Meeting: **Reservoir Committee & Authority Board Agenda Item 7.2** **August 21, 2026**

Subject: **Update on Glenn-Colusa Irrigation District and Tehama-Colusa Canal Authority Facilities Use Agreements**

Requested Action:

Receive a status update on the Facilities Use Agreements with Glenn Colusa Irrigation District (GCID) and Tehama-Colusa Canal Authority (TCCA) and review draft technical memoranda describing operations, maintenance, and replacement activities.

Detailed Description/Background:

Draft Facilities Use Agreements with GCID and TCCA were included in the June 2026 Board packet for Participant reference during review of the updated draft contract documents. The Facilities Use Agreements have been negotiated among staff but have not yet been presented to the GCID and TCCA boards in open session for consideration of approval. This affords the opportunity to further consider the capacity and maintenance concerns that some Participants have asked to be reviewed and to identify any remaining issues or concerns of Participants to be addressed before both agreements are finalized.

Capacity and Maintenance Concerns

The Sites Authority has worked with GCID and TCCA to cooperatively develop technical memoranda (TM) describing the operations, maintenance, and replacement (OM&R) activities associated with the major components of each water delivery system and to document the conveyance capacities of each system. The attached documents (Attachment A: Draft GCID OM&R Technical Memorandum and Attachment B: Draft TCCA OM&R Technical Memorandum) are intended to provide an overview of current OM&R and conveyance capacities. Developed in collaboration with GCID and TCCA staff, these memoranda are not intended to direct the OM&R practices for the existing facilities. Instead, these OM&R TMs are intended to describe current conditions and how the Sites Project can be accommodated within the existing practices.

The OM&R TMs also document that hydraulic capacity is available in the GCID and TCCA systems for conveyance of Sites water. For the TCCA system, the modeled hydraulic capacity of the system shows that there is availability for Sites diversions and releases in all months of planned Sites operations. For the GCID system, the modeled hydraulic capacity is available for diversions until GCID irrigation begins to increase in late April through June. Additional coordination is still needed between the Sites Authority and the GCID and TCCA around maintenance shutdown windows

and the coordination of shoulder season diversions when irrigation operations are beginning to ramp up.

Staff believe a workable approach for integrating the TMs with the FUAs is to follow a similar approach to that which was successfully used with the "White Paper" in the Sites-DWR-Reclamation Agreement to Coordinate the Operations of Sites Reservoir. In that case, the "White Paper" describes the Parties mutual understanding at the time of the Agreement how current operating conditions would be examined if Sites was in place today. This is very similar to the information provided in the TMs. The "white paper" serves to inform future collaboration as things change. The TMs could serve the same purpose. The Agreement itself is adhered to at all times; same for the FUAs; and a re-examination of then current circumstances would occur at the time of initiating operations for the "white paper" and the TMs. This approach gives all parties i) near-term assurances that the current circumstances are manageable and ii) that future changes affecting the operations will be navigated cooperatively and be evaluated with all the parties at the table at a starting place of like-mind.

Affirmation of Board negotiating parameters

The Board established negotiating parameters for these agreements in December 2020 and reaffirmed those parameters during a November 2022 update. In February 2023, the Sites Authority executed a Cooperative Agreement with GCID and TCCA that established both a framework for the future use of partner facilities and a process for negotiating the Facilities Use Agreements. To support those negotiations, the Sites Authority retained Water Resources Economics to work collaboratively with Sites Authority, GCID, and TCCA staff to evaluate wheeling rates and develop a recommended methodology for determining compensation for the use of shared conveyance facilities. This effort was completed in December 2024.

At this meeting, staff will summarize how the negotiating parameters have been addressed in the current drafts of the Facilities Use Agreements. Staff will also seek direction on any remaining principles or provisions that should be considered before the agreements are brought back for approval next month.

Prior Action:

June 2026 – Receive a status update on the Facilities Use Agreements with Glenn Colusa Irrigation District (GCID) and Tehama-Colusa Canal Authority (TCCA).

Fiscal Impact/Funding Source:

Negotiation of both Facilities Use Agreements is to be conducted within the budgeted funds currently authorized by the Board.

There is an attachment in both agreements that describes the methodology previously determined for setting rates and charges by the non-Federal Operating Entity. While the exact amounts have not yet been determined, current estimates

that have been discussed are in the range of $10-30/af (2026 dollars), which is consistent with prior versions of the Plan of Finance. The rates would be set such that diversions and releases constitute an independent proportionate share of the existing O&M for the reaches of Canal in use.

Staff Contact:

JP Robinette

Primary Service Provider:

Nossaman / Brown and Caldwell

Attachments:

Attachment A – Draft GCID OM&R Technical Memorandum

Attachment B – Draft TCCA OM&R Technical Memorandum

Glenn-Colusa Irrigation District Facility Operations, Maintenance, and Replacement

Draft Technical Memorandum

To:	Sites Project Authority
CC:	Rob Natoli, P.E./Sites
Date:	August 6, 2026
From:	Brad Memeo, P.E./Jacobs
Quality Review:	Peter Rude, P.E./Jacobs
GCID Review:	Jeff Sutton, Brad Mattson, Ed Henderson, Chris Cesa
Authority Agent Review:	Reviewer
Subject:	GCID OM&R

Executive Summary

The purpose of this technical memorandum (TM) is to describe the inspection, operation, maintenance, and replacement (OM&R) activities associated with the major components of the Glenn-Colusa Irrigation District (GCID) water delivery system. This TM is intended to provide an overview of existing OM&R practices and activities and is not intended to serve as a detailed OM&R manual for the existing facilities.

The Sites Project Authority is currently developing the proposed off-stream storage reservoir known as Sites Reservoir, located approximately 10 miles west of Maxwell, California, near the community of Sites. The reservoir would be filled primarily through diversions of winter floodwaters from the Sacramento River. The capacity of existing conveyance facilities, including the GCID water delivery system to safely convey these winter flows, is an important component. Figure 1 shows the complete process flow diagram for the Sites Project with the GCID facilities highlighted.

The GCID system includes the Hamilton City Pumping Plant and Fish Screen, approximately 65 miles of Main Canal and an extensive network of canals, laterals, and drains that deliver water to agricultural users and wildlife refuges throughout the region. The Sites Reservoir Project would use portions of this existing infrastructure to divert Sacramento River water during winter high-flow periods, conveying water through the Main Canal to the proposed Terminal Regulating Reservoir near canal Mile Post 41.3.

The GCID Main Canal is typically dewatered and taken out of service for approximately 6 weeks each year, generally from early January through late February, to facilitate routine inspection, maintenance, and repair activities. As operations of the Sites Project are initiated, GCID will strive to shorten this inspection/maintenance window for the facilities used by the Sites Project to 3 weeks and to prioritize such work, when feasible, to periods when Sites is not able to divert. Use of the Sites fund for expediting

winter maintenance of Partner Facilities will be relied upon to achieve this goal when circumstances merit.

GCID commits to make best efforts regarding planning for such inspection/maintenance shutdown periods and the timing thereof to maximize opportunities for diversions and conveyance of water to Sites. However, GCID will be sole arbiter of the timing and duration of necessary inspection/maintenance periods, which will be determined by GCID based on the amount, nature, and duration of work necessary; the windows of opportunity to conduct such work; and other relevant details that will define the circumstance. GCID commits to make best efforts to coordinate such needs and activities with the Sites Project Joint Powers Authority. Under no circumstance will GCID be held responsible or liable in any manner for reductions in water quantity or foregone diversion opportunities for Sites deliveries associated with GCID's determination regarding the need, timing, or duration of such inspection/maintenance shutdown periods.

The Sites Project team extends its appreciation to GCID for its valuable collaboration in the preparation of this document, including providing and reviewing the information contained herein and verifying that the compiled information is reasonable and accurate.

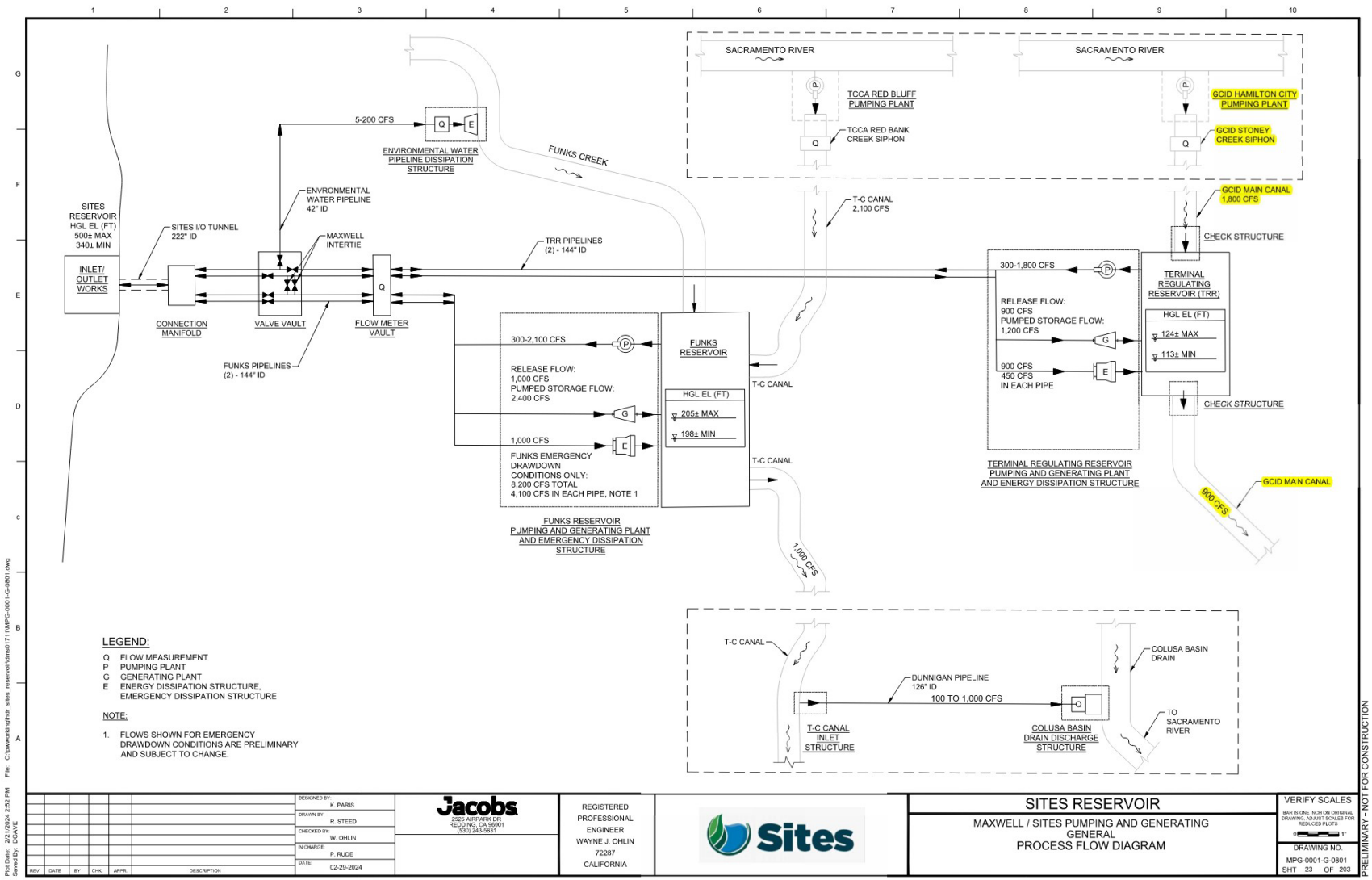

Figure 1. GCID and Sites Project Facilities Process Flow Diagram (Jacobs 2026)

1.0 Brief Description of GCID System

The Glenn-Colusa Irrigation District (GCID) is the largest irrigation district in California's Sacramento Valley, serving approximately 175,000 acres in Glenn and Colusa Counties. Organized in 1920, the GCID holds some of the oldest and largest water rights on the Sacramento River, with origins dating to 1883. GCID diverts water from the Sacramento River at its Hamilton City Pumping Plant (HCPP) and delivers it through a 65-mile Main Canal and an extensive network of canals, laterals, and drains that support a diverse agricultural economy, including rice, orchards, tomatoes, and other crops. GCID is also responsible for supplying water to three wildlife refuges that provide habitat for waterfowl, shorebirds, and numerous threatened and endangered species.

The HCPP is located on an oxbow of the Sacramento River at River Mile 206, approximately 100 miles north of Sacramento, California. The oxbow is a natural feature of the river that has been maintained by the GCID as part of its water diversion and conveyance operations.

A River Gradient Facility was constructed across the main stem of the Sacramento River at the upstream end of Montgomery Island to confirm that the fish-screening facility would operate as designed throughout the life of the project. The gradient facility is configured to provide (1) sufficient hydraulic head and flow through the oxbow, and (2) adequate water depth at the fish screens. An adjustable water-control weir located downstream of the fish screens allows for regulation of open-channel bypass flows and maintenance of the required screen submergence levels.

The facilities are designed to enable the HCPP to divert up to 3,000 cubic feet per second (cfs) from the Sacramento River when upstream river flows are as low as 7,000 cfs at the entrance to the oxbow.

Figure 2 shows the primary river diversion facilities. General descriptions of each facility are provided in the following subsections.

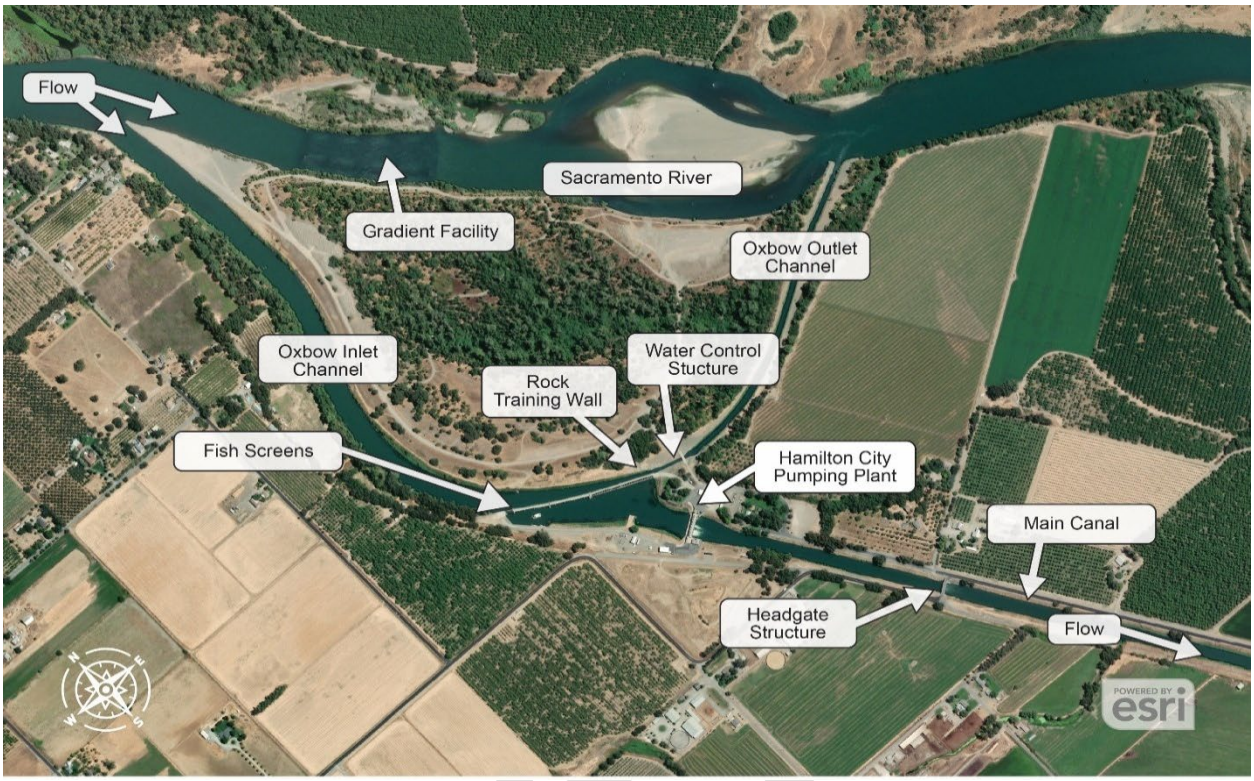

Figure 2. GCID HCPP Diversion Facility

1.1 GCID Oxbow, Fish Screen, Forebay, and Pumping Plant

The oxbow consists of four primary components:

- The upstream oxbow channel, which conveys flow from the Sacramento River
- A training wall, which directs and controls flow within the oxbow
- The water-control structure, which regulates water surface elevations and flow conditions
- The bypass channel, which conveys bypass flows downstream and provides a route for fish passage around the screening facility

The fish screen structure was designed to divert 3,000 cfs while meeting the maximum approach velocity criterion for salmonid fry in streams and rivers of 0.33 foot per second. The facility includes three bypass bays that are no longer operational according to an agreement with state and federal fishery agencies—one within the original screen structure and two within the extended screen structure—as well as a dedicated passage bay for dredging equipment.

The deck elevation of the extended fish screen structure was set to match the deck elevation of the existing screen structure. Both decks are subject to overtopping during Sacramento River flows exceeding approximately 110,000 cfs. Such high-flow events, when they occur, are most likely during the winter season with a duration of a few hours to a few days.

The fish screens are cleaned by eight mechanical screen sweeps, with four sweeps serving the original fish screen structure and four serving the extended fish screen structure. Currently, the fish screen cleaner cannot be operated in high flows exceeding 20,000 cfs.

The Forebay, located downstream of the fish screen structure, functions as a sediment settling area and provides uniform flow conditions to the HCPP. The Forebay encompasses approximately 5.5 acres and accumulates sediment transported from the Sacramento River.

The HCPP consists of 10 medium-voltage synchronous motors operating at 2,300 volts; these motors power vertical axial-flow pumps with a combined design pumping capacity of 3,000 cfs. The horsepower rating and flow capacity of each pumping unit are summarized in Table 1. The HCPP motors have been in service for approximately 42 years. To maintain long-term reliability and operational performance, GCID has implemented a motor rehabilitation program that includes rewinding the existing motors. Since 2016, all 10 motors have been refurbished as part of this effort. In addition, infrared inspection ports have been installed on each motor terminal box.

Table 1. Pump Unit Performance Characteristics

Pump Unit	Horsepower	Flow Capacity (cfs)
1 and 2	250	150
3 through 8	600	400
9	300	200
10	150	100

The HCPP motors are equipped with factory-installed anti-backspin clutches to prevent reverse rotation of the pumps during gravity-flow operations. During gravity flows, the pump shafts spin in their normal clockwise direction. Gravity-flow operation is dependent on high river levels and is constrained by operational limitations of the existing Main Canal Headgate Structure. Historically, gravity-flow operation has not been a common operating mode and will require further evaluation for the Sites Project.

1.2 Main Canal Reach from HCPP to Funks Check

The Main Canal conveys water diverted from the Sacramento River at the HCPP to agricultural and other water users throughout the GCID service area. Extending from its diversion point approximately 5 miles northwest of Hamilton City to a location southeast of the City of Williams, the canal is an unlined earthen channel approximately 65 miles long. Canal capacity gradually decreases along its length, from about 3,000 cfs at the upstream end to approximately 300 cfs at its southern terminus, where flows are discharged into the Colusa Basin Drain.

The Main Canal reach between the HCPP and Funks Check structure, which is located immediately upstream of Funks Creek Siphon, extends approximately 41.3 miles. The principal features located along this 41.3-mile reach of the canal are summarized in Table 2.

Table 2. Main Canal Infrastructure (HCPP to Funks Creek Siphon)

Feature	Quantity
Field Turnouts	168
Check Structures	10
Bridges	27
Siphons	6
Drain Siphons[a]	36
Tehama-Colusa Canal Authority Wasteway	1

[a]Drain siphons cross beneath the Main Canal and therefore do not obstruct or affect canal flows.

A map showing all infrastructure located on or crossing the GCID Main Canal upstream of Funks Creek is provided in Attachment 1.

1.3 Operational Timing for Sites Water Conveyance

The Conveyance Capacity TM (Jacobs 2026) indicates that the GCID Main Canal can convey up to 1,800 cfs of Sites diversion flows from the Sacramento River to the proposed Terminal Regulating Reservoir (TRR) (Mile Post [MP] 41.3), provided the canal bank improvements identified in the Sites Project 10% design drawings are implemented.

During the Sites diversion season (November 1 through June 30), daily coordination between GCID and Sites will be required to verify that GCID water delivery demands are met while maximizing diversion opportunities for Sites. Coordination will be particularly important during the following periods:

- **January and February**, when the canal is typically taken out of service to accommodate annual maintenance activities
- **Mid-April through June**, when GCID irrigation demands are at their peak due to rice field flood–up operations and when Sites may have opportunities to divert Sacramento River flows during outlier years in which flood flows are available

1.4 GCID Facility Considerations and Potential Improvements

This section identifies facility-specific considerations associated with operations and maintenance (O&M) of the GCID water delivery system; and identifies potential improvements that may be required to support reliable system performance. Considerations include hydraulic capacity; freeboard requirements; maintenance access; mechanical and electrical equipment condition; and the ability of existing facilities to accommodate future operational demands associated with the Sites Project. Potential improvements may include modifications to conveyance facilities, control structures, mechanical and electrical systems, and pumping equipment to enhance system reliability, operational flexibility, efficiency, and safety.

Necessary improvements include replacement of the GCID Main Canal Headgates Structure, as well as improvements to several miles of canal roads to restore required freeboard, as identified through the hydraulic modeling completed in 2023 (Jacobs 2026) and included in the Sites Project 10% design and cost estimate. In addition, portions of the canal roads between the HCPP and TRR (MP 41.3) will require

improvements, such as aggregate base surfacing, to provide reliable all-weather access for O&M activities. Select canal embankment reaches will also require slope stabilization or armoring to protect against erosion and maintain embankment stability.

Other necessary improvements include replacement of the fish screen-cleaning system and pumping plant flap gate valves, which were included in the Sites Project as contingency items but were not specifically identified or quantified in the 30% design construction cost estimate.

An evaluation of pump performance at higher river stages, relative to historical operating conditions, will be required to confirm that pump operation remains within the allowable operating range and/or can be safely operated under gravity-flow conditions.

1.5 Current and Future Maintenance Window

The GCID Main Canal is typically taken out of service for approximately 6 weeks each year, generally from January 7, marking the end of water delivery season, through February 22. This annual shutdown period allows the GCID to perform routine maintenance, inspections, repairs, and construction activities on the canal and its associated facilities before the start of the next irrigation season.

Annual substation and associated medium-voltage electrical testing and maintenance at the HCPP must be scheduled several months in advance and is performed each year at the end of January. Depending on the equipment scheduled for service, this work requires the removal of utility power for approximately 3 to 5 days. Historically, electrical testing and maintenance activities have been conducted on a 3-year rotation. Due to the advance planning and coordination required, it is not feasible to reschedule maintenance during the outage period if Sites diversion requests are received.

As operations of the Sites Project are initiated, GCID will strive to shorten this inspection/maintenance window for the facilities used by the Sites Project to 3 weeks and to prioritize such work, when feasible, to periods when Sites is not able to divert. Use of the Sites fund for expediting winter maintenance of Partner Facilities will be relied upon to achieve this goal when circumstances merit.

GCID commits to make best efforts regarding planning for such inspection/maintenance shutdown periods and the timing thereof to maximize opportunities for diversions and conveyance of water to Sites. However, GCID will be sole arbiter of the timing and duration of necessary inspection/maintenance periods, which will be determined by GCID based on the amount, nature, and duration of work necessary, the windows of opportunity to conduct such work, and other relevant details that will define the circumstance. GCID commits to make best efforts to coordinate such needs and activities with the Sites Project Joint Powers Authority. Under no circumstance will GCID be held responsible or liable in any manner for reductions in water quantity or foregone diversion opportunities for Sites deliveries associated with GCID's determination regarding the need, timing, or duration of such inspection/maintenance shutdown periods.

1.6 Current Instrumentation and Controls and SCADA System

GCID modernized its Main Canal by equipping 17 check structures with locally controlled programmable logic controllers integrated through a district-wide supervisory control and data acquisition (SCADA) network. The system enables real-time monitoring and remote control of canal operations, improving water level regulation, delivery efficiency, and operational responsiveness across the entire Main Canal.

Based on documentation from the Irrigation Training & Research Center (ITRC) for the GCID Main Canal Modernization and Automation Program (ITRC 2023), the SCADA system associated with the 17 automated check structures provides the following key operational capabilities:

- Automated upstream water level control
- Remote manual gate control
- Remote monitoring of canal levels and gate positions
- Remote selection of control and monitoring sensors
- Remote adjustment of controller setpoints
- Remotely switching between automatic and manual operating modes

The SCADA systems associated with eight of the major check structures upstream of Funks Creek are described in the following sections.

1.6.1 Jacinto Check

Jacinto Check is the first major check structure on the Main Canal. The facility consists of three automated radial gates that regulate canal operations by maintaining an upstream water surface elevation setpoint established by GCID supervisory staff. The structure includes the following:

- Two level sensors upstream and two level sensors downstream (ultrasonic sensor and pressure transducer on each side) for redundant water level measurement
- Two gate position sensors per gate (Celesco string potentiometer and inclinometer) for redundant gate position monitoring
- Gate travel limit switches to prevent operation beyond physical limits

Control and data acquisition are provided by a SCADAPack 32 remote terminal unit (RTU) programmed by ITRC in 2010. Data are transmitted through GCID's 5.8-gigahertz (GHz) radio network to the primary SCADAPack 470 RTU at the Willows office and then to the Ignition human-machine interface (HMI) system.

1.6.2 Willard, Walker, Willows, Spooner, and Norman Checks

Willard Check, Walker Check, Willows Check, Spooner Check, and Norman Check are configured similarly to Jacinto Check. Each structure consists of three automated radial gates controlled to maintain an upstream water level setpoint established by GCID supervisory staff. Each site includes the following:

- Four redundant water level sensors (two upstream and two downstream)
- Six gate position sensors (two per gate)
- Gate travel limit switches
- SCADAPack 32 RTUs with automation programs developed by ITRC in 2010
- Communications through GCID's 5.8-GHz radio network to the primary SCADAPack 470 RTU and Ignition HMI system

1.6.3 Tuttle Check

Tuttle Check is the third major check structure on the Main Canal and was constructed in 2021. Unlike the older radial-gate facilities, Tuttle Check uses three Langemann gates. The site includes the following:

- Two gate position sensors per gate (rotary encoder and Celesco string potentiometer)
- Redundant upstream and downstream level measurement using Senix ultrasonic sensors and pressure transducers
- A SCADAPack 474 RTU programmed by ITRC
- Communications through GCID's 5.8-GHz radio network to the primary RTU and Ignition HMI system

1.6.4 Funks Check

Funks Check is the eighth major check structure and the first Main Canal check containing two gates rather than three. Although the gates are capable of automated upstream-level control, the structure is typically operated manually. The site includes the following:

- Four redundant water level sensors (two upstream and two downstream)
- Two gate position sensors per gate (Celesco string potentiometer and inclinometer)
- Gate travel limit switches
- A SCADAPack 32 RTU with an ITRC-developed automation program
- Communications through GCID's 5.8-GHz radio network to the primary SCADAPack 470 RTU and Ignition HMI system

1.7 Current Water Measurement System

The GCID Stoney Creek Siphon is a key flow-measurement location on the GCID Main Canal. Flow is measured using three SonTek SL1500 sensors recessed into the downstream side of the siphon. The sensors are owned, operated, and maintained by the Bureau of Reclamation (Reclamation). Data are collected through a SCADAPack RTU and transmitted via GCID's 5.8-GHz radio network to the Ignition HMI system for monitoring and reporting.

Key facts in the ITRC Paper Number P 2002-006 (Perkins et al. 2002) about water measurement at the Stoney Creek Siphon are as follows:

- The siphon consists of three rectangular tubes, each approximately 12 feet by 14 feet and more than 200 feet long. The facility was designed to convey up to about 3,200 cfs.
- Because flow is divided among the three barrels, three acoustic doppler flowmeters were installed, one in each tube, to measure water velocity and calculate discharge.

- The sensors were installed near the downstream end of the siphon where they remain continuously submerged, improving measurement reliability.

- Flow data were connected to a SCADA system, allowing both GCID and Reclamation to monitor flows remotely in near real-time.

2.0 Oxbow OM&R

The following sections describe existing operation, maintenance, and replacement (OM&R) practices and potential changes associated with implementation of the Sites Project.

2.1 Existing OM&R

Operation of the water-control structure can be adjusted as necessary to maintain at least the minimum required bypass flow while verifying that adequate water surface elevations are maintained at the fish screens to support proper facility operation and fish protection criteria.

Annual maintenance of the oxbow (also known as the intake channel) consists of removing accumulated silt, sand, gravel, cobble, washed-in vegetation, and human-made debris using heavy equipment. Significant sediment deposition is anticipated in the upstream channel area during winter flow events. The downstream bypass channel should also be dredged as necessary; however, substantial sediment accumulation is not expected due to the higher flow velocities typically present in the bypass channel. Changes in river morphology resulting from erosion or sediment deposition should be documented and monitored.

Riprap should be inspected regularly for evidence of displacement, settlement, erosion, or sloughing, particularly following high-flow events. Any damaged or displaced riprap should be repaired or replaced promptly to prevent further deterioration; protect adjacent slopes and structures from erosion; and maintain the effectiveness of the erosion protection system.

The oxbow should be inspected routinely for obstructions that could impede flow or fish passage, including snags, fallen trees, and other debris. Any such obstructions should be removed as necessary to maintain the hydraulic capacity and operational effectiveness of the channel. Following significant flow events, additional inspections should be conducted to identify and address newly deposited debris or other conditions that may affect channel performance.

Channel dredging activities are conducted annually between March 1 and July 1 under a California Department of Fish and Wildlife Lake and Streambed Alteration Agreement and an Incidental Take Permit.

2.2 OM&R with Sites Project

With implementation of the Sites Project, channel dredging requirements may increase due to additional winter operations and the potential for increased sediment deposition during diversion events. Continued monitoring of sediment accumulation should be performed to evaluate whether modifications to existing dredging frequency, disposal practices, or sediment-management procedures are warranted.

3.0 Water-Control Structure OM&R

The following sections describe existing OM&R practices and potential changes associated with implementation of the Sites Project.

3.1 Existing OM&R

The water-control structure is an integral component of the fish screen and plays a critical role in the hydraulic performance of the overall system (which includes the river gradient facility, the internal bypass system, the intake and bypass channels, and the bypass outfall). The structure is located immediately downstream of the fish screen facility and consists of an upstream transition, a central throat section, and a downstream transition. The throat section is designed to accommodate precast concrete bulkhead panels and slabs that can be installed to adjust flow conditions.

The crest elevation of the water-control structure is adjustable through the addition or removal of precast concrete blocks, in 1-foot increments. The water-control structure regulates the distribution of flow to the bypass channel in response to varying river stages and pumping plant operating conditions. This integrated control system helps maintain appropriate hydraulic conditions at the fish screen while providing the required bypass flows for fish passage and facility operation.

Operational activities are minimal; however, the facility is monitored and maintained continuously throughout the year, with heightened oversight during diversion operations.

3.2 OM&R with Sites Project

No substantial modifications to current facility operations or maintenance practices are anticipated in connection with Sites Project diversions through the facility.

4.0 Fish Screen OM&R

The following sections describe existing OM&R practices and potential changes associated with implementation of the Sites Project.

4.1 Existing OM&R

Operation of the fish screen facility includes the following items:

- An adjustable water-control weir located downstream of the fish screens allows for regulation of open-channel bypass flows and maintenance of the required screen submergence levels
- Adjusting baffles to maintain a uniform flow through the fish screen structure
- Mechanical screen-cleaning systems

Maintenance of the fish screen facility includes the following:

- Inspection and maintenance activities for mechanical equipment include inspecting and cleaning the fish screens; inspecting and maintaining adjustable baffles; and inspecting, maintaining, and repairing screen-cleaning systems, the high-pressure service water pipeline, barrier panels, trash

racks, bulkheads at the bypass bays, bulkheads at the bypass outlet and water-control structure, and dredge bay panels.

- Inspection and maintenance activities for electrical equipment include inspecting, testing, and maintaining motors associated with the screen cleaner systems, facility lighting systems, water surface elevation monitoring equipment, and related electrical controls and instrumentation.

- Inspection and maintenance activities for structural and civil components include inspecting and maintaining all concrete structures associated with the facility, including precast concrete beams, the removable deck at the dredge passage bay, the bridge to Montgomery Island, the bypass outlet structure, and the water-control structure.

- Inspection and maintenance activities include identifying and monitoring scour holes and maintaining riprap protection alongside slopes and within the intake and bypass channels to prevent erosion and maintain the structural integrity and hydraulic performance of the facility.

Replacement of fish screen facility components is primarily condition-based. Fish screen panels, solid panels, screen cleaner brushes, and other mechanical appurtenances are repaired or replaced when inspections identify damage, excessive wear, corrosion, or operational deficiencies that could affect facility performance.

The fish screen facility is monitored and maintained year-round, on a continuous basis, with increased oversight during diversion operations. Major maintenance and replacement activities are generally performed at the end of the water delivery season during the annual maintenance window.

4.2 OM&R with Sites Project

With implementation of the Sites Project, the fish screen facility would likely experience increased wintertime operations compared to its current irrigation-focused seasonal use. Because Sacramento River flows during winter storm events are typically more turbid and contain higher suspended sediment concentrations, screen-cleaning frequencies may increase to prevent excessive debris and fine sediment accumulation on screen panels. Additional inspections of screens, screen-cleaning equipment, baffles, and related mechanical systems may be warranted following high-flow diversion events. Over the long term, increased operating hours and exposure to abrasive sediment loads could accelerate wear of screen panels, brushes, cables, and drives, potentially shortening replacement intervals for these assets.

5.0 Forebay OM&R

The following sections describe existing OM&R practices and potential changes associated with implementation of the Sites Project.

5.1 Existing OM&R

Forebay dredging operations are conducted on an as-needed basis to maintain adequate water depths, preserve hydraulic performance, and verify reliable operation of the fish screen facility and HCPP. Dredging is typically performed using a hydraulic dredge capable of removing accumulated sediment from the Forebay. Dredged material is conveyed through a dredge pipeline to designated spoil disposal or sediment storage areas for drying and management. Dredging activities are generally coordinated

with seasonal maintenance schedules and operational requirements to minimize disruptions to water deliveries and facility operations.

The Forebay is currently dredged on a recurring cycle of approximately every 3 to 5 years. Dredging is performed by renting a dredge for 5 weeks, typically during the months of July and August.

Replacement of Forebay O&M equipment is primarily condition-based. Dredging equipment, slurry pipelines, valves, and other sediment-management components are repaired or replaced, as needed, based on inspection findings and operational condition.

5.2 OM&R with Sites Project

With implementation of the Sites Project, Forebay dredging requirements may increase due to additional winter operations and the potential for increased sediment deposition during diversion events. Continued monitoring of Forebay sediment accumulation should be performed to evaluate whether modifications to existing dredging frequency, disposal practices, or sediment-management procedures are warranted.

6.0 Pumping Plant OM&R

The following sections describe existing OM&R practices and potential changes associated with implementation of the Sites Project.

6.1 Existing OM&R

Typical OM&R activities for the constant-speed vertical axial-flow pumps include routine inspection of pump and motor performance; lubrication of bearings; inspection and replacement of packing and seals; vibration monitoring; cleaning of trash racks; removal of accumulated debris and sediment; and periodic overhaul of impellers, bearings, shafts, and motors as required to maintain reliable operation.

The pumping plant facility is monitored and maintained year-round, on a continuous basis, with increased oversight during diversion operations. Major maintenance and replacement activities are generally performed at the end of the water delivery season during the annual maintenance window.

6.2 OM&R with Sites Project

With implementation of the Sites Project, the HCPP would likely experience increased operating hours due to additional winter diversions. In addition, higher sediment concentrations associated with more turbid Sacramento River water could increase wear on pumps, impellers, valves, and other hydraulic components. As a result, inspections, preventive maintenance, and replacement of wear-related components may be required more frequently to maintain pumping efficiency and reliable operation.

7.0 Main Canal OM&R

The following sections describe existing OM&R practices and potential changes associated with implementation of the Sites Project.

7.1 Existing OM&R

The Main Canal is operated and maintained to provide reliable water delivery while maintaining the structural integrity and hydraulic capacity of the conveyance system.

Typical operational activities include the following:

- Monitoring and adjusting canal flows and water levels
- Operating check structures and turnouts
- Coordinating water deliveries with agricultural demand and other water users
- Monitoring canal freeboard and hydraulic conditions during normal and high-flow operations
- Inspecting canal facilities to verify safe and reliable operation
- Operating measurement and telemetry systems used to track flows and water levels

Routine maintenance activities typically include the following:

- Removal of sediment deposits that reduce canal capacity
- Aquatic vegetation control within the canal prism and adjacent facilities
- Removal of debris, trash, and other material from canal structures
- Mowing and vegetation management along canal banks and right-of-way
- Inspection and repair of canal structures, embankments, access roads, and erosion protection features
- Cleaning and maintenance of culverts, siphons, gates, and turnout structures
- Lubrication, adjustment, and minor repair of mechanical and electrical equipment

The Main Canal is monitored and maintained year-round, on a continuous basis, with increased oversight during diversion operations. Major maintenance and replacement activities are generally performed at the end of the water delivery season during the annual maintenance window.

7.2 OM&R with Sites Project

With implementation of the Sites Project, O&M requirements for the Main Canal are anticipated to increase due to both the timing and volume of water deliveries. Unlike traditional irrigation deliveries that occur primarily during the summer, Sites water would be conveyed largely during the winter and non-irrigation season, requiring more year-round operation of canal facilities, gates, and measurement structures. This could reduce opportunities for maintenance outages and increase inspection and staffing needs.

In addition, Sites water diverted from the Sacramento River during high-flow periods may contain higher sediment concentrations than typical irrigation deliveries. Increased sediment loads could lead to greater accumulation of silt in canal reaches, turnouts, siphons, check structures, and measurement facilities, requiring more frequent sediment removal and cleaning. Higher sediment levels could also accelerate wear on gates, seals, and flow-measurement equipment, potentially increasing long-term repair and replacement requirements. Overall, the addition of Sites water would likely shift canal

operations toward a more continuous, year-round maintenance program with greater emphasis on sediment management and hydraulic structure upkeep.

8.0 Conveyance Capacity for Sites

The GCID Main Canal has an upstream channel capacity of approximately 3,000 cfs during the dry summer irrigation season. Because the Sites Project is diverting water during the winter season and extending into the early summer, it was decided to use 2,850 cfs as the upstream channel capacity. This allows GCID to maintain adequate freeboard for the safe conveyance of flows during potential wet weather conditions. The channel capacity decreases to approximately 2,150 cfs near the TRR.

Under current conditions, the Main Canal can convey up to approximately 1,800 cfs of Sites Project flows to the TRR. The primary constraints are operational rather than hydraulic. GCID and Sites will be working together in the fall of 2026 to verify that there is adequate capacity near the Railroad Siphon and the Willows Check to convey the 1,800 cfs to the TRR and up to 350 cfs of expected GCID deliveries during the same operational window.

Canal capacity availability is generally favorable during the winter diversion season but becomes limited in Mid-April through June when irrigation demands increase. While these months can coincide with conditions when the Sites Project is able to divert, Sites Project diversions are not expected during peak irrigation demand periods, reflecting the priority of GCID deliveries. Additional constraints include short maintenance outages, typically occurring in early January through late February. Accordingly, the GCID canal represents a viable conveyance pathway, provided that daily coordination with GCID operations is maintained to balance Sites Project diversions with agricultural demands.

Tables 3, 4, and 5 present the results of the GCID Main Canal capacity analysis for the Sites diversion period (November 1 through June 30) for 3 recent water years. Additional information regarding the capacity analysis is provided in the HC Conveyance Capacity TM (Jacobs 2026).

Table 3. GCID Main Canal Capacity Analysis for November 2022 through June 2023 (Wet Year)

Sites Diversion Operation Window: November 1 through June 30

Month	Flow Statistic	GCID Diversion at SCS (cfs)[a]	Available Capacity at SCS (cfs)	GCID Diversion at Willows Check (cfs)[a]	Available Capacity at Willows Check (cfs)	Sites CalSim 2 Top Speed Scenario Maximum Diversion (cfs)	Available Capacity for Sites Diversion (%)
Column #	*[1]*	*[2]*	*[3]*	*[4]*	*[5]*	*[6]*	*[7]*
November 1 to 30	Minimum	25	2,825	51	2,099	850	100
	Midpoint	189	2,662	127	2,024		100
	Maximum	352	2,498	202	1,948		100
December 1 to 15	Minimum	84	2,766	39	2,111	1,400	100
	Midpoint	314	2,536	197	1,954		100
	Maximum	544	2,306	354	1,796		100
December 16 to 31	Minimum	0	2,850	97	2,053	1,400	100
	Midpoint	296	2,554	222	1,928		100
	Maximum	592	2,258	347	1,803		100
January 1 to 7	Minimum	30	2,820	84	2,066	1,550	100
	Midpoint	149	2,701	92	2,059		100
	Maximum	268	2,582	99	2,051		100
January 8 to 31	Minimum	0	2,850	0	2,150	1,100	100
	Midpoint	0	2,850	0	2,150		100
	Maximum	0	2,850	0	2,150		100
February 1 to 22	Minimum	0	2,850	0	2,150	1,200	100
	Midpoint	173	2,678	0	2,150		100
	Maximum	345	2,505	0	2,150		100
February 23 to 28	Minimum	100	2,750	0	2,150	1,750	100
	Midpoint	175	2,675	11	2,140		100
	Maximum	250	2,600	21	2,129		100
March	Minimum	0	2,850	0	2,150	1,550	100
	Midpoint	150	2,700	40	2,110		100
	Maximum	300	2,550	80	2,070		100

Month	Flow Statistic	GCID Diversion at SCS (cfs)[a]	Available Capacity at SCS (cfs)	GCID Diversion at Willows Check (cfs)[a]	Available Capacity at Willows Check (cfs)	Sites CalSim 2 Top Speed Scenario Maximum Diversion (cfs)	Available Capacity for Sites Diversion (%)
Column #	*[1]*	*[2]*	*[3]*	*[4]*	*[5]*	*[6]*	*[7]*
April 1 to 15	Minimum	0	2,850	24	2,126	1,800	100
	Midpoint	111	2,739	83	2,067		100
	Maximum	222	2,628	142	2,008		100
April 16 to 30	Minimum	208	2,642	116	2,034	1,800	100
	Midpoint	946	1,905	512	1,638		**91**
	Maximum	1,683	1,167	908	1,242		**65**
May	Minimum	2,055	795	1,072	1,078	1,000	**80**
	Midpoint	2,435	416	1,451	699		**42**
	Maximum	2,814	36	1,830	320		**4**
June	Minimum	2,031	819	1,214	936	450	100
	Midpoint	2,335	516	1,448	703		100
	Maximum	2,638	212	1,681	469		**47**

Column Notes:

1. [2] SCS operational capacity for Sites analysis: 2,850 cfs.
2. [2] There are no irrigation deliveries along the Main Canal between the HCPP and the SCS.
3. [2] Currently, the Main Canal is taken out of service annually for maintenance between January 7 and February 22.
4. [4] Willows Check modeled capacity: 2,150 cfs.
5. [7] Values shown in bold font indicate that the available capacity for Sites diversions is less than 100%.

Notes:

Water Year 2022 was a drought year, and GCID's diversion was limited to 25% of its water right allocation. Therefore, only diversions from November and December 2022, after drought-related restrictions were lifted, were used in the analysis.

Water Years 2023, 2024, and 2025 were years in which GCID received its full water allocation, and Sacramento River flows were sufficient to allow Sites Reservoir diversions.

[a]Daily flow data from GCID at the SCS and Willows Check were used for the period November 2022 through June 2023.

CalSim = California Simulation Model

SCS = Stoney Creek Siphon

Table 4. GCID Main Canal Capacity Analysis for November 2023 through June 2024 (Above Normal Year)

Sites Diversion Operation Window: November 1 through June 30

Month	Flow Statistic	GCID Diversion at SCS (cfs)[a]	Available Capacity at SCS (cfs)	GCID Diversion at Willows Check (cfs)[a]	Available Capacity at Willows Check (cfs)	Sites CalSim 2 Top Speed Scenario Maximum Diversion (cfs)	Available Capacity for Sites Diversion (%)
Column #	*[1]*	*[2]*	*[3]*	*[4]*	*[5]*	*[6]*	*[7]*
November 1 to 30	Minimum	1,090	1,760	753	1,397	850	100
	Midpoint	1,274	1,577	840	1,310		100
	Maximum	1,457	1,393	927	1,223		100
December 1 to 15	Minimum	1,002	1,848	547	1,603	1,400	100
	Midpoint	1,124	1,726	674	1,476		100
	Maximum	1,246	1,604	801	1,349		**96**
December 16 to 31	Minimum	912	1,938	473	1,677	1,400	100
	Midpoint	1,031	1,819	603	1,547		100
	Maximum	1,150	1,700	733	1,417		100
January 1 to 7	Minimum	607	2,243	196	1,954	1,550	100
	Midpoint	737	2,113	346	1,805		100
	Maximum	867	1,983	495	1,655		100%
January 8 to 31	Minimum	0	2,850	0	2,150	1,100	100
	Midpoint	290	2,561	132	2,018		100
	Maximum	579	2,271	264	1,886		100
February 1 to 22	Minimum	0	2,850	0	2,150	1,200	100
	Midpoint	0	2,850	42	2,108		100
	Maximum	0	2,850	84	2,066		100
February 23 to 28	Minimum	0	2,850	0	2,150	1,750	100
	Midpoint	0	2,850	0	2,150		100
	Maximum	0	2,850	0	2,150		100
March	Minimum	50	2,800	0	2,150	1,550	100
	Midpoint	129	2,722	38	2,112		100
	Maximum	207	2,643	76	2,074		100
April 1 to 15	Minimum	183	2,667	0	2,150	1,800	100
	Midpoint	214	2,636	96	2,055		100
	Maximum	245	2,605	191	1,959		100

Month	Flow Statistic	GCID Diversion at SCS (cfs)[a]	Available Capacity at SCS (cfs)	GCID Diversion at Willows Check (cfs)[a]	Available Capacity at Willows Check (cfs)	Sites CalSim 2 Top Speed Scenario Maximum Diversion (cfs)	Available Capacity for Sites Diversion (%)
Column #	*[1]*	*[2]*	*[3]*	*[4]*	*[5]*	*[6]*	*[7]*
April 16 to 30	Minimum	183	2,667	6	2,144	1,800	100
	Midpoint	801	2,050	310	1,841		100
	Maximum	1,418	1,432	613	1,537		**80**
May	Minimum	1,670	1,180	345	1,805	1,000	100
	Midpoint	2,282	568	986	1,165		**57**
	Maximum	**2,894**	0	1,626	524		**0**
June	Minimum	2,221	629	1,074	1,076	450	100
	Midpoint	2,559	291	1,327	823		**65**
	Maximum	**2,897**	0	1,580	570		**0**

Column Notes:

[2] SCS operational capacity for Sites analysis: 2,850 cfs. Values shown in bold font indicate that the SCS operational capacity was exceeded.

[2] There are no irrigation deliveries along the Main Canal between the HCPP and the SCS.

[2] Currently, the Main Canal is taken out of service annually for maintenance between January 7 and February 22.

[4] Willows Check modeled capacity: 2,150 cfs

[7] Values shown in bold font indicate that the available capacity for Sites diversions is less than 100%.

Notes:

Water Years 2023, 2024, and 2025 were years in which GCID received its full water allocation, and Sacramento River flows were sufficient to allow Sites Reservoir diversions.

[a]Daily flow data from GCID at the SCS and Willows Check were used for the period November 2023 through June 2024.

Table 5. GCID Main Canal Capacity Analysis for November 2024 through June 2025 (Above Normal Year)

Sites Diversion Operation Window: November 1 through June 30

Month	Flow Statistic	GCID Diversion at SCS (cfs)[a]	Available Capacity at SCS (cfs)	GCID Diversion at Willows Check (cfs)[a]	Available Capacity at Willows Check (cfs)	Sites CalSim 2 Top Speed Scenario Maximum Diversion (cfs)	Available Capacity for Sites Diversion (%)
Column #	*[1]*	*[2]*	*[3]*	*[4]*	*[5]*	*[6]*	*[7]*
November 1 to 30	Minimum	98	2,752	0	2,150	850	100
	Midpoint	887	1,963	450	1,700		100
	Maximum	1,676	1,174	900	1,250		100
December 1 to 15	Minimum	244	2,606	128	2,022	1,400	100
	Midpoint	669	2,182	340	1,810		100
	Maximum	1,093	1,757	552	1,598		100
December 16 to 31	Minimum	57	2,793	55	2,095	1,400	100
	Midpoint	476	2,375	217	1,933		100
	Maximum	894	1,956	379	1,771		100
January 1 to 7	Minimum	576	2,274	109	2,041	1,550	100
	Midpoint	656	2,194	223	1,927		100
	Maximum	736	2,114	337	1,813		100
January 8 to 31	Minimum	0	2,850	0	2,150	1,100	100
	Midpoint	370	2,481	155	1,995		100
	Maximum	739	2,111	310	1,840		100
February 1 to 22	Minimum	0	2,850	0	2,150	1,200	100
	Midpoint	261	2,589	0	2,150		100
	Maximum	522	2,328	0	2,150		100
February 23 to 28	Minimum	0	2,850	0	2,150	1,750	100
	Midpoint	172	2,679	40	2,111		100
	Maximum	343	2,507	79	2,071		100
March	Minimum	98	2,752	0	2,150	1,550	100
	Midpoint	163	2,688	70	2,081		100
	Maximum	227	2,623	139	2,011		100

Month	Flow Statistic	GCID Diversion at SCS (cfs)[a]	Available Capacity at SCS (cfs)	GCID Diversion at Willows Check (cfs)[a]	Available Capacity at Willows Check (cfs)	Sites CalSim 2 Top Speed Scenario Maximum Diversion (cfs)	Available Capacity for Sites Diversion (%)
Column #	*[1]*	*[2]*	*[3]*	*[4]*	*[5]*	*[6]*	*[7]*
April 1 to 15	Minimum	142	2,708	52	2,098	1,800	100
	Midpoint	259	2,591	130	2,021		100
	Maximum	376	2,474	207	1,943		100
April 16 to 30	Minimum	347	2,503	146	2,004	1,800	100
	Midpoint	1,215	1,635	635	1,516		**84**
	Maximum	2,083	767	1,123	1,027		**43**
May	Minimum	2,088	762	944	1,206	1,000	**76**
	Midpoint	2,449	402	1,462	689		**40**
	Maximum	2,809	41	1,979	171		**4**
June	Minimum	1,957	893	1,325	825	450	100
	Midpoint	2,412	438	1,517	634		**97**
	Maximum	**2,867**	0	1,708	442		**0**

Column Notes:

[2] SCS operational capacity for Sites analysis: 2,850 cfs. Values shown in bold font indicate that the SCS operational capacity was exceeded.

[2] There are no irrigation deliveries along the Main Canal between the HCPP and the SCS.

[2] Currently, the Main Canal is taken out of service annually for maintenance between January 7 and February 22.

[4] Willows Check modeled capacity: 2,150 cfs

[7] Values shown in bold font indicate that the available capacity for Sites diversions is less than 100%.

Notes:

Water Years 2023, 2024, and 2025 were years in which GCID received its full water allocation, and Sacramento River flows were sufficient to allow Sites Reservoir diversions.

[a]Daily flow data from GCID at the SCS and Willows Check were used for the period November 2024 through June 2025.

9.0 References

Irrigation Training & Resource Center, at California Polytechnic State University – San Luis Obispo (ITRC). 2023. Glenn-Colusa Irrigation District - Modernization Projects with US Bureau of Reclamation. https://itrc.org/projects/GCID.htm.

Jacobs. 2026. *Technical Memorandum: Sites Reservoir Project: Conveyance Capacity.* June 18.

Perkins, Dennis, Stuart W. Styles, and Marcus Y. Yasutake (Perkins et al.). 2002. *Glenn-Colusa Irrigation District Flow Monitoring Program*. ITRC Cal Poly. Paper No. P 2002-006. July 9. Digital Commons at Cal Poly, Bioresource and Agricultural Engineering. https://digitalcommons.calpoly.edu/bae_fac/24.

Attachment 1
GCID Main Canal Infrastructure

GCID Pump Station

Main Canal Headgates
Mile Post: 1.73

Stony Cr. Headgates
Mile Post: 7.23

Stony Creek Siphon
Mile Post: 7.23

Jacinto Check
Mile Post: 13.75

Bondurant Check
Mile Post: 17.68

Tuttle Check
Mile Post: 21.75

Match Line

Walker Check
Mile Post: 24.00

Willow Creek Siphon 2
Mile Post: 24.68

Walker Creek Siphon 1
Mile Post: 24.48

Willows Check
Mile Post: 26.21

Willows Rail Road Siphon
Mile Post: 26.60

Spooner Check
Mile Post: 31.71

Baker Creek Siphon
Mile Post: 34.04

Norman Check
Mile Post: 35.63

Funks Check
Mile Post: 41.30

Funks Creek Siphon
Mile Post: 41.34

Funks Creek

Match Line

Feature	Total Counts
Turnouts	168
Main Canal Checks	10
Main Canal Bridges	27
Drain Siphons	37
Main Canal Siphons	6

Legend
- Turnouts (68)
- Main Canal Checks (4)
- Main Canal Bridges (12)
- Main Canal Siphon (1)
- Main Canal Drain Siphon (16)
- Main Canal

All Structures on/across the Main Canal - Pump Station to Funks Creek (North)

0 0.25 0.5 1 Miles

Author: Kevin Berry
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community, Esri, NASA, NGA, USGS

GCID GLENN-COLUSA IRRIGATION DISTRICT

Feature	Total Counts
Turnouts	168
Main Canal Checks	10
Main Canal Bridges	27
Drain Siphons	37
Main Canal Siphons	6

Legend
- Turnouts (100)
- Main Canal Checks (6)
- Main Canal Bridges (15)
- Main Canal Siphon (5)
- Main Canal Drain Siphon (20)
- Main Canal
- Tehema-Colusa Canal Authority Wasteway

All Structures on/across the Main Canal - Pump Station to Funks Creek (South)

0 0.25 0.5 1 Miles

Author: Kevin Berry
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community, Esri, NASA, NGA, USGS

GCID GLENN-COLUSA IRRIGATION DISTRICT

Tehama-Colusa Canal Authority Facility Operations, Maintenance, and Replacement Draft Technical Memorandum

To:	Sites Project Authority
CC:	Rob Natoli, P.E./Sites
Date:	August 11, 2026
From:	Jessie Hekl, P.E./Jacobs, Megan Campbell, P.E./Jacobs
Quality Review:	Peter Rude, P.E./Jacobs
TCCA Review:	William Vanderwaal, Aaron Hall, Don Babb
Authority Agent Review:	Reviewer
Subject:	TCCA Operation, Maintenance, and Replacement

Executive Summary

This Technical Memorandum documents the existing operation, maintenance, and replacement (OM&R) practices for Tehama-Colusa Canal Authority (TCCA) facilities that are proposed to support operation of the Sites Reservoir Project and identifies potential changes to those practices resulting from future project operations. The evaluation focuses on the Red Bluff Pumping Plant (RBPP) and Fish Screen (FS), Tehama-Colusa Canal (TCC), Funks Reservoir and Dam, and associated control, measurement, and delivery facilities.

The TCCA system includes the RBPP and FS, approximately 137 miles of canal (including 26 miles of the Corning Canal and 111 miles of the TCC), Funks Reservoir and Dam, and numerous check structures and turnouts that deliver water to agricultural users throughout the region. The Sites Reservoir Project would use portions of this existing infrastructure to divert Sacramento River water during winter high–flow periods, convey water through the TCC to Funks Reservoir for storage in Sites Reservoir, and release water back through the TCC for delivery through the proposed Dunnigan Pipeline.

Hydraulic evaluations indicate that Sites Project operations are generally planned within the available conveyance capacity of the TCC. Diversions to Sites Reservoir are expected to occur primarily between November and June, while releases from Sites Reservoir are expected to occur primarily between April and November. Because agricultural demands increase during irrigation season, coordination between TCCA and Sites operators will be important to manage available conveyance capacity and operational priorities.

The Sites Reservoir Project will affect existing OM&R practices by increasing facility use during winter months and reducing the duration of traditional maintenance outages. Increased conveyance of Sacramento River water during winter storm events will also result in greater sediment loads within the FS Facility, Forebay, settling basins, Funks Reservoir, and portions of the canal system. As a result, sediment management, inspections, cleaning, and maintenance activities will need to occur more frequently than under current operations. Increased operating hours will also contribute to additional

wear on pumps, gates, seals, flow-measurement equipment, FS components, and other mechanical and hydraulic assets.

In summary, this memorandum documents existing OM&R practices for TCCA facilities and identifies areas where operation of the Sites Reservoir Project will influence future OM&R requirements. Potential changes include increased winter operations, reduced maintenance windows, additional sediment management, greater inspection and monitoring needs, and increased use of mechanical and hydraulic equipment. These considerations provide a basis for future coordination, operational planning, and refinement of maintenance and asset management practices as the Sites Reservoir Project advances.

The Sites Project team extends its appreciation to TCCA for its valuable collaboration in the preparation of this document, including providing and reviewing the information contained herein and verifying that the compiled information is reasonable and accurate at the time of writing. TCCA is required to operate and maintain the TCC to the standards included in the Operations, Maintenance, Repair and Replacement Contract it has with the Bureau of Reclamation (Reclamation). TCCA supports the Sites Reservoir Project and is committed to see its success including maximizing the diversions and delivery of Sites Reservoir Project water to its investors within the parameters allowed by the Operations, Maintenance, Repair and Replacement Contract with Reclamation and other controlling laws and regulations.

1.0 Introduction

This document provides an overview of the existing Tehama-Colusa Canal Authority (TCCA) facilities that are proposed to support operation of the Sites Reservoir Project and describes the current operation, maintenance, and replacement (OM&R) practices associated with those facilities. The document also identifies potential changes to facility operations, maintenance activities, inspection requirements, and asset replacement considerations that will result from integration with and use by the Sites Reservoir Project. The intent is to establish a baseline understanding of existing OM&R responsibilities while evaluating how Project-related operational needs will affect future facility management and long-term reliability.

2.0 Brief Description of TCCA System and Sites Facility Use

The TCCA is a Joint Powers Authority that operates and maintains the Tehama-Colusa Canal (TCC) irrigation water supply system (TCCA n.d.). The system starts in the north with the Red Bluff Pumping Plant (RBPP) and Fish Screen (FS). It was constructed in 2010 to 2012, became operational in 2012, and is designed to divert water at a rate of up to 2,500 cubic feet per second (cfs) from the Sacramento River into the TCC. The FS has a current capacity of 2,500 cfs, and the RBPP has a current pumping capacity of 2,000 cfs.

The TCC is a concrete-lined channel that was completed in 1980 by the Bureau of Reclamation (Reclamation), and it extends approximately 111 miles from the RBPP in Tehama County to south of Dunnigan in Yolo County, and serves more than 139,000 acres of irrigated agriculture. The TCC has 26 automated check structures and approximately 75 turnouts. The TCC has a capacity of 2,530 cfs at its headworks, reducing to 2,100 cfs by the time it gets to Funks Reservoir that sits between Check 16 and Check 17. Funks Reservoir is located approximately 66 miles downstream and south of the RBPP, and its initial storage capacity was 2,250 acre-feet (ac-ft). However, this volume has been reduced to approximately 1,100 ac-ft since its construction in 1976 due to sediment deposition (primarily from

natural flows from Funks Creek). Downstream of Funks Reservoir, the TCC has a capacity of 2,100 cfs and then reduces to 1,700 cfs at Check 23 until its terminus at Check 26.

The Sites Project Joint Powers Authority is currently developing the off-stream storage reservoir, known as the Sites Reservoir, located approximately 10 miles west of Maxwell, California, near the community of Sites. The proposed reservoir would be filled primarily through diversions from the Sacramento River during winter flooding events, thereby requiring evaluation of the ability of existing conveyance infrastructure, including the TCC, to accommodate the Sites diversion flows within the limits of the designed freeboard requirements.

The TCCA maintenance period is typically from December 1 through February 15, approximately 10 weeks. In recent years the TCCA has facilitated groundwater recharge projects in this period with intermittent operation of the canal, but has reserved the ability to completely shut down as needed to do maintenance. In the more distant past, the TCCA maintenance coincided with the Funks Reservoir Standard Operating Procedure (SOP) that dictated November 15 through April 1.

With the Sites Project, the TCCA will modify the maintenance period to enable adequate facility maintenance to comply with the OM&R Agreement with Reclamation and allow for Sites Project diversions during periodic winter flood events on the Sacramento River. The Sites Project will also include the construction of the Dunnigan Pipeline between Checks 25 and 26 on the TCC to take Sites Project Water to the Colusa Basin Drain. Figure 1 shows the complete process flow diagram for Sites Project with the TCCA facilities highlighted.

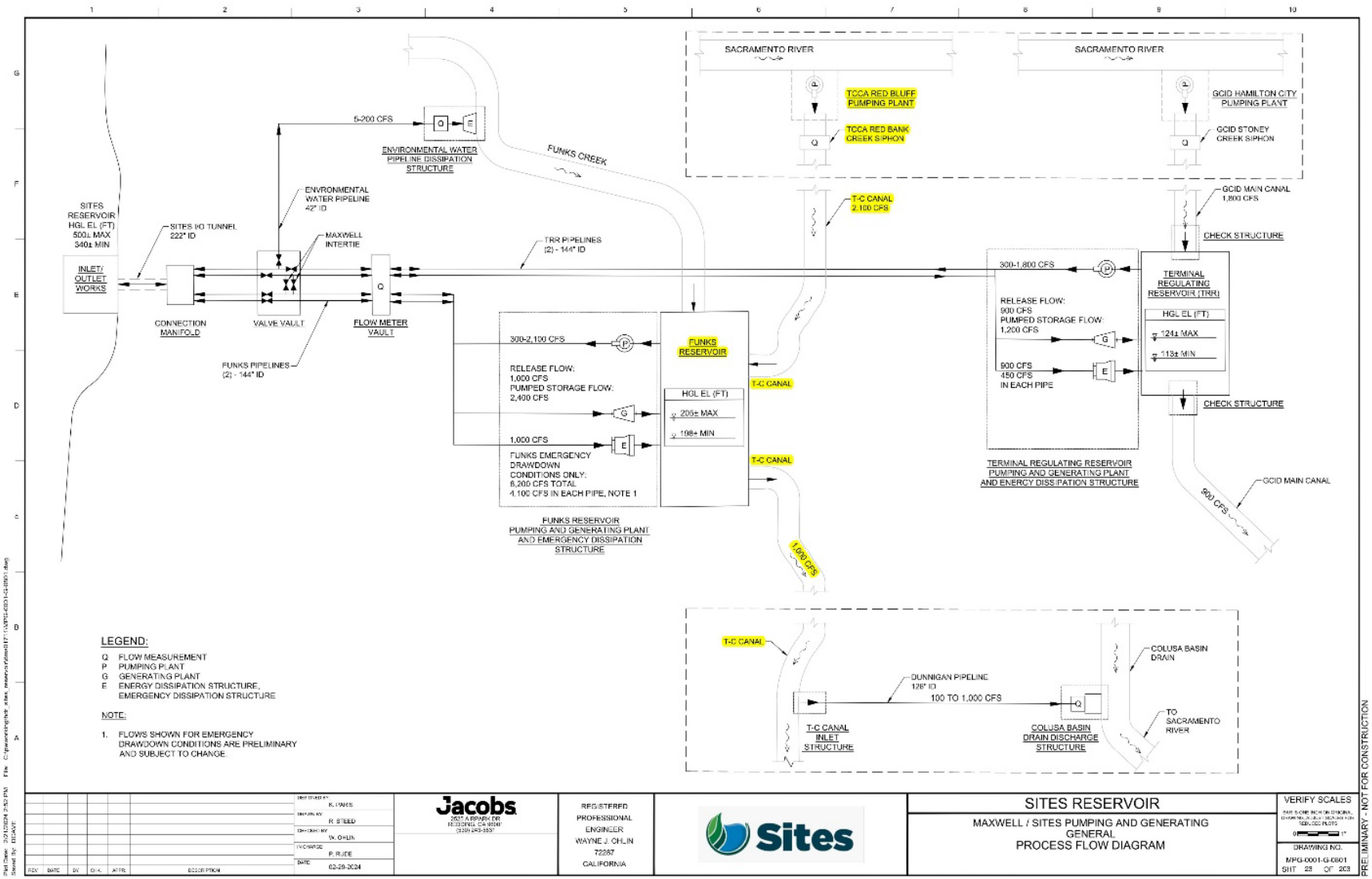

Figure 1. TCCA and Sites Project Facilities Process Flow Diagram (Jacobs, 2026a)

2.1 Red Bluff Fish Screen, Forebay, and Pumping Plant

The water diversion off the Sacramento River begins upstream of the Red Bluff Diversion Dam. Water enters the diversion facility through the 1,180-foot-long FS intake structure into the Forebay, which provides a uniform flow pattern for the RBPP. The Forebay is approximately 3.4 acres and accumulates sediment deposited by the FS bays. The water is then pumped using single-stage vertical axial-flow pumps in the RBPP into the Afterbay. The Afterbay leads into an upstream canal, siphon under Red Bank Creek, and downstream canal before connecting to the settling basin. The canals use ASTM A572 compliant Grade 50 hot-rolled steel sheet piles for the walls and a concrete structural slab for the bottom. The siphon consists of three 10-foot-wide by 9-foot-high barrels made from a reinforced concrete structure. From the settling basin, the water either enters the TCC using gravity or is pumped into the Corning Canal. Figure 2 shows an aerial photograph of the RBPP facilities.

Figure 2. Aerial Photograph of the RBPP Facilities (CH2M 2013)

The RBPP has a current capacity of 2,000 cfs and is being expanded to its full design capacity of 2,500 cfs using funds from the 2025 Reconciliation Bill (OB3) passed by the U.S. Congress. The OB3 funded project will expand the RBPP to its maximum capacity by adding two 250-cfs pumps. Two additional pump bays were designed and constructed during the original 2010 to 2012 RBPP & FS project. Each bay will accommodate a new 250 cfs pump and associated 600-horsepower (hp) motor. The FS system including the flat plate FS, cleaning system, and debris boom were designed to pass up to 2,500 cfs. To convey the maximum flow, all slide gates for the siphon must be fully open.

2.2 Main Canal from Check 1 to Check 16

The TCC was designed and constructed in reaches, with standard cross sections defined for each reach. The canal is concrete-lined and was built in a standard cross section shape, with the bottom width, side slopes, and canal depth varying slightly through the canal. Reaches 1 to 5 include 146 structures, 16 of which are check structures 1 through 16 (Jacobs 2026b). This section of reaches is the upstream segment of the TCC that conveys water from the RBPP to the Funks Reservoir. Check 1 is located at the point where the settling basin of the RBPP connects to the TCC. The TCC runs south between Interstate 5 (I-5) and the Sacramento River. Between Checks 10 and 11, the TCC crosses I-5 west. The TCC continues south until it connects to the Funks Reservoir just below Check 16. Figure 3 shows the location of the check structures and Funks Reservoir along the TCC.

This segment of the TCC runs through Tehama, Glenn, and Colusa counties. A maximum of 2,100 cfs of Sites Project water is expected to flow through the upstream segment of the TCC at any given time (Jacobs 2026b).

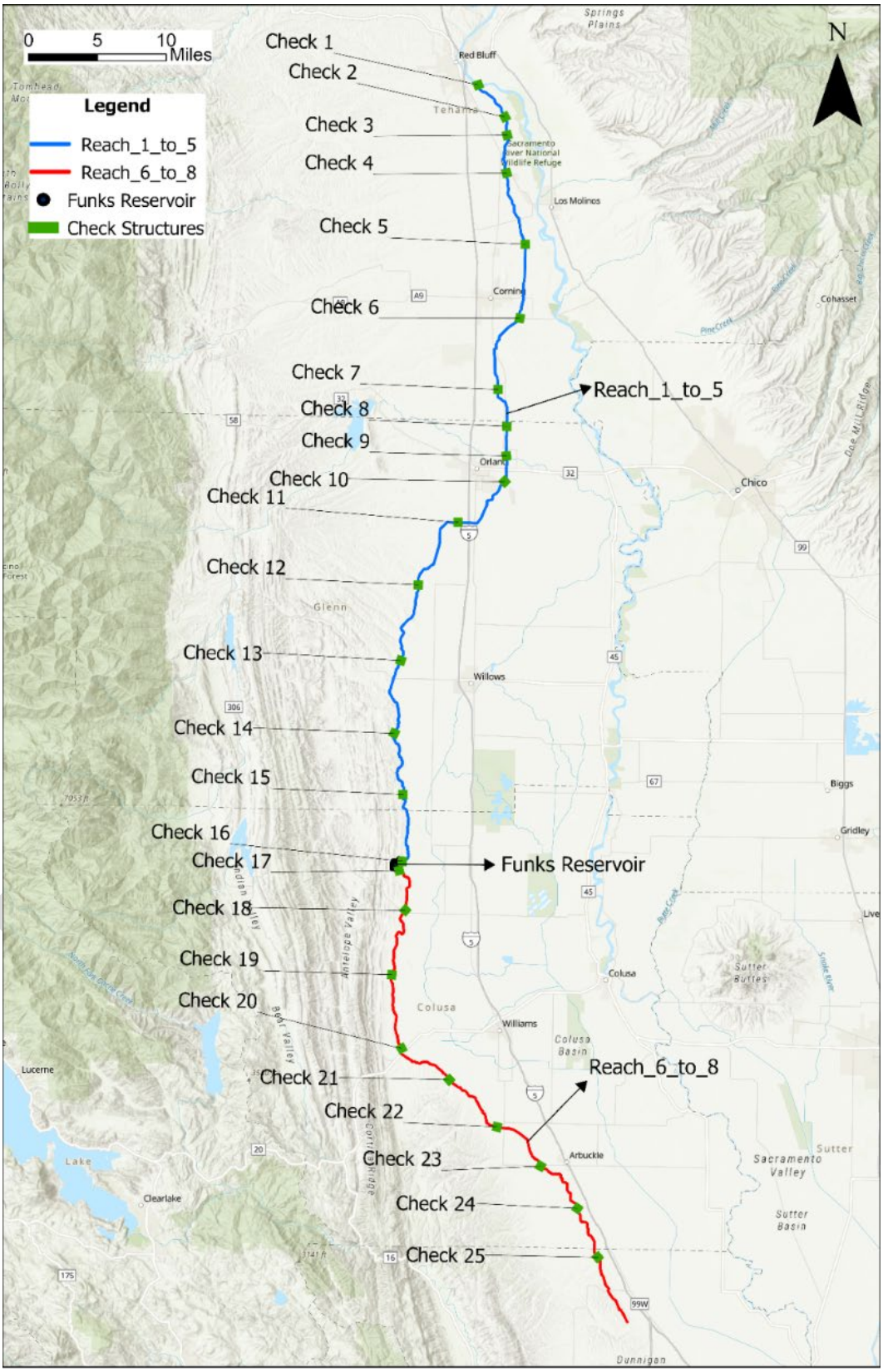

Figure 3. Check Structure Locations along TCC (Jacobs 2026b)

2.3 Funks Reservoir

The Funks Reservoir was constructed in the mid-1970s by Reclamation to provide operation flexibility for the TCC. It is located on the TCC at milepost (MP) 66.50 northwest of Maxwell, California, in Colusa County. Figure 4 shows the TCC in relationship to the Funks Reservoir area.

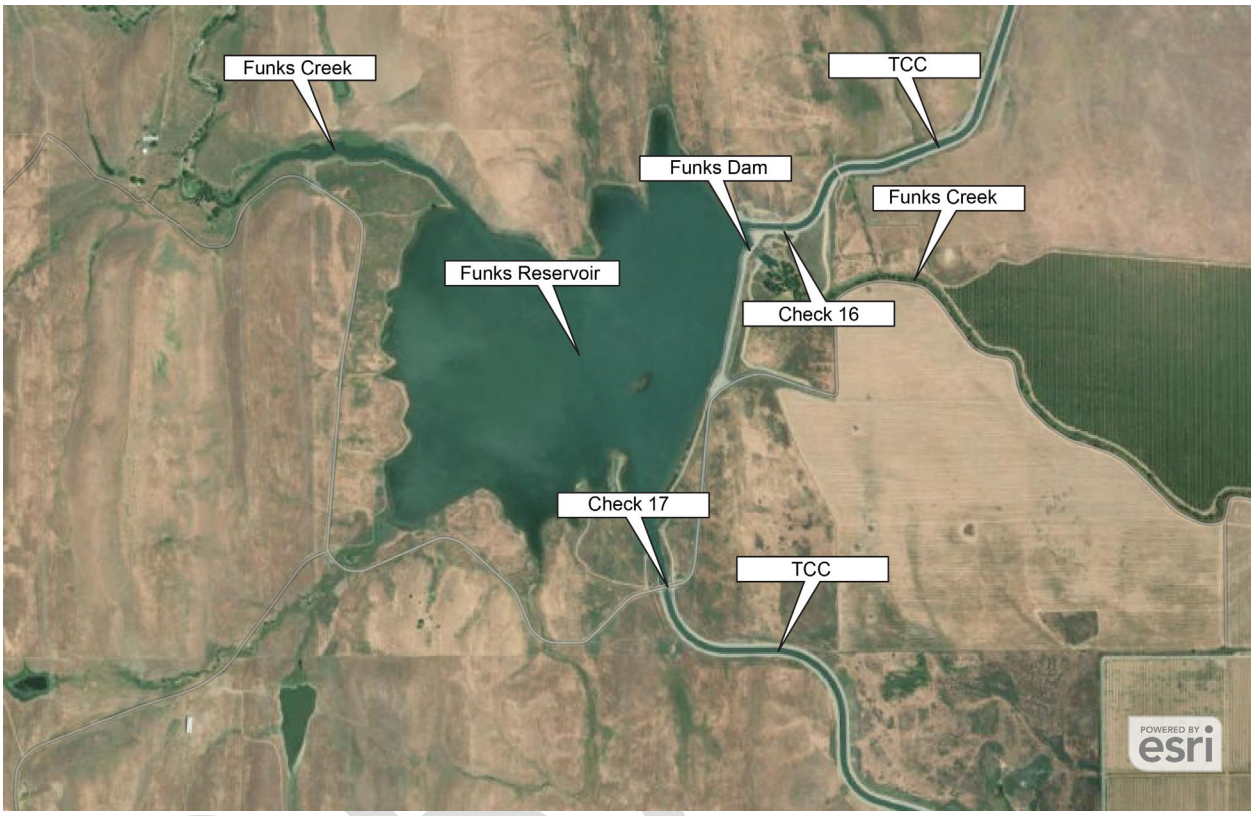

Figure 4. Funks Reservoir Area

The reservoir is operated by TCCA and is inspected and monitored at frequencies specified in the SOP and as needed to evaluate the facility conditions (Reclamation 2007). The reservoir water surface elevation (WSE) is regulated by Check 16 at the TCC inlet to Funks Reservoir and Check 17 at the outlet to the TCC. The reservoir WSE typically ranges from 200 to 205 feet, with a preferred operating range of 202 to 204 feet. The minimum WSE in the reservoir is 198 feet so that water can flow south in the TCC while providing the head required for downstream turnouts (Jacobs 2024).

At the time of construction, the reservoir had a usable capacity of 1,170 acre-feet between the operating levels of 199.5 feet and 205.2 feet elevation, and 1,080 acre-feet of inactive storage below elevation 199.5 feet, for a total capacity of 2,250 acre-feet; however, the addition of sediment from Funks Creek and TCC have reduced the total storage volume to approximately 1,100 acre-feet. The Sites Project will remove accumulated sediment to restore the original capacity of the reservoir. Excavation will occur at an elevation of approximately 197 feet in the reservoir to 165 feet for the proposed Funk Pumping and Generating Plant for the Sites Project (Jacobs 2024).

The Funks Reservoir will be used as a source of water to pump to and receive discharged water from Sites Reservoir. The Funks pumping generating plant (PGP) will pump water from Funks Reservoir to Sites Reservoir and will generate electricity using hydroelectric turbines when flow is released from Sites

Reservoir to Funks Reservoir for passage down the TCC. The pumping plant will be designed for 2,100 cfs while the generating plant will be for 1,000 cfs. An emergency dissipation structure will be included in the PGP to allow releases back to Funks Reservoir as a backup to the generating plant and to diffuse Sites Reservoir emergency drawdown flows (Jacobs 2024). Refer to Figure 1 for how the Funks Reservoir will operate with the Sites Project.

2.4 Main Canal from Check 17 to 26 (Dunnigan Pipeline)

The TCC below Funks Reservoir has nine check structures, numbered 17 through 25 (Jacobs 2026b). Check 26 marks the end of the TCC. This section of reaches is the downstream segment of the TCC that conveys water from the Funks Reservoir. Check 17 is located at the point where the Funks Reservoir flows into the TCC. The TCC continues south, crossing State Route 20 before turning southeast. It then parallels I-5 until terminating at Check 26. Refer to Figure 3 for the check structure locations. This segment of the TCC passes through Colusa and Yolo counties.

As part of the Sites Project, the Dunnigan Pipeline will connect to the TCC between Checks 25 and 26 using the TCC Inlet Structure. This structure will be placed along the east bank of the canal and conform to the existing slope of the canal. A maximum of 1,000 cfs of Sites Project water is expected to flow through the downstream segment of the TCC (Jacobs 2026b).

2.5 Operational Timing and Conveyance Capacity for Sites Project Water

The TCC is currently operated daily. This is important because water levels need to be maintained to provide adequate deliveries to existing users who are heavily affected by water levels in the canal. There will be daily peaks that will restrict what can be diverted to Sites Reservoir in certain circumstances.

Generally, the TCC has hydraulic capacity to convey most of Sites Project flows from RBPP to Funks Reservoir and all of Sites Project flows from Funks Reservoir to the Dunnigan Pipeline inlet. The following sections discuss the specifics of the flow into and out of Sites Reservoir.

2.5.1 Sacramento River Diversions to Funks Reservoir

The Sites Project will divert floodwaters off the Sacramento River at the RBPP between October and June, convey the water down the TCC into the Funks Reservoir, and then pump the water into the Sites Reservoir. The TCC capacity between RBPP and Funks Reservoir, by month is provided in Table 1 and uses 2025 data. Agricultural flow for 2025 was selected as a year when TCCA received its full allotment of water and it's a year when Sites could have diverted water off the river. Based on hydraulic modeling, the capacity of the TCC between Check #1 and Funks Reservoir is 2,400 cfs (Jacobs 2026a). The maximum Sites Project diversion is 2,120 cfs but varies by month and is based on the CalSim 3 "Top Speed" Scenario. The TCC frost water and future groundwater recharge is estimated between 100 and 200 cfs, but for this effort 200 cfs was assumed.

Table 1 indicates that in October and November the TCC has plenty of capacity for Sites water. Then in December through May the TCC is at or near capacity with Sites water and in June there is plenty of capacity for Sites water. This analysis is based on monthly average flows. In recent years the TCC has had peak daily flows more than 1,450 cfs for short periods in May and more sustained daily peaks more than 1,100 cfs in June and July. What this indicates is that there will need to be daily coordination between Sites and TCCA during river diversions for Sites water and there may be days when Sites gets less than their full diversion capacity.

Table 1. Red Bluff Pumping Plant from Check #1 to Check #16 into Funks Reservoir

Sites Diversion Operation Window: October 1 through June 30

Month	TCC Design Capacity (cfs)	TCC Modeled Capacity with 2-feet concrete freeboard (cfs)	Monthly Average TCC Agricultural Flows (cfs)	TCC Frost Water and Future Groundwater Recharge (cfs)	Sites CalSim 3 Top Speed Scenario Diversion Maximum Flow (cfs)	Combined Flows (cfs) [3+4+5]	TCC Extra Design Capacity (cfs) [1-6]	TCC Extra Modeled Capacity (cfs) [2-6]
Column #	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
January	2,100	2,400	0	200	2,120	2,320	-220	80
February	2,100	2,400	0	200	2,120	2,320	-220	80
March	2,100	2,400	1	200	2,120	2,321	-221	79
April	2,100	2,400	0	200	2,120	2,320	-220	80
May	2,100	2,400	823	0	1,375	2,198	-98	202
June	2,100	2,400	757	0	820	1,577	523	823
July	2,100	2,400	795	0	0	795	1,305	1,605
August	2,100	2,400	546	0	0	546	1,554	1,854
September	2,100	2,400	332	0	0	332	1,768	2,068
October	2,100	2,400	167	0	200	367	1,733	2,033
November	2,100	2,400	71	200	1,475	1,746	354	654
December	2,100	2,400	42	200	2,120	2,362	-262	38

Notes:

TCC Design Capacity Check #1 to Check #2 is 2,530 cfs, Check #2 through Check #4 is 2,300 cfs and from Check #5 through Check #16 is 2,100 cfs.

TCC Average Winter Flows (November 1 to April 30) vary between 100 cfs and 200 cfs for groundwater recharge and frost water upstream of Funks Reservoir.

TCC Average Summer Flows (April 1 through November 31) are taken from 2025 data per TCCA.

2.5.2 Sites Reservoir Water Releases to Dunnigan Pipeline

Releasing Sites Project flows from Sites Reservoir to Funks Reservoir to the TCC to the Dunnigan Pipeline will occur between April 1 and November 31. The TCC capacity between Funks Reservoir and the Dunnigan pipeline inlet upstream of Check 26 is provided by month in Table 2 and uses 2025 data. Agricultural flow for 2025 was selected as a year when TCCA received its full allotment of water and it's a year when Sites could have diverted water off the river. Based on hydraulic modeling, the capacity of the TCC downstream of the Funks Reservoir is 1,900 cfs (Jacobs 2026a). The maximum Sites Reservoir release is 1,000 cfs with a potential of 1,300 cfs for very short periods of time. The TCC frost water and future groundwater recharge downstream of Funks Reservoir is estimated between 50 and 150 cfs, but for this effort 150 cfs was assumed.

Table 2 indicates that in April the TCC has plenty of capacity for Sites water. Then in May through August the TCC is near its capacity for Sites water, but there is a 250 to 450 cfs buffer. In September through November the TCC has plenty of capacity for Sites water. In recent years the TCC agricultural flows downstream of Funks Reservoir have rarely exceeded peak daily flows of 600 cfs, still providing adequate capacity in the TCC for Sites water.

Table 2. From Funks Reservoir at Check #17 to end of TCC near Dunnigan Pipeline Inlet just Upstream of Check #26

Sites Releases Operation Window: April 1 through November 31

Month	TCC Design Capacity (cfs)	TCC Modeled Capacity with 1.5- to 3.5-feet concrete freeboard (cfs)	Monthly Average TCC Agricultural Flows (cfs)	TCC Frost Water and Future Groundwater Recharge (cfs)	Sites Reservoir Releases Maximum Flow (cfs)	Combined Flows (cfs) [3+4+5]	TCC Extra Design Capacity (cfs) [1-6]	TCC Extra Modeled Capacity (cfs) [2-6]
Column #	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
January	1,700	1,900	0	150	0	150	1,550	1,750
February	1,700	1,900	0	150	0	150	1,550	1,750
March	1,700	1,900	0	150	0	150	1,550	1,750
April	1,700	1,900	0	150	1,000	1,150	550	750
May	1,700	1,900	435	0	1,000	1,435	265	465
June	1,700	1,900	418	0	1,000	1,418	282	482
July	1,700	1,900	419	0	1,000	1,419	281	481
August	1,700	1,900	308	0	1,000	1,308	392	592
September	1,700	1,900	192	0	1,000	1,192	508	708
October	1,700	1,900	145	0	1,000	1,145	555	755
November	1,700	1,900	68	150	1,000	1,218	482	682
December	1,700	1,900	42	150	0	192	1,508	1,708

Notes:

TCC Design Capacity Check #17 through Check #22 is 2,100 cfs and from Check #23 to #26 is 1,700 cfs.

TCC Average Winter Flows (November 1 to April 30) vary between 50 and 150 cfs for groundwater recharge and frost water downstream of Funks Reservoir.

TCC Average Summer Flows (April 1 through November 31) are taken from 2025 data per TCCA.

2.6 Current and Future Maintenance Window

Major maintenance activities for the TCCA RBPP and FS facilities are generally performed during planned outage periods when diversion demands allow equipment to be removed from service. The SOP specifies annual, semiannual, monthly, and condition-based maintenance activities for the FSs, pumping plant, Forebay dredging system, and sediment ponds but does not identify a specific seasonal maintenance window; however, the conditions that enable maintenance to be completed are typically found during periods of low or no flow (Reclamation 2012; CH2M 2013).

The SOP does not identify a specific annual maintenance season for the Funks Reservoir and Dam; however, certain activities can only be performed during dewatered conditions, and inspection and testing requirements are specified on annual and semiannual frequencies for selected facilities. Maintenance timing is therefore tied primarily to operational conditions which occur during the period of November 15 through April 1 as dictated by the SOP (Reclamation 2007).

Maintenance for the TCC usually occurs between December 1 and February 15, when the Funks Reservoir is dewatered (Jacobs 2024). The TCC typically shuts down for about 10 weeks from December 1st through February 15 for maintenance. The TCC is not routinely dewatered as part of normal operations. However, certain repairs will require localized isolation or outages. With the Sites Project, this maintenance window will be more flexible to enable adequate facility maintenance and allow Sites Project diversions during periodic winter flood events.

Generally, the TCC will be inspected for voids behind the canal lining and fill voids before the rainy season begins, generally November 1 (Reclamation 1988). The TCCA will clear TCC pipe crossings and bridge piers that are within the TCC prism before the rainy season, typically November 1 to March 1, to prepare for runoff (Reclamation 1988).

2.7 Current SCADA and Instrument and Control System

The RBPP facilities can be operated through a supervisory control and data acquisition (SCADA) system (CH2M 2013). This system includes the fish screens, pumping plant pumps, settling basin, TCC flowmeter, and Corning Pumping Plant. The FS section includes the sediment jetting system and FS cleaner system. The sediment jetting valves and pumps along with the FS cleaner motor can be operated from the SCADA system. The system also manually operates the initial nine pumps and valves within the RBPP. The canal and basin flow level section provides monitoring information for the flowmeter in the upstream pumping plant canal and settling basin level instrument upstream of Check 1. Unlike the rest of the Sites Project elevations, these levels are reported in National Geodetic Vertical Datum of 1929 (NGVD29). It also manually adjusts the siphon motor-operated slide gates at the inlet of the siphon. Refer to Section 2.8 for more information on water measurements systems. Finally, the SCADA system can remotely monitor the status of the pumping plant. The system can be accessed and used locally and remotely.

The RBPP and FS Designers' Operating Criteria (DOC) describes the instrument and control (I&C) system used in the RBPP facilities (Reclamation 2012). The system uses programmable logic controllers (PLCs), remote input/output, and variable frequency drives to remotely monitor and control key areas of the RBPP. Data such as river levels and FS differential level measurements, Forebay levels, FS diversion flow limit, canal flow and level, and settling basin level are all transmitted to the RBPP control system. With this information, the system can manually or automatically control parts of the FS cleaning equipment,

sediment jetting system, and Forebay pumps. More information on the I&C of the RBPP is located in the RBPP DOC.

TCC and Corning Canal check structures are monitored and remotely controlled through the same SCADA system that controls the RBPP facilities. Each of the 26 check structures on the TCC communicates via 450-megahertz licensed ultra high frequency radio telemetry to the RBPP facilities and other check structures. A repeater at Grapevine Pass northwest of Sites, California provides radio communications between locations. Each check structure includes a PLC and is in constant communication with upstream and downstream check structures to modulate gates and control pool level. Operators can adjust setpoints for RBPP facilities and check structures from the Red Bluff and Willows offices and other remote locations over virtual private network connection where internet access is available.

2.8 Current Water Measurement System

To measure flow within the RBPP, an ultrasonic flowmeter is located in the Upstream Canal approximately 125 feet upstream of the Siphon Inlet Structure to measure volumetric flow rate in the canal from the pumping plant. The meter is an Argonaut-SL1500 model, manufactured by Sontek/YSI. The following signals are read from the canal flowmeter:

- Water Flow
- Water Level
- Water Temperature
- Water Velocity (across and through the canal section)

Throughout the TCC, each check structure is a measuring station through SCADA by gate opening and WSE (head); there are 25 measuring stations. The canal is operated automatically from SCADA using data from each of the check structure PLCs to remotely monitor WSEs and adjust check gate openings to maintain target water levels and delivery requirements. The canal can be operated manually using fixed gate controls during power outages, communications failures, or control system failures.

Water is delivered through slide-gate turnouts that serve irrigation districts and other authorized users. These turnout structures range in size from approximately 8 to 72 inches in diameter, and there are about 102 turnout gates along the TCC. Operators adjust these gates to meet delivery demands while maintaining target water levels throughout the canal system.

The Performance Work Statement identifies propeller, Venturi, and ultrasonic meters as flow-measurement devices maintained within the canal system. It also requires the use of current-meter measurements, pitot measurements, and head tests to verify flows and calibrate measurement equipment used for water accounting and delivery operations (Reclamation 1988).

Many delivery locations are equipped with acre-foot totalizers that record the cumulative volume of water delivered. Some sites also maintain daily flow records in cubic feet per second, allowing operators to compare instantaneous flow rates with cumulative delivery volumes for water accounting and reporting purposes (Reclamation 1988).

3.0 Fish Screen OM&R

The following sections describe existing OM&R practices and potential changes associated with implementation of the Sites Project.

3.1 Existing OM&R

The FS Facility OM&R practices are described in the *Red Bluff Pumping Plant and Fish Screen Designers' Operating Criteria* (Reclamation 2012) and the RBPP and FS SOPs (CH2M 2013). These documents describe operation of the FS bays, screen-cleaning system, sediment jetting system, and associated maintenance activities necessary to maintain fish protection and diversion functions.

The FS structure is designed to meet National Marine Fisheries Service and California Department of Fish and Game criteria for diversion flows ranging from 2,500 cfs down to as low as 80 cfs. To meet these requirements, screen bays are blocked off in numerical order from Bay 1 through Bay 58, upstream to downstream, based on the assumption that Bays 59 and 60 would remain available to accommodate the minimum diversion flow of 80 cfs.

Monthly diversion forecasts are used to determine how many bays must remain open. Operators verify the anticipated peak diversion for the upcoming month and then maintain at least 120% of that forecasted flow capacity by adjusting the number of active bays. Each bay contains a FS panel, a lower solid panel, and an upper solid panel. Spare screen panels are stored in the back slots of Bays 1–3, and spare solid panels in Bays 4–58, while Bays 59 and 60 do not store any spare panels.

During startup, the tuning baffle system was set to establish the initial porosity gradient across the screen array. Bay 1 is adjusted to approximately 4% porosity, Bay 60 to approximately 98%, and all intermediate bays are set to evenly distributed values between these endpoints. This configuration promotes uniform flow distribution and supports effective fish guidance across the full screen face.

Periodic structural inspections shall be performed to identify cracking or deterioration. Any cracks larger than hairline width must be reported promptly to Reclamation, Technical Service Center – Denver, Plant Structures Group (Attn: 86-68120), with photographs and marked prints showing their locations. Annual inspections shall also verify the condition of exterior wall penetrations and attachments, ensuring fasteners are secure and any corrosion is addressed through cleaning, recoating, or replacement. Anchor bolts and nuts shall be checked to confirm they remain fully tightened.

Each equipment module shall be inspected and maintained in accordance with the manufacturer's operations and maintenance manual, which supplements the structural inspection requirements described above.

Replacement of FS Facility components is primarily condition-based. FS panels, solid panels, screen cleaner brushes, sediment jetting equipment, and other mechanical appurtenances are repaired or replaced when inspections identify damage, excessive wear, corrosion, or operational deficiencies that will affect facility performance. Spare screen and solid panels are maintained on-site to support replacement activities and minimize operational downtime (Reclamation 2012, CH2M 2013).

3.2 OM&R with Sites Project

With the inclusion of Sites Reservoir diversions, the FS Facility would likely experience increased wintertime operations compared to its current irrigation-focused seasonal use. Because Sacramento River flows during winter storm events are typically more turbid and contain higher suspended sediment concentrations, screen-cleaning frequencies will increase to prevent excessive debris and fine sediment accumulation on screen panels. Sediment jetting systems will need to operate more frequently and for longer durations to maintain acceptable hydraulic conditions and FS performance criteria. Additional inspections of screens, screen-cleaning equipment, baffles, and related mechanical systems will be

warranted following high-flow diversion events. Over the long term, increased operating hours and exposure to abrasive sediment loads will accelerate wear of screen panels, brushes, chains, drives, and jetting system components, potentially shortening replacement intervals for these assets.

The debris boom functions to prevent large floating debris and logs from damaging the fish screens, but increased operations during high-flow runoff events will create higher likelihood of damage due to semi-submerged debris damaging the FS panels.

Under current operations, FS bays not required to meet diversion demands are blocked off using solid panels to reduce debris damage and sediment accumulation. Operation of Sites Reservoir will increase the number of bays required to remain open during winter months, potentially reducing opportunities to place bays in a blocked-off configuration and increasing screen cleaning, sediment jetting, inspection, and maintenance requirements.

4.0 Forebay OM&R

The following sections describe existing OM&R practices and potential changes associated with implementation of the Sites Project.

4.1 Existing OM&R

The Forebay is constructed downstream of the FS structure to serve as a conduit to provide uniform flow pattern and convey screened river water to the pumping plant (Figure 5). The Forebay OM&R practices are described in the *Red Bluff Pumping Plant and Fish Screen Designers' Operating Criteria* (Reclamation 2012) and the *Red Bluff Pumping Plant and Fish Screen Standard Operating Procedures* (CH2M 2013). These documents describe sediment management, dredging operations, dredge system maintenance, and long-term upkeep required to maintain reliable pumping plant operations.

Figure 5. Aerial Photograph of the RBPP Forebay (CH2M 2013)

Sediment that is deposited in the FS bays will be pushed by the sediment jetting system into the Forebay where it can be removed with the Project hydraulic dredge. Considering historical diversion rates, installed pumping capacity, and recommended operating protocols, the annual sediment deposition volume is assumed to be 2,000 to 3,400 cubic yards (0.3 to 0.5 foot thick).

Whenever more than 2 feet of sediment has deposited in the Forebay, dredging must occur to maintain the hydraulic capacity of the Forebay. Since installation, dredging has been occurring every 3 to 5 years. Dredging operations within the Forebay are influenced by the Sacramento River stage and the resulting WSE inside the Forebay. For planning and design purposes, dredging is assumed to occur at or below elevation 246.0 feet (NAVD88). Historical data show that the Sacramento River is below elevation 246.0 feet approximately 65% to 100% of the year, and during winter months, when irrigation demand is low, the river typically remains below this elevation approximately 75% of the time annually. The Forebay should be dredged to approximately elevation 234.5.

To minimize sediment deposition, the upstream most screen bays should be sequentially opened to meet projected monthly peak irrigation demand, with peak demand determined at the beginning of each month, and solid panels installed or removed to provide 120% of the predicted peak demand (CH2M 2013).

Replacement of Forebay facilities is primarily condition-based. Dredging equipment, slurry pipelines, valves, and other sediment-management components are repaired or replaced as needed based on inspection findings and operational condition.

4.2 OM&R with Sites Project

With implementation of the Sites Reservoir Project, the Forebay would likely experience increased sediment accumulation due to the diversion of more turbid Sacramento River water during winter periods. Higher sediment loads will increase the frequency of sediment monitoring and dredging beyond current operating assumptions, resulting in greater use of the hydraulic dredge system and associated slurry pipelines and appurtenances. Consequently, maintenance and replacement of sediment-management equipment and appurtenances will be required more frequently to maintain Forebay capacity and reliable operation of the pumping plant.

5.0 Settling Basins OM&R

The following sections describe existing OM&R practices and potential changes associated with implementation of the Sites Project.

5.1 Existing OM&R

The Settling Basins and Sediment Ponds OM&R practices are described in the *Red Bluff Pumping Plant and Fish Screen Designers' Operating Criteria* (Reclamation 2012) and the RBPP and FS SOPs (CH2M 2013). These documents describe operation of the sediment-management system, sediment storage facilities, water-control structures, and associated maintenance and replacement requirements.

The sediment ponds receive dredged slurry from the Forebay and provide settling capacity for suspended sediment prior to returning decanted water to the canal system. Operations include routing dredged slurry through the pond system to maximize detention time and settling efficiency using culverts, discharge structures, and sluice gates. Maintenance activities include annual inspection of

discharge structures, semiannual cleaning and repair of sluice gates, and periodic removal of accumulated sediment to preserve available storage capacity.

Replacement is condition-based and includes repair or replacement of gates, culvert appurtenances, discharge-control structures, and other sediment-management facilities when deterioration, corrosion, leakage, or operational deficiencies are identified (CH2M 2013).

5.2 OM&R with Sites Project

With implementation of the Sites Reservoir Project, the settling basins and sediment ponds would likely receive greater sediment loads due to winter diversions of more turbid Sacramento River water. Increased sediment accumulation will require more frequent sediment removal to maintain available storage capacity and settling performance. Higher use of sluice gates, culverts, transfer pipes, and discharge structures will also increase maintenance needs and accelerate replacement of sediment-management components over time.

6.0 Pumping Plant OM&R

The following sections describe existing OM&R practices and potential changes associated with implementation of the Sites Project.

6.1 Existing OM&R

The pumping plant includes nine single-stage, vertical axial-flow pumps manufactured by Moving Water Industries Corporation and two more pumps being installed by the OB3 funded project (each with a capacity of 262 cfs). Of the nine existing pumps, seven are 84-inch model 84NWC units, each with a nominal capacity of 262 cfs, and two are 60-inch model 60NWC units rated at 131 cfs. All pumps are designed for approximately 12.5 feet of total dynamic head and discharge into the Afterbay. The pumps were selected to operate as follows:

- Over a total dynamic head range of 7.0 to 17.0 feet
- Between the pump Intake Low Water Locket-level elevation 242.0 feet and sump High Emergency Off-level elevation of 266.0 feet (normal pump operation occurs between sump WSEs of 242.0 and 250.0 feet)
- Between Afterbay WSEs of 253.0 feet and 265.7 feet, where slide gates control the flow to the Settling Basin to meet irrigation water delivery requirements throughout the season
- Over the full operating head ranges of both the Afterbay and the Sacramento River

Table 3 describes the maintenance requirements for the pumps.

Table 3. Red Bluff Pumping Plant Maintenance Schedule

Maintenance Item	Maintenance Action	Time Interval
Pump Installation Operations and Maintenance Manual		
Pump	Lubricate	Every 6 months during operation
Pump	Minor inspection	Every 6 months during operation

Maintenance Item	Maintenance Action	Time Interval
Pump	Major inspection	Once per year
Driver	Inspect	Every 6 months
Packing	Check for leakage	Once per month
Drip-oil system	Check line shaft bearing	Once per month
Impeller	Check clearance	Once per year
Pump	Check for accumulated grease, dirt, and worn, broken, or loose parts	Every 6 months

Source: CH2M 2013.

Table 4 lists maintenance requirements for the pump motors.

Table 4. Red Bluff Pumping Plant Variable Frequency Drives Motor Maintenance Schedule

Maintenance Item	Maintenance Action	Time Interval
US Motors		
Oil	Inspect	Once every month
Oil	Replace	1 year or as needed
Shaft	Rotate	Once every month
Winding insulation	Clean and dry	1 year or as needed

Source: CH2M 2013.

Pumping plant replacement activities are driven by equipment condition and performance. Major components, including pumps, impellers, bearings, valves, actuators, and gates, are rehabilitated or replaced as needed to maintain reliable and efficient operations (Reclamation 2012, CH2M 2013).

6.2 OM&R with Sites Project

With implementation of the Sites Reservoir Project, the pumping plant will experience increased operating hours due to additional winter diversions. In addition, higher sediment concentrations associated with more turbid Sacramento River water will increase wear on pumps, impellers, valves, and other hydraulic components. As a result, inspections, preventive maintenance, and replacement of wear-related components will be required more frequently for pumping facilities to maintain pumping efficiency and reliable operation.

7.0 Funks Dam and Reservoir OM&R

The following sections describe existing OM&R practices and potential changes associated with implementation of the Sites Project.

7.1 Existing OM&R

OM&R activities for Funks Dam and Reservoir are described in the SOP (Reclamation 2007) and are intended to support the continued safe and reliable operation of the dam, reservoir, spillway, outlet

works, gates, valves, and other appurtenant facilities. The SOP identifies the responsibilities of operating personnel and establishes requirements for routine inspections, maintenance activities, operational testing, monitoring, and documentation necessary to maintain facility functionality and operational readiness (Reclamation 2007).

Funks Dam is a zoned earthfill embankment. The structure height is approximately 80 feet with a crest width of 20 feet at an elevation of 214 feet and a crest length of approximately 1,500 feet.

Outlet works include a 14-inch diameter steel pipe with a 14-inch flowmeter and 12-inch motor-operated butterfly valve. This pipe facilitates small discharges into Funks Creek. The 14-inch flowmeter and two differential-pressure transmitters are installed to indicate, record, and totalize the flow of water through the outlet works on Funks Dam. Operation, servicing, and maintenance of the flow-metering equipment shall be performed in accordance with the manufacturer's instructions from Badger Meter, Inc. (Tulsa, Oklahoma) and from Kent Taylor for the differential-pressure cells.

The spillway is a left-abutment structure featuring a 75-foot gated overflow crest at elevation 186 feet, an 83-foot-wide chute, and an 83-foot-wide stilling basin. It uses three radial gates, each 25 feet by 20.22 feet, operated by hydraulic cylinders. The spillway also includes the previously mentioned 14-inch outlet pipe for small downstream releases. A 15-inch-diameter cast iron slide gate is installed in the spillway structure to control flow of the water through the 14-inch flowmeter. This is manually operated by a handwheel on a pedestal lift. Four turns of the handwheel will move the gate 1 inch.

Reservoir levels will rise without restriction up to elevation 186 feet; however, between 186 feet and 205.2 feet, the filling rate must be limited to 2 feet per day, ideally performed in the morning to allow daylight monitoring of embankment and structural response. During normal operations, drawdown between 205.2 feet and 186 feet should also be limited to 2 feet per day, while in emergency conditions no drawdown rate limit applies.

During the irrigation season (April 1 to November 15), the spillway gates stay closed, and the reservoir is filled with TCC water, with Funks Creek inflow normally routed through the outlet works. During the flood or high-water season (November 15 to April 1), the spillway gates are normally fully open; however, the gates can be operated to allow for deliveries downstream of Funks. This practice has been more aggressively pursued with the advent of the *Sustainable Groundwater Management Act* and the recharge projects downstream of Funks Reservoir.

During the high stream runoff season (November to early April), the reservoir must be isolated from the canal system by closing the gates at Checks 16 and 17 in TCC Reaches 5 and 6. The reservoir should be lowered to elevation 186 feet with the spillway gates fully open. However, to pass water through the reservoir to downstream deliveries, stoplogs may be added and the gates operated to maintain the water surface at elevation 197 feet (Reclamation 2004).

7.2 OM&R with Sites Project

With implementation of the Sites Reservoir Project, OM&R activities at Funks Dam and Reservoir will need to be adjusted to accommodate increased winter operations and the conveyance of more turbid water diverted from the Sacramento River. Higher sediment loads will increase inspection, cleaning, and maintenance requirements for gates, valves, outlet works, and flow-measurement equipment, while also contributing to greater wear on seals and other wetted components. As a result, maintenance frequencies, replacement intervals, and operational procedures will require updates to address sediment accumulation, equipment wear, and the shift toward more frequent wintertime operations.

Funks Creek will be dammed off by Sites Reservoir and therefore, Funks Reservoir will be able to be full during the high stream runoff season (November through April) when diversions off the Sacramento River are occurring to fill Sites Reservoir if the State Water Resources Control Board Permit enables retention of Funks Creek water. If Funks Creek water retention is not allowed by the diversion permit, Funks operations will need to be reviewed and the SOP updated further.

8.0 Main Canal and Appurtenances OM&R

The following sections describe existing OM&R practices and potential changes associated with implementation of the Sites Project.

8.1 Existing OM&R

The TCCA is responsible for operating, maintaining, and repairing the canal and associated facilities to ensure safe and reliable water deliveries. Canal operators perform daily inspections during the irrigation season to identify seepage, cracking, debris, and other operational issues, while additional inspections are conducted weekly, annually, or seasonally depending on the facility. These OM&R practices are described in the *Performance Work Statement for the Operation and Maintenance of the Tehama-Colusa and Corning Canals* (Reclamation 1988).

The canal includes approximately 102 slide-gate turnouts used to deliver water to irrigation districts. These turnouts must be kept in operable condition through annual cleaning and lubrication, adjustment of gates and operators, removal of trash and sediment, repair or replacement of damaged components, and corrosion prevention. Radial gates at check and control structures also require regular lubrication, annual inspections, and periodic replacement of seals and other wear components.

Canal maintenance includes removal of floating debris, sediment, and other obstructions that will affect operations. Concrete-lined reaches are inspected weekly for cracks, broken sections, and voids, with repairs completed as needed. Annual inspections are also required to identify and repair voids behind the lining before the rainy season. Although the TCC is generally not dewatered, maintenance activities will require localized isolation of facilities to perform repairs, sediment removal, or structure maintenance.

Siphons, drainage crossings, inlet drains, flap valves, measuring structures, and related facilities must be routinely inspected and repaired or replaced, as necessary. Drainage channels and crossings are cleaned and repaired before the rainy season and inspected during storms to maintain capacity and protect canal infrastructure. Overall, the maintenance program emphasizes preventive maintenance through daily operational inspections, weekly canal inspections, annual facility maintenance, and seasonal preparation activities, with emergency repairs receiving the highest priority.

8.2 OM&R with Sites Project

With the addition of Sites Reservoir Project water, operation and maintenance requirements for the TCC will increase due to both the timing and quality of deliveries. Unlike traditional irrigation deliveries that occur primarily during the summer, Sites water would be conveyed largely during the winter and non-irrigation season, requiring more year-round operation of canal facilities, gates, and measurement structures. This will reduce opportunities for maintenance outages and increase inspection and staffing needs.

In addition, Sites water diverted from the Sacramento River during high-flow periods will contain higher sediment concentrations than typical canal deliveries. Increased sediment loads will lead to greater accumulation of silt in canal reaches, turnouts, siphons, check structures, and measurement facilities, requiring more frequent sediment removal and cleaning. Higher sediment levels will also accelerate wear on gates, seals, and flow-measurement equipment, potentially increasing long-term repair and replacement requirements. Overall, the addition of Sites water will shift canal operations toward a more continuous, year-round maintenance program with greater emphasis on sediment management and hydraulic structure upkeep.

9.0 References

Bureau of Reclamation (Reclamation). 1988. *Performance Work Statement for the Operation and Maintenance of the Tehama-Colusa and Corning Canals*. Internal Working Document, Revision dated September 15, 1988.

Bureau of Reclamation (Reclamation). 2004. *Funks Dam – Recommendations and Request for Revision to Standard Operations and Procedures for Funks Dam and Reservoir*. February. U.S. Department of the Interior, Mid-Pacific Region.

Bureau of Reclamation (Reclamation). 2007. *Standing Operating Procedures for Funks Dam and Reservoir*. April. U.S. Department of the Interior, Mid-Pacific Region.

Bureau of Reclamation (Reclamation). 2012. *Red Bluff Pumping Plant and Fish Screen Designers' Operating Criteria.* June.

CH2M HILL Engineers Inc. (CH2M). 2013. *Red Bluff Pumping Plant and Fish Screen Project Standing Operating Procedures.* May. Prepared for Tehama-Colusa Canal Authority.

Jacobs. 2024. *30 Percent Design – Draft Basis of Design Report – HC Conveyance Facilities Sites Reservoir Project*. February 5.

Jacobs. 2026a. *Sites Reservoir Project: Conveyance Capacity Technical Memorandum*. June 18.

Jacobs. 2026b. *Tehama- Colusa Canal HEC-RAS Hydraulic Modeling Technical Memorandum*. June 12.

Tehama-Colusa Canal Authority (TCCA). n.d. *About TCCA*. https://tccanal.com/about-tcca.