Section 401 Permit from Regional Water Quality Control Board, Section 404 and Section 408 Permits from U.S. Army Corps of Engineers.

California Environmental Quality Act

The District understands the importance of compliance with the California Environmental Quality Act (CEQA). The primary goal of the District with this Project is to ensure that environmental factors are considered in decision-making processes.

Consistent with the March 28, 2023, Drought Executive Order N-7-22 Action 13, the California Department of Water Resources (DWR) developed a process to allow local agencies to submit their proposed recharge projects to DWR for CEQA suspension, which meet the objectives of the Executive Order (EO). Based upon the unpredictable and severe circumstances created by the state's increasingly hotter and drier climate, Governor Newsom enacted EO 13 to suspend CEQA for groundwater recharge projects that capture available water for the purposes of recharging groundwater basins through the application on open and working lands to help mitigate drought impacts on groundwater conditions. DWR determined that the Chowchilla Bypass Project meets the criteria and is consistent with the requirements and concurred with project eligibility.

Central Valley Flood Protection Board Minor Alteration Request & Encroachment Permit

The Central Valley Flood Protection Board (CVFPB) establishes, maintains, and enforces standards for the construction, maintenance, and operation of the flood control system to protect life, property, and habitat for the Chowchilla Bypass. The District applied for an Encroachment Permit and Minor Alteration Request.

The Minor Alteration Request allows the District to perform a geotechnical investigation along the CBP to determine levee stability and other information required to construct the Project. The District performed three (3) geotechnical borings to get a broad understanding of the CBP levee. The findings of the geotechnical investigation will be used to design structures such as the fish screen concrete vault and gate control box.

The CVFPB Encroachment permit allows the District to construct the Project on the State property. The encroachment permit required endorsement from the Lower San Joaquin Levee District (LSJLD). The endorsement received by LSJLD District Engineers allows for the District to move with the Project permitting phase.

California Department of Fish and Wildlife – Lake and Streambed Alteration

The District will apply for a Lake & Streambed Alteration (1602 Section) Permit with CDFW to construct the project. CDFW requires the permit requires any person, state or local governmental agency, or public utility to notify CDFW prior to beginning any activity that may do one or more of the following:

- Divert or obstruct the natural flow of any river, stream, or lake;
- Change the bed, channel, or bank of any river, stream, or lake;
- Use material from any river, stream, or lake; or
- Deposit or dispose of material into any river, stream, or lake.

Temporary and Permanent impacts on the Chowchilla Bypass and Cottonwood Creek were quantified and exhibits were prepared to submit to CDFW and facilitate the permitting process. Although the 1602 permit is not based on impacts but on construction costs; the Agency still requires a visual of the impacts. This additional work to prepare the exhibits is time-consuming and it does not aid the District to obtain the permit.

During a pre-filling meeting, CDFW will provide guidance to prevent back-and-forth between the Client and Agency for a streamlined permit process.

U.S. Army Corps of Engineers – Section 404 Clean Water Act

Typically, a Section 404 permit is not required for the Project since the Chowchilla Bypass is not a Water of U.S. and no discharge of dredge or fill material will take place during the construction of the Project. The Project falls under multiple exemptions of Section 404(f) of the Federal Clean Water Act.

Continued on next page

Relative to the Project all the impacted waters are accurately characterized as "irrigation ditches" and involve the construction of the various components listed in the regulations. Therefore, the Project is exempt from Section 404 of the Federal Clean Water Act and the Porter- Cologne Water Quality Control Act.

U.S. Army Corps of Engineers – Section 408

Typically, a Section 408 permit is required for any project constructed that alters USACE Civil Works project. The Lower San Joaquin Levee District received a letter from the USACE stating that the Chowchilla Bypass levees are not recognized as a federal levee. Hence, the Project being exempt from Section 408 Permit.

Regional Water Quality Control Board – Section 401 Water Quality Certification

Typically, a Section 401 permit is required for projects that actively discharge any dredge or fill materials into the Waters of the State. The proposed Project by the District is exempt from the Section 401 permit and discharge any dredge or fill material will take place during the construction of the Project.

Since the Project is exempt from U.S. Army Corps of Engineer Section 404 permit, it allows for the Project to also be exempt from Section 401 permit issued from Regional Water Quality Control Board.

PROJECT FUNDING AND COST

The District elected to be the GSA for the lands within its service area. As a GSA, the District is authorized under Water Code Section 10730 et seq. to impose fees to fund the costs of a groundwater sustainability program, including, but not limited to, preparation, adoption, and amendment of a groundwater sustainability plan, and investigations, inspections, compliance assistance, enforcement, and program administration, including a prudent reserve. The District is authorized to collect these fees in the form of real property assessments.

Continued on next page

The District also has general authority to levy assessments to fund improvements under Water Code Section 36455 et seq.
The District recently approved a land base assessment and a groundwater extraction fee to fund on-going compliance with SGMA, District Administration, District Consulting Services, Monitoring, and Capital Improvement Projects (CIP). The District recognizes the need to groundwater recharge and achieve sustainability by 2040. The need for groundwater recharge and ambitious sustainability goals from the District led the District to proposed for the construction of the Project. The District received a grant for the Construction of Project from the Department of Water Resources (DWR) under the State Budget Act of 2021. The District is currently securing funds from other agencies such as United States Department of Agriculture (USDA) and/or Natural Resources Conservation Services (NRCS), and California Infrastructure and Economical Development Bank (IBank).

The NRCS launched a Groundwater Recharge Pilot Program where public agencies such as irrigation and water district were encouraged to apply. The NRCS was not ready for the influx of additional work and legal hurdles when dealing and assisting a water management entity to apply and secure funds appropriately. The District submitted all documentation required and was unsuccessful in securing funds from NRCS due to the hurdles that the District had to endure to prove Tax Exemption status.
Capital Cost. Initial capital cost to develop the Project are significant. The Engineers Opinion of Probable Construction Cost for the Project is approximately $10 million. This includes the cost to construct the infrastructure in the Chowchilla Bypass, pump station, furnish and install approximately 8,000 lineal feet of pipeline, construct an 80-acre recharge basin, inter-basin structures, and construct monitoring wells. With the average net yield of 10,000 AF of groundwater recharge every 4 years, the capital cost to develop this new supply calculates to approximately $4,000 per AF.

The following table breaks down the capital cost into the major cost components.

Table 2. Proportions of the Major Capital Cost Components

Item	Portion of Cost
Chowchilla Bypass Infrastructure	17%
Pump Station	22%
Discharge Pipeline	44%
Recharge Basin	17%

Flexibility in Design and Permitting. The AWD project demonstrated the necessity of incorporating flexibility into both design and permitting processes. The fluctuating water levels in the CBP, and the infrequency of high-flow events required the AWD to evaluate multiple alternatives for the pump station design. The chosen design allows for effective operation during varying flow conditions by using an aboveground common suction header, which provides a more flexible and robust solution. Moreover, the permitting process underlines the importance of engaging with regulatory agencies early and thoroughly understanding the environmental and legal requirements to avoid delays. AWD had to navigate various state and federal permits, learning that clear and early communication with agencies can streamline the process and mitigate challenges related to environmental impacts and water rights.

CONCLUSION

The results of this Project show that the District will continue to work to achieve sustainability under SGMA. The Project will demonstrate that taking advantage of wet years, such as Water Year 2023, to divert unappropriated high-flow waters from the Bypass will allow AWD to operate sustainably. A Project of this magnitude and scale will not only allow the District achieve sustainability, but it will demonstrate that there is a need for adaptive strategies in water resource management, especially in the face of climate variability and stringent regulatory landscapes. Flexibility in both design and permitting can ensure the sustainability and success of similar projects in the future.

Blast From The Past

Remember this article from **1992?**

Mitigating Environmental Impacts of Water Management Projects: Examples

Michael Day[1], Brian Ehlers[1], and Dale Melville[1]

ABSTRACT

Water management projects undertaken by public agencies often require mitigation measures to reduce or offset potential environmental impacts. Negotiating, designing, administrating and constructing mitigation mea-sures often involves significant expenditures of time and money. The resulting costs and delays can affect the feasibility of the project. Cre-ative ways can often be found to satisfy environmental concerns without "killing" the project. Examples from recent projects in California's San Joaquin Valley by Laguna Irrigation District, Dudley Ridge Water Dis-trict, James Irrigation District, Raisin City Water District and the Lost Hills Water District are presented and discussed.

INTRODUCTION

Projects which improve water management, including those designed for water conservation, groundwater recharge and drainage management, are generally supported by public opinion, national and state governments and by many environmentalists. However, when public agencies seek to undertake these types of projects, they quite often find that potential environmental impacts, even relatively minor ones, stand as road blocks to funding, design, construction and operation. As a result, project managers and engineers find themselves spending considerable time, and the agency's money, seeking ways to mitigate those impacts. This paper summarizes the authors' experiences with several water management projects undertaken by irrigation and water districts in the San Joaquin Valley of California.

CEQA PROCESS

The California Environmental Quality Act (CEQA) of 1970 governs the actions that local agencies must take

[1] *Registered Civil Engineers, Provost & Pritchard Engineering Group, Fresno, California.*

This article was posted on the California Water Blog in May 2019 and March 2019. and was duplicated with permission from Jay Lund.

Continued on next page

when sponsoring a construction project to ensure that protection of the environment is included in the planning process. CEQA is California's version of NEPA, the National Environmental Policy Act. This paper does not attempt to explain CEQA or NEPA.

Condition of Funding
Projects constructed by local agencies, but funded by state bond issues (like the projects given as examples later) are especially subject to delays during the CEQA process. Since funding for design and construction is contingent upon the CEQA process being completed, other parties have the power to bring a project to a complete stop by raising objections during the CEQA process. Some parties have been known to take advantage of this process and hold a project hostage to their own agenda.

Endangered Species Act
The most common potential environmental impacts of water management projects which become an issue in the San Joaquin Valley are those which involve threatened and endangered species. The Endangered Species Act (BSA) governs the actions which must be taken when there are potential impacts to plants or animals listed as threatened or endangered. Both the Federal government and the State of California have their own lists of threatened and endangered species. When a plant or animal on one or both lists exists, or is suspected to exist, within or near the project site, the regulatory agency(s) responsible for protecting that species will require mitigation measures to offset the potential impacts (whether perceived or real).

In the San Joaquin Valley, the agencies responsible for protecting endan-gered species are the California Department of Fish and Game (DFG) for State listed species and the United States Fish and Wildlife Service (USFWS) for Federally listed species. The BSA is an incredibly powerful law. It in essence places the protec-tion of threatened and endangered species above all other considerations. Practical and economical factors are not considered in its enforcement. It has even been interpreted by a judge as meaning that protection of threatened and endangered species takes priority over the national defense. Because of the ESA's strength, the agencies which administer it are in a position to dictate mitigation measures. In the example projects given, the DFG is further empowered by the fact that it is a branch of the same State government which is providing loan funds to the projects.

Other Environmental Impacts
Other potential environmental impacts encountered by some water management projects involve other powerful laws or regulations including the Migratory Bird Treaty Act, wetlands laws, the Clean Water Act, the State Fish and Game Code, archeological protection laws and the California Toxic Pits Cleanup Act. Project conflicts with any of these laws or regula-tions must be resolved during the CEQA process before the project can proceed.

Mitigation Measures
When there is a potential conflict with the ESA, other laws or regulations, the project manager is in a position to negotiate mitigation measures with the party who raised the objection. Sometimes this can be as easy as hiring a biologist to perform a survey to demonstrate that the listed species does not exist in or near the project area.

Other conflicts may require altering the project's alignment, changing the design of the project, adding new facilities for wildlife enhancement, purchasing other lands to set aside for wildlife habitat, applying for a streambed alteration agreement, etc. Generally, on water management projects of the size the authors have dealt with (relatively small compared to major water supply projects sponsored by the U.S. or State governments) there is a way to satisfy environmental concerns. The challenge is to find a resolution which minimizes additional· costs and time delays to the project.

Looking for Win-Win Solutions
Often the key to resolving environmental concerns lies in looking for "win-win" situations, i.e. looking for opportunities to satisfy the environmental concern, but in a way which also benefits the project's agency. Finding the win-win situation usually requires meetings with the con-cerned parties to brainstorm and negotiate a mutually agreeable resolution. This process demands that the project manager look at the project from different viewpoints and think in creative, innovative ways.

Don’t Expect Reasonableness
To the sponsoring agency, the concerns of those who raise objections during the CEQA process are sometimes unreasonable. But whether they are reasonable or not, the agency rarely has a choice but to address those concerns since the project cannot proceed otherwise. Some of the exam-ple projects discussed later encountered objections with questionable reasonableness.

Costs of Mitigation Measures
Even when win-win situations are found, mitigation measures invariably involve substantial costs. Not the least of which are various consultants' fees incurred during the resolution process. Although the costs may be substantial, they must be maintained at a level not to kill the project. Mitigation costs on the example projects were on the order of 1 percent of the total project cost.

Time Delays
Perhaps the greatest effect that the CEQA process has on water management projects are the time delays that usually result from the need to mitigate environmental impacts. The CEQA process for a project whichis declared categorically exempt or for which a negative declaration is prepared and is not challenged may only take a few

Continued on page 21

months. But a mitigated negative declaration or the preparation of an environmental impact report can take several months or even years to complete. The time delays often push back construction for similar periods of time. Project managers and sponsoring agencies must learn to anticipate time delays and plan the project schedule accordingly.

Often CEQA is not the only process delaying a project. For instance, the agency administering the loan may have other conditions that must be met by the project sponsor before funding can be disbursed. Agreements or permits with other agencies may be necessary; public hearings and other activities may also effect project schedules.

EXAMPLE PROJECTS

Examples of water management projects for which mitigation measures were required are presented below. A summary of the specifics of each project is given for each project in Tables 1 through 5, while the following text discusses the unique aspects of each project. Figure 1 shows the location of the districts involved.

Laguna Irrigation District's South Island Canal Project
When the Laguna Irrigation District decided to pipe its South Island Canal (an earthen canal with high seepage losses) the DFG objected that piping the canal would result in loss of habitat for shorebirds. In spite of the fact that District or DFG staff had never seen shorebirds on the banks of the canal, a mitigation agreement was eventually reached in which the District would construct a new regulation reservoir as part of the project to provide alternative habitat.

A regulation reservoir had been needed by the District, and a win-win situation began to develop. The regulation reservoir was designed with input from the DFG to maximize shoreline and shallow water for wading shorebirds. The large shoreline with interior levees provided cells in the reservoir, allowing the District to operate all or only a portion of the reservoir, whereby seepage losses from the reservoir can be minimized when only minor flow regulation is needed.

Dudley Ridge Water District's Service Area 3 Improvements
The Dudley Ridge Water District replaced earthen canals in its Service Area 3 with concrete lined canals and pipelines. The DFG objected that the project would reduce shorebird habitat, San Joaquin Kit Fox dens could be disrupted during the construction and the lined canal would block kit fox movements. A mitigation agreement eventually was negotiated in which the District (1) constructed an island in an existing regulation reservoir to provide habitat for shorebirds, (2) imposed construction restrictions on the earthwork activities and provided crossings for kit fox over the newly lined canal.

Although the agreement cost the District some time and money, it also provided some benefits. The creation of the island in the regulation reservoir was coordinated with an expansion of the reservoir to provide the District with needed additional regulation storage. The restrictions on earthwork never became a factor during construction, and in the design phase, it was mutually concluded that the new and remodelled canal structures could also serve as bridges for kit fox crossings.

James Irrigation District's Eastside Canal Lining
The DFG and USFWS were concerned that construction activities from James Irrigation District's project to reduce seepage losses by concrete lining and piping its eastside canals would kill Fresno Kangaroo Rats. After consultations with these agencies the District retained a biological consultant to perform a reconnaissance survey to locate any evidence of kangaroos rats and their habitat. When the biologist found kangaroo rat habitat and tracks, the District hired the biologist to set traps so he could determine whether they were Fresno Kangaroo Rats or another non-listed species. Six consecutive nights of trapping found only non-listed kangaroo rat species. This process took nine months and over $25,000 to complete. Obtaining a permit to trap the kangaroo rat was an especially time con-suming and frustrating process.

Raisin City Water District's Groundwater Recharge Project
The Raisin City Water District is planning a groundwater recharge project which has also required mitigation measures. The proposed canal alignment was altered to avoid a small parcel of native land (never developed into agriculture because it is a radio tower site) because it was suspected to be potential habitat for the Fresno Kangaroo Rat, San Joaquin Kit Fox, Burrowing Owls and Blunt Nosed Leopard Lizard. The USFWS also insisted that a survey be conducted for kit fox near·the proposed recharge basin site because one kit fox had been seen 17 years ago, 5 miles away. The local biologists for DFG were certain that there were no kit fox in the area, but yielded to the USFWS request. The ten-night scent station and five-night spotlight surveys found no kit fox. If kit fox had been found, the USFWS would have required that the District purchase land three times the size of the recharge basin site as set-aside habitat for kit fox. Although the basin site is agricultural land in production, the agricultural field may have been an area "where Kit Fox could browse". The District questioned the reasonableness of the requirement for a kit fox survey, but spent the money and time required because it had no choice, if the project was to proceed.

Lost Hills Water District's Evaporation Ponds
Since 1986, the Lost Hills Water District has been involved with the operation of farmer-owned evaporation basins for subsurface agricultural drainage. Naturally occurring levels of selenium have been a concern in agricultural drainage along the westside of the San Joaquin Valley since adverse effects to waterfowl were documented at Kesterson Reservoir. Efforts of the $60 million San Joaquin

Continued on page 23

Valley Drainage Program have had little impact for implementating solutions to drainage and wildlife issues. Pond operators, such as the Lost Hills Water District, are subject to regulatory and political enforcement of the Migratory Bird Treaty Act (MBTA) which could force closure of the evaporation basins to protect against any loss of migratory shorebirds or waterfowl. Beneficial and adverse impacts of evaporation ponds containing parts per billion of selenium and other salts are being weighed by the scientific (and political) communities; the question may become whether a 5% adverse impact outweighs a 95% beneficial impact of the evaporation basins to waterfowl.

The costs borne by the Lost Hills Water District to modify ponds in an attempt to mitigate environmental impacts is shown in Table 5. Even with this enormous level of financial commitment related to mitigation, the results of waterfowl impact studies currently being conducted at the request of the regulatory agencies, are likely to recommend significant additional mitigation measures be implemented. In the case of agricultur-al evaporation basins, even when the CEQA process has been complied with years ago, the compliance with the MBTA continues as pond opera-tors struggle to find economical mitigation measures which satisfy envi-ronmental groups.

CONCLUSION

The mitigation of environmental impacts will continue to be a part of the process of constructing water management projects. If current trends continue, the process will become increasingly difficult. Project managers will need to become more skillful in working through the process by anticipating potential environmental concerns early in the planning stage, and by working with biologists and regulatory agencies to develop mutually agreeable mitigation measures.

Hopefully in the future, the country's politicians can be convinced to modify some of the existing environmental laws to balance protection of species with economic and practical considerations, give local fish and wildlife biologists more flexibility in implementing the laws, and streamline the process.

FIGURE I
AGENCY LOCATION MAP

Table 1. Project Summary
Laguna Irrigation District
South Island Canal Project

Project Purpose	Reduce seepage losses
Project Facilities	1.2 miles of 42″ and 36″ cast–in–place conc. pipe 20 acre regulation reservoir associated water control structures
Total Project Cost	$536,000
Funding Source	Proposition 44: Water Conservation and Water Quality Bond Law of 1986
Environmental Costs	$156,293 (29% of total project cost) Preparation and Processing of CEQA Documents Consulting Engineer's Fees: $3,828 Attorney's Fees: $240 District Costs: $500 County Filing Fee: $25 Subtotal: $4,593 Construction of Mitigation Measures Design Fees: $18,000 Costruction of Reservoir: $124,000 Construction Inspection: $9,700 Subtotal: $151,700
ESA Listed Species	Western Snowy Plover – CSC, 2 Long Billed Curlew – CSC, 2
Mitigation Required	Compensation for ″loss of habitat″ Elected to construct regulation reservoir
Time Required	CEQA Process took 6 months to complete

Codes for Tables 1 – 5

CSC = California DFG ″Species of Special Concern″
ST = Listed as Threatened by the State of California
SE = Listed as Endangered by the State of California
2 = Category 2 Candidate for Federal listing
FE = Listed as Endangered by the Federal Govt.

Mitigating Environmental Impacts of Water Management Projects: Examples

(Continued)

Table 2. Project Summary
Dudley Ridge Water District
Distribution System Improvements, Service Area 3

Project Purpose	Reduce seepage losses
Project Facilities	7.7 miles of 12″ to 27″ PVC pipeline 3.2 miles of concrete lined canal associated water control structures
Total Project Cost	$3,107,000
Funding Sources	Proposition 24: Clean Water Bond Law of 1984 Proposition 44: Water Conservation and Water Quality Bond Law of 1986
Environmental Costs	$32,163 (1.0% of total project cost) Preparation and Processing of CEQA Documents Consulting Engineer's Fees: $5,000 Biological Consultant Fees: $1,925 Attorney's Fees: $400 County Filing Fee: $50 Subtotal: $7,375 Construction of Mitigation Measures Land purchase (pond site): $10,330 Design Fees: $1,160 Earthwork: $12,525 Construction staking: $773 Subtotal: $24,788
ESA Listed Species	San Joaquin Kit Fox – ST, FE Blunt Nosed Leopard Lizzard – SE, FE Western Snowy Plover – CSC, 2 Long Billed Curlew – CSC, 2
Mitigation Required	Restrictions on earthwork activities Kit Fox bridges over lined canal Constructed island in regulation reservoir
Time Required	CEQA Process took 4 months to complete

Table 3. Project Summary
James Irrigation District
Eastside Canal Lining

Project Purpose	Reduce seepage losses
Project Facilities	3.25 miles of 18″ to 36″ plastic pipe 11.5 miles of conc. lined canal associated water control structures
Total Project Cost	$4,250,000
Funding Sources	Proposition 82: Water Conservation and Groundwater Recharge Bond Law of 1988 and Certificates of Participation
Environmental Costs	$25,670 (0.6% of total project cost) Preparation and Processing of CEQA Documents Consulting Engineer's Fees: $7,800 Biological Consultant Fees: $13,720 Attorney's Fees: $1,000 District Costs: $600 DFG Filing Fees: $2,500 County Filing Fee: $50 Subtotal: $25,670
ESA Listed Species	Fresno Kangaroo Rat – SE, FE
Mitigation Required	Survey and trapping for kangaroo rats to verify that no listed species were present
Time Required	CEQA Process took 9 months to complete

Table 4. Project Summary
Raisin City Water District
Groundwater Recharge Project

Project Purpose	Groundwater Recharge
Project Facilities	3 miles of unlined canal 2.75 miles of 66″ cast–in–place concrete pipe 68 acre recharge basin associated water control structures
Total Project Cost	$2,400,000
Funding Source	Proposition 82: Water Conservation and Groundwater Recharge Bond Law of 1988
Environmental Costs	$28,630 (1.2% of total project cost) Preparation and Processing of CEQA Documents Consulting Engineer's Fees: $4,125 Biological Consultant's Fees: $6,600 Attorney's Fees: $400 District Costs: $600 DFG Filing Fee: $1,250 County Filing Fee: $25 Subtotal: $13,000 Construction of Mitigation Measures Alignment Change: $15,000 Post Construction Bio. Survey: $630 Subtotal: $15,630
ESA Listed Species	Fresno Kangaroo Rat – SE, FE San Joaquin Kit Fox – ST, FE Burrowing Owl – CSC
Mitigation Required	Changed canal alignment to avoid taking potential habitat. Performed 11 day scent station and 6 night spot–light survey for Kit Fox.
Time Required	CEQA Process took 18 months to complete Election has added a 6 month delay

Table 5. Project Summary
Lost Hills Water District
Evaporation Pond Improvements

Project Purpose	Meet State waste discharge requirements Reduce impacts to shorebirds Improve flexibility of pond operations
Project Facilities	Purchase 540 acres of evaporation ponds 5.25 miles subsurface interceptor drains 3 interceptor drainage sumps with pumps 89,300 cubic yards of earthwork 5 transfer structures 1 mile PVC pipe and valving
Total Project Cost	$2,670,000
Funding Sources	Proposition 44: Water Conservation and Water Quality Bond Law of 1986
Environmental Costs	$1,169,000 plus $64,000 per year Capital Costs (Estimated): Construction Improvements: $650,000 Participation in funding EIRs: $35,000 Contingency for Wildlife Mitigation Measures: $394,000 Research Projects: $90,000 Subtotal: $1,169,000 Annual Costs (Estimated): Waterfowl Monitoring and Hazing: $12,000 Water Quality and Biological Monitoring and Testing: $19,000 Administration: $5,000 Pond Levee Maintenance: $8,000 Research Budget: $20,000 Subtotal: $64,000
ESA Listed Species	Western Snowy Plover – CSC, 2 Long Billed Curlew – CSC, 2
Mitigation Required	Not determined yet
Time Required	CEQA Process took 6 months to complete 4 years to get loan approved

ORLAND-ARTOIS WATER DISTRICT ANNEXATION AND INFRASTRUCTURE EXPANSION PROJECT

Daniel Kerns[1] and Jenny Scheer[2]

ABSTRACT

The Orland-Artois Water District's Class II Lands Annexation Project is an example of an innovative and collaborative approach between a water district and surrounding agricultural landowners to address local declining groundwater levels. Orland-Artois WD (District) is a Central Valley Project water service contractor located in Glenn County, California. The District and surrounding region is primarily used for agricultural production of permanent crops such as almonds, olives, and walnuts. While the District delivers Sacramento River surface water to in-District lands, there are thousands of acres of irrigated farmland adjacent to and intermingled with the District that rely solely on groundwater for irrigation. Historical groundwater use has led to declining supplies in the region surrounding and including the District. However, in certain wet year types, there are surface water supplies available for irrigation use. This Project accomplished the annexation of approximately 10,000 acres into the District facilitating the possibility to purchase and irrigate with additional available surface water and reducing reliance on groundwater. The Project also evaluated the feasibility of using existing District infrastructure to deliver water to annexed lands and where not feasible, new infrastructure was designed to 30% completion level. The District recently applied for and received USBR WaterSMART Grant funds for design completion and construction of proposed infrastructure improvements. This presentation will discuss project concept development, policy decisions and agreements between the District and Class II landowners, benefits to the District and its existing landowners, and design process and criteria for infrastructure improvements.

INTRODUCTION

The Orland-Artois Water District (District) Infrastructure Expansion Implementation Project (Project) is located within Glenn County, California, 90 miles north of Sacramento. This project will make it possible to deliver supplemental surface water supply, through voluntary transfers, to land within the District that will result in a reduction of groundwater pumping by approximately 10,000 to 20,000 acre-feet/year. It will also allow for Central Valley Project (CVP) contract water or flood water to be delivered to a recharge basin for groundwater storage. New infrastructure will consist of 4 new turnouts off the Tehama-Colusa Canal (TCC), two booster pumps to increase flows on existing pipelines, and expansion of its buried pipeline conveyance system to deliver supplemental surface water to approximately 10,000 acres of adjacent established farmland within the United States Bureau of Reclamation's (Bureau) Central Valley Project (CVP) Place of Use (see Figure 1). This Project increases drought resiliency by providing a secondary source of water supply for 10,000 acres of land which provides flexibility, decreasing groundwater pumping in normal to wet years which ensures groundwater supplies will be available in dry years, and increasing groundwater supplies through groundwater recharge. California recently experienced consecutive years of drought. These dry years caused groundwater levels to decline, had negative impacts on household wells, and are threatening the nearby infrastructure of the TCC and Interstate Highway 5. This project aligns with the goals of multiple local and regional water management plans to address water resiliency such as the District's Ag Water Management Plan, the Colusa Subbasin Groundwater Sustainability Plan, and the North Sacramento Valley Integrated Regional Water Management Plan. The project has the support of the landowners, the City of Orland, Artois Community Services District, Colusa Basin Drainage District, Glenn County Board of Supervisors, Glenn Groundwater Authority, Tehama- Colusa Canal Authority, and North Valley Community Foundation.

BACKGROUND & NEED

The District was formed in 1954 and began water deliveries in 1977. Today the District serves approximately 29,664 acres. The District is a CVP contractor whose water originates in the Sacramento River, is stored behind Shasta Dam and is conveyed to Glenn County via the TCC before entering the District's distribution system.

[1] Senior Engineer, Provost and Pritchard Consulting Group, dkerns@ppeng.com
[2] Ag Water Specialist, Water & Land Solutions, jscheer@waterandlandsolutions.com

Continued on page 27

Orland-Artois Water District Annexation and Infrastructure Expansion Project

(Continued)

The District has a CVP contract with the Bureau for 53,000 acre-feet (AF) annually. Additionally, the District contracts with local landowners and water districts for another 10,000 AF of transfer water each year and has two groundwater wells. The amount of available deliverable water can be reduced in drought years. The 10- year average annual water supply is 38,090 acre-feet, which includes four years of 0% allocation due to droughts in 2014, 2015, 2021, and 2022. In unconstrained years, the total amount of available water is 63,000 acre-feet per year (AF/YR). In the ten years from 2013 to 2022, the District delivered an average of 39,617 AF in years when their CVP allocation was greater than 0%. Thus, in years when the District receives water from the Central Valley Project, they have over 23,000 acre-feet of unused water that would be available to newly annexed lands.

Because the District historically has excess supplies in average to wet years, infrastructure improvements to deliver water to newly annexed lands will enable the District to beneficially use their full CVP contract water while protecting local groundwater supplies. By constructing new water distribution infrastructure and improving existing conveyance capacity, this Project will allow for an additional 10,000 acres of newly annexed established farmland to access supplemental surface water supplies. Newly annexed lands will have access to annual excess CVP supplies, CVP transfers, or other non-project water that will be conveyed by the TCC. This project does not put new land into agricultural production.

The annexation of this land provides established farmland with an alternative source of irrigation water other than groundwater to support long-term sustainability and drought resiliency. 95% of the newly annexed lands are planted to tree crops, which cannot be fallowed and require water every year regardless of water year type. This Project will build drought resiliency by supplying 10,000 to 20,000 AF of surface water each year to these lands, which will reduce groundwater pumping by an equal amount and protect groundwater supplies for use during dry years when District surface water is not available. This offset of groundwater pumping within the District boundary will benefit all District landowners and groundwater users in the surrounding area.

Offsetting groundwater pumping and undertaking groundwater recharge will allow the Colusa Subbasin groundwater basin to meet its goals and objectives of groundwater sustainability by Water Year 2042 as mandated within California's Sustainable Groundwater Management Act (SGMA). The District has taken a leadership role in effectively managing the local groundwater resources that they and their current landowners conjunctively manage to sustain agricultural production in Northern California. Implementation of this Project will allow for management of an additional 10,000 acres that are currently outside of the District boundary and solely rely on groundwater to meet crop demand.

The newly annexed landowner group, in conjunction with the District, has already made a substantial investment to see this Project come to fruition. Roughly $1 million was spent by the landowners for design, environmental documentation, agency reviews, and project management to complete the annexation.

Uncertainty in surface water deliveries has increased significantly since the District first received water from Reclamation's CVP over four decades ago. Groundwater pumping increases when surface water deliveries are curtailed in an area dominated by permanent plantings of orchards. Farmers in the Orland-Artois area are facing a dual threat of smaller and less frequent surface water allocations and declining groundwater levels. This Project helps ensure two sources of water for thousands of acres and a multitude of families. For orchards that are currently irrigated with only groundwater, they gain access to surface water. For their neighbors who are already in the District, groundwater supply reliability is increased by decreasing groundwater pumping in Normal to Wet years on Project lands.

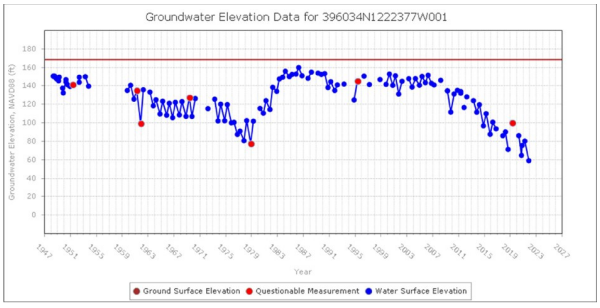
To comply with temperature and flow requirements to protect endangered fish, in recent years Reclamation has been unable to deliver historical levels of water to their water service contractors like the District. More water needs to remain behind the dam at the CVP's Lake Shasta to keep water temperatures lower for migrating salmon and other species. This effectively shrinks the capacity of Lake Shasta, California's largest reservoir. At the same time, minimum flows required to be released into the Sacramento River out of Lake Shasta have increased, so the lake is draining faster each year. Taken together, these operational restraints have seriously hampered

Continued on next page

surface water deliveries. In the decade from 2014-2023, CVP allocations for the District averaged 56%. The decade prior, from 2004-2013, allocations averaged 86%, a full 30 percentage points higher.

Droughts make matters worse and California experienced five years of serious drought in the decade from 2014-2023 and 2020-2022 was the driest three-year period on record in California. Unfortunately, California's climate is notoriously variable and highly susceptible to droughts. Climate change is expected to exacerbate this feature, resulting in wetter wet years and dryer dry years as well as longer stretches of dry years. Reservoirs help buffer the effects of drought by carrying over water supplies from wet years to dry years. However, given the restrictions in place for California's reservoir operations, their benefits have become more limited, and farmers have become more vulnerable to California's yo-yo weather patterns.

Under SGMA, there has been an increased emphasis on fully utilizing available surface water supplies. As groundwater pumping becomes less certain, surface water supplies are increasingly sought to maintain current levels of agricultural production. The graph below shows just how valuable surface water supplies are for protecting groundwater. As shown below, groundwater levels were slowly declining from 1950 to 1980, particularly in the drought years of 1977-1978. Groundwater levels began to rise with the introduction of surface water supplies in the region from the Tehama-Colusa Canal, as groundwater pumping was curtailed in lieu of surface water and flood irrigation helped aquifers recharge. However, after about 30 years of stability from the early 1980s to the late 2000s, groundwater levels began to decline again, and at an even faster rate. At the well shown on the hydrograph, groundwater levels are now at an all-time low.



Since 2010, there has been a shift toward a preference for groundwater supplies among local farmers, as shown on the well hydrograph, which has been driven by surface water supply uncertainty, efficient irrigation systems such as drip and micro sprinklers that many feel are better suited to groundwater, a concern about phytophthora in surface water supplies among orchardists, and the lower cost of groundwater relative to surface water. In the decade from 2000 to 2009, the District delivered an average of 54,718 acre-feet in 100% allocation years. In the following decade from 2010 to 2019, the District delivered an average of 40,422 in 100% allocation years. To increase surface water deliveries and reduce groundwater pumping, the District is annexing 10,000 acres with landowners eager to use surface water.

When more groundwater is pumped from an aquifer than enters the aquifer in a given period of time, the aquifer is in overdraft. Average annual overdraft in the immediate vicinity of the District has been estimated at 2,900 AF. This number was developed using the C2VSimFG-Colusa groundwater model developed for preparation of the Colusa Subbasin GSP. Cumulative overdraft from 1990-2015 was 74,600 AF in the District area.

Dry wells and land subsidence reflect a trend of declining groundwater levels exacerbated by drought. From spring 2020 to fall 2022, 279 dry wells were self-reported in Glenn County, California. These all represent households and farms who have been negatively affected by groundwater overdraft. In the disadvantaged city of Orland, a municipal well went dry within city limits and hundreds of households were affected in the surrounding unincorporated area. The City of Orland received a grant from the California Department of Water Resources to extend its water delivery pipelines into the unincorporated area to serve 190 of these households. The Artois Community Services District received a similar grant to extend water service to 25 households. Both projects help households access deeper public supply wells, however, they do not reduce overall groundwater use since the City of Orland and the community of Artois use groundwater for their sole source of water supply. On the contrary, this Project would bring additional water supplies into the area and offset groundwater use with surface water use.

Continued on next page

Orland-Artois Water District Annexation and Infrastructure Expansion Project

(Continued)

By reducing groundwater demand, this Project will increase groundwater levels and groundwater storage in the Orland/Artois area where 14,000 people are solely dependent on groundwater. This will decrease the likelihood that other Glenn County residents will face the hardship that hundreds of their neighbors recently faced when their wells went dry. Dry wells lead to great challenges in the affordability and accessibility of water as homeowners fill tanks with hauled water for hygiene and sanitation and buy bottled water for drinking and cooking.

Land subsidence in the District service area was measured at 0.6 feet (7.2 inches) per year in the five-year period June 2015 to June 2020 by InSAR (Interferometric Synthetic Aperture Radar) (see same map). The Tehama-Colusa Canal, Interstate 5, and the Union Pacific Railroad run through the Project area and are threatened by land subsidence, as are the City of Orland's water supply and wastewater pipelines.

The Project is one of just a handful of projects described in detail in the Colusa Subbasin GSP and is included as a Project and Management Action. The Colusa GSP covers the 1,130 square mile (733,000-acre) Colusa groundwater subbasin in Colusa and Glenn counties in Northern California and is the largest groundwater subbasin in California's Sacramento Valley. Although projects are not ranked in the GSP, this project was recently ranked by the two groundwater sustainability agencies in the Colusa Subbasin as the second most important implementation project and was characterized thus:

"*This project is a priority for the Colusa Subbasin because it provides significant near- and long-term benefits to raise groundwater levels, re-water domestic wells, and reduce land subsidence. Without this keystone conjunctive use project, it will be difficult to stabilize groundwater levels in the area and achieve groundwater sustainability in the largest subbasin in the Sacramento Valley. If this project had been in place 10 years ago, this area would not have experienced such*

Continued on next page

groundwater decline and its attendant negative impacts. The Project helps the Colusa Subbasin address groundwater challenges related to three undesirable results: declining groundwater levels, land subsidence, and reduction of groundwater storage as well as address impacts to domestic wells, which is a major goal of California's Sustainable Groundwater Management Act [SGMA]."

GROUNDWATER RECHARGE

The Project will also include a new connection to an existing basin within and adjacent to the District's boundary for the benefit of replenishing the groundwater aquifer through managed groundwater recharge. The basin cannot currently receive water, but deliveries on a new pipeline will enable recharge of voluntary transfer water, excess flood water, and excess District CVP supplies.

The site is an existing basin that is the result of gravel removal for building the railroad and Interstate 5 and does not require additional excavation. The basin had a Feasibility and Preliminary Design Report prepared to evaluate groundwater recharge potential. According to that study, "the basin was quarried to a depth of 15 to 25 feet below ground surface and the bottom area of the basin encompasses about 20 acres. The total design volume capacity of the basin is about 200 acre-feet."

In the event of excess storm water in wet years this new infrastructure can be used to convey flood water via the Bureau's 3F floodwater provisions in the newly approved WIIN Act contract with the District. This Project will create a conjunctive use program designed to increase surface water supplies, improve water management operational flexibility, sustain local groundwater levels, improve District operational efficiencies, and achieve long-term sustainability goals for all users within the District boundary. Conjunctive use provides drought resiliency for District water users because they can use District surface water in normal to wet years and rely on groundwater in dry years.

As groundwater levels have declined in Glenn County due to recent droughts and lack of access to surface water, the impacts have included hundreds of domestic (household) wells that have gone dry and land subsidence that threatens the Bureau's TCC and the State of California's Interstate 5. Management of recharge basins connected by this Project will speed up the recovery of groundwater levels, re-water domestic wells, and reduce land subsidence as they all share connectivity within the same groundwater aquifer.

ENGINEERING

Designs are based on topographical site surveys completed in October and November 2022 and March 2023. For each site, a local title company provided conditional title reports, which were reviewed by a registered land surveyor who mapped all easements in the path of new infrastructure to ensure there would be no conflicts with existing infrastructure including electrical and telecommunications.

Hydraulic analyses were prepared for 3 of the District's 5 laterals using computer modeling of the District's existing water delivery system to determine available capacity in existing pipelines and identify areas where new infrastructure is needed. Designs are based on projected peak demands, which are calculated using historical data and increasing future demand by 30%. The 30% demand increase is based on a survey mailed to District landowners where landowners reported they expect to increase their use of District water by 30% over the next 5 years in order to reduce reliance on groundwater.

The project includes 2 phases, with the first phase consisting of infrastructure that is lower cost per acre and can be implemented more quickly, and a second phase of higher cost infrastructure that can only be completed with assistance from grant funds. Construction is expected to last approximately 21 months. The project timeline was extended to 36 months to allow for all required reviews and approvals in addition to any potential weather delays during construction. Refer to Figure 2 for proposed infrastructure locations.

Phase I components:

33.6E Extension – Extend the pipeline with an additional 1,500 feet of new pipe to serve two additional landowners with two 10-inch farm turnouts and two road crossings. A new easement will be granted for the 1,500 feet of new pipe. The new easement will be granted by one of the landowners at no cost to the project.

0.6 Booster Pump – Install a 90-horsepower (HP) booster pump on an existing Reclamation-owned pipeline (OAWD sublateral 35.2-0.6) to increase flow from seventeen cubic-feet-per second (CFS)

Continued on next page

to thirty CFS. The booster pump provides more pressure and velocity to deliver supplemental surface water to 1,800 acres of newly annexed lands. Adding a booster pump on an existing pipeline is an economical and environmentally neutral way to increase acreage served while avoiding the larger cost and greater disturbance that would be required from a new pipeline. An easement will be granted by one of the landowners served by the extension at no cost to the project. Booster pump designs include a fenced gravel area surrounding the pump that is large enough for a crane to enter for maintenance and repair of the pump.

Hart 342 Tie-in – Approximately 81 feet of 12-inch PVC pipe connecting into an existing Reclamation-owned pipeline (OAWD Lateral 41.2) with a 12-inch on-farm turnout, and one road crossing of a county-owned gravel road. No easements are needed, as all work will be in the existing USBR right-of-way or on the annexing property.

Knight 27 Tie-in – One connection to an existing Reclamation-owned pipeline (OAWD Lateral 35.2) with 291 feet of 14-inch PVC pipe and one 14-inch farm turnout. The infrastructure includes one road crossing and .02 acres of easement acquisition. The easement will be granted by a neighboring landowner who is also involved in the project.

Knight 33 Tie-in – One connection to existing Reclamation-owned pipeline (OAWD Lateral 41.2) with 184 feet of 14-inch PVC pipe and one 14-inch farm turnout. An easement of 0.1 acres will be granted by a neighboring landowner.

33.6N Tie-in – One connection to existing Reclamation-owned pipe (OAWD Lateral 33.6) with 55 feet of 8- inch PVC pipe and one 8-inch farm turnout. One road crossing is needed, and no easements are needed since all work will be in existing USBR right-of- way or on the annexing property.

Phase II components:

99W Pipeline – One all new lateral to serve lands in an area where no existing District water delivery system exists. The lateral begins with a 75-horsepower pump on the Tehama-Colusa Canal. The pump discharges into a pipeline that begins with 9,668 feet of 24-inch PVC pipe, reduces to 18-inch PVC pipe after the first on-farm outlets and continues an additional 5,402 feet before reducing further to 10-inch PVC pipe the last 237 feet of the pipeline to serve the final on-farm outlets. An additional 291 feet of PVC pipe of varying sizes is needed for the on-farm outlets, bringing the total length of pipe to 15,598 linear feet. The pipeline includes 6 new on-farm turnouts for irrigation (ranging from 8-inch to 14-inch outlets) and two new turnouts to deliver water to existing basins for groundwater recharge. 6 road crossings are needed along with a 0.93-acre easement from a neighboring landowner. All other easements needed will be granted at no cost by landowners served by the pipeline.

2.6 Booster Pump – Install a 70-horsepower booster pump on Reclamation-owned OAWD sublateral 35.2-2.6- 2.0LT to add 20 feet of head at 22 CFS to serve four properties downstream. The booster pump design includes a small, fenced gravel area surrounding the pump. Crane access for maintenance and repair of the pump will be provided on the adjacent private road. An easement will be granted by a neighboring landowner.

The proposed infrastructure would be constructed on either newly annexed private landowners' property, existing District landowners' property, Reclamation land adjacent to the TCC, on other private lands, and adjacent to and across several Glenn County roads. Spoil from excavation will be managed on site and used as pipe backfill. No spoiled material will be exported. Pipeline diameters will range from eight (8) to thirty (30) inches. Steel casing pipe will be used in areas where the exposed pipe passes through the TCC bank. The maximum depth of ground disturbance for pipelines and farm turnouts will be nine (9) feet, while the booster pump stations would have a maximum depth of eighteen (18) feet.

Planning for the OAWD Infrastructure Expansion Project began in February 2020 and all work to date has been entirely funded by private landowners whose lands would be served by the expanded infrastructure. Extensive infrastructure feasibility analysis has been completed including evaluating alternative alignments, locating existing electrical utilities to serve new pumps, determining the amount of flow each property needs, and consulting with Reclamation and the Tehama-Colusa Canal Authority on design requirements. Existing site-specific 30% engineering designs have been completed for all infrastructure expansion sites in the Project. These plans were developed to be consistent with

Continued on next page

USBR As-Built plans for the Reclamation-owned Tehama-Colusa Canal and the existing Reclamation-owned OAWD distribution system. All designs for improvements to Federal facilities undergo engineering design review by Reclamation through MP-620 forms (Request for Review and Acceptance of Design Drawings and Specifications) and a license request for the new pump on the Tehama-Colusa Canal. The Tehama-Colusa Canal Authority, which operates and maintains the TCC, will also review the designs.

An extensive hydraulic analysis was developed for the District's Lateral 35.2, which identified two locations for booster pumps to be installed to increase flow in the existing system and thereby increase the flow that can be delivered to serve additional acreage. This hydraulic analysis was even peer-reviewed by another local engineering consulting firm who concurred with the findings of the consulting engineers. Hydraulic analyses were also prepared by the consulting engineers for Lateral 33.6, which identified a pipeline extension to serve annexed lands, and for Lateral 41.2, which identified sufficient capacity to serve 2 new on-farm outlets.

Site topographical surveys have been completed and title reports have been reviewed to identify and address other easements or infrastructure that could impede plans for infrastructure expansion. This work generated the necessary inputs to develop 30% designs which were submitted to the Bureau for engineering review. Designs are now proceeding to 60% for Phase 1 projects.

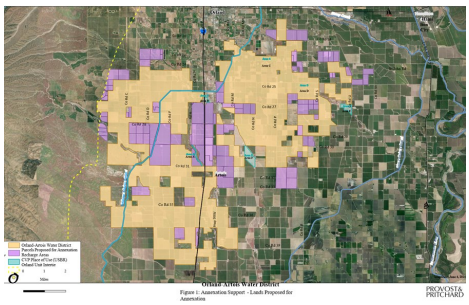
Easements are needed on 3 parcels outside the lands owned by the District or Project proponents on a total area of 1.13 acres. Landowners have been approached at all three parcels and negotiations with private landowners have resulted in verbal agreements for all easements needed for infrastructure expansion. All easements will be granted to the District.

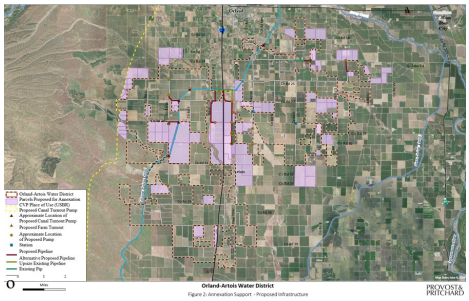
MEASUREMENT

The Project benefits will all be quantifiable utilizing metered diversions and monitored groundwater elevations. This new data will be compared to historical data to substantiate the Project's benefits. The information will be accessible to the public on the Orland-Artois Water District website under "District Projects".

These benefits will be quantified in the following manners:

- All new Project TCC turnouts will be metered
- All new Project field level turnouts will be metered
- The new connection to the recharge facility will be metered
- The new recharge facility will incorporate additional groundwater monitoring wells located adjacent to the basins.
- All current groundwater monitoring wells will continue to be monitored, measured, and recorded, both within the District boundary and the Colusa subbasin
- All supplemental voluntary water transfers will be duly agreed upon and approved by the various agencies (Bureau, TCCA, and the District) and documented in contract form and in board meeting minutes.
- The District's annual water budgets will be amended to show annual water use projections and actual deliveries through the newly constructed Project facilities.
- The District will continue to improve their website, www.oawd.com, to allow the District landowners, water users and members of the public access to all recorded data.
- The District will work closely with the Glenn Groundwater Authority to share all common groundwater elevation data and updated District water balance information to comply with SGMA goals and objectives.





CAL POLY
Irrigation Training & Research Center

Professional Education Opportunities at ITRC 2025

www.itrc.org

Winter 2025

ITRC

Flow Measurement – January 8-10, 2025
February 26-28, 2025
(8 am - 5 pm)

Sponsor: USBR California-Great Basin Region

ITRC is providing several training and educational opportunities for staff, engineers, and water operators of agricultural irrigation districts. These classes utilize the excellent indoor and outdoor facilities at ITRC.

Chico

Flow Measurement – *February 18-20, 2025*
(9 am - 4 pm)
Sponsor: USBR California-Great Basin Region

Provided in cooperation with Chico Farm, this annual flow measurement and canal operation training covers topics including: flow measurement details such as how to properly use a meter gate, how to get more water through various structures, and an introduction to SCADA.

ITRC

Pumps (for Irrigation Districts) – February 5-7, 2025
(8 am – 5 pm)

Sponsor: USBR California-Great Basin Region

Pumps topics covered include types; terms; curves; pumps in series and parallel; system curves; TDH computations; efficiency; WHP, BHP, input HP; pump selection; common pump questions and answers.

ITRC

SCADA (for Irrigation Districts) – FULL for 2025
(8 am - 5 pm)

Sponsor: USBR California-Great Basin Region

This course provides an overview of SCADA systems, starting with electric and electronic fundamentals and moving on to typical technician role and responsibilities.

Spring and Summer 2025

ITRC

Certified Irrigator Program
Training for ITRC Certified Irrigator
(8 am - 5 pm)

Sponsor: CDFA WETA

Certified Irrigator I
Focuses on the basics of irrigation.

Certified Irrigator I (English with Spanish translation)
March 11-12, 2025
August 2025

Certified Irrigator II
Covers basic pipeline hydraulics, irrigation efficiency, salinity management for drip/micro and drainage and freeze protection.

Certified Irrigator II (English with Spanish translation)
March 13-14, 2025
August 2025

Exam administered after class.

ITRC

Ag Irrigation System Evaluation Short Course 2025
Training for ITRC Certified Evaluator
Sponsor: DWR

ISE I: Theory and Laboratory Practice of Evaluations.
This 2½-day course will be held **June 16-18, 2025.** The class combines classroom (50%) and outdoor laboratory (50%) activities.

ISE II: Field Evaluations of Drip/Micro Systems
This 2½-day class, held on **June 23-25, 2025**, travels to the San Joaquin Valley and performs the entire evaluations on 2 fields.

Exam administered after class.

CHICO

Ag Irrigation System Evaluation
Training for ITRC Certified Evaluator
***May 20-22, 2025** (9 am - 4 pm)*

Sponsor: DWR

This comprehensive 3-day class combines classroom (50%) and outdoor laboratory (50%) activities. The techniques and programs covered are the standard used for DWR-funded evaluation projects throughout California.

ITRC

Designer/Manager School of Irrigation
(8 am - 5 pm)

The Designer/Manger School is a comprehensive educational program offering a variety of classes designed for agricultural irrigation professionals. See http://www.itrc.org/classes/desmgr.htm for details.

Irrigation Scheduling — **July/August 2025**
Training for IA Certified Ag Irrigation Specialist
Soil texture and structure, water holding capacity, retention, intake rates, evaporation, transpiration, soil classification, measurement of soil moisture and tension, ETo and crop coefficients. *Exam administered after class.*

Pipeline Hydraulics — **July/August 2025**
Pipe material & sizes, energy equation, friction, elevation changes, and basic spreadsheet operations.

Pumps — **July/August 2025**
Pumps topics covered include types; terms; curves; pumps in series and parallel; system curves; TDH computations; efficiency; WHP, BHP, input HP; pump selection; trimming impellers; common pump questions and answers.

Row Crop Drip Irrigation — **July/August 2025**
Design layouts, flushing, fittings, how design relates to management, hose installation, retrieval.

Drip/Micro Irrigation Design — **July/August 2025**
Training for IA Certified Irrigation Designer
Filtration, step-by-step design procedure of hardware selection and hydraulics, drip/micro system design, SDI for trees and vines, plugging prevention. *Exam administered after class.*

ONLINE

Fertigation
Training for ITRC Certified Fertigator
Online class available now!
Sponsor: CDFA FREP

The class will cover new techniques in the control and application of fertilizers through irrigation systems and strategies to conform with the intent of the new nitrogen regulations in California. Increasing yields per acre-foot of evapotranspiration (ET) through better fertility management, will also be discussed – a key topic for California growers. *Exam administered after class.*

USCID

1521 I Street
Sacramento, CA 95814
(916) 441-1064
www.uscid.org

The United States Committee on Irrigation and Drainage is a National Committee of the International Commission on Irrigation and Drainage.

Executive Director
Jane Townsend, jane@agamsi.com

Associate Director
Megan Corcoran, megan@agamsi.com

Sustaining Member
Bureau of Reclamation

2025
USCID Conference
RENO, NEVADA
October 20-23, 2025

Corporate Members

Advanced Drainage Systems
Aqua Systems 2000 Inc.
Davids Engineering, Inc.
Eagle-Spec Sales Group
GEI Consultants, Inc.
Geosyntec Consultants, Inc.
HDR, Inc.
In-Situ Inc.
International Water Screens
Jacobs Engineering
Kjeldsen, Sinnock & Neudeck Inc.
Land IQ
Larry Walker Associates
MBK Engineers
Provost & Pritchard
Rubicon Water
Saturas USA Inc.
Sierra Controls, LLC
Summers Engineering, Inc.
Teledyne RD Instruments, Inc.
Watervize
WEST Consultants, Inc.

Water District Members

Glenn-Colusa Irrigation District
Greenfields Irrigation District
Henry Miller Reclamation Dist. #2131
Imperial Irrigation District
Lower Colorado River Authority
Merced Irrigation District
Middle Rio Grande Conservancy District
Modesto Irrigation District
Northern Colorado WCD
Oakdale Irrigation District
Pershing County WCD
South San Joaquin Irrigation Dist.
Stockton East Water District
Turlock Irrigation District
Uncompahgre Valley WUA
Upper Arkansas WCD
Weber Basin Water District
White River Irrigation District

Institutional Members

American Academy of Water Resource Engineers
Colorado Water Center
Daugherty Water for Food Global Institute
Irrigation Training & Research Center

Mission Statement

The mission of USCID is to promote progressive and sustainable irrigation, drainage and flood control practices in support of food and fiber production and public safety, recognizing that sustainability embodies economic, social and environmental goals.

USCID Newsletter and Membership

The *USCID Newsletter* is published by ITRC for USCID members. News items and technical articles of interest to the irrigation community are invited. Membership information is available on the USCID website www.uscid.org