# Appendix F: Conveyance Facilities and Waterways

# Conveyance Facilities and Waterways

This appendix includes a summary of conveyance facilities and waterways that may be used for conveyance and exchange of available water supplies between the Cross Valley Contractors and their potential exchange partners.

## Central Valley Project

The Central Valley Project (CVP) is one of the nation's major water conservation developments. It extends from the Cascade Range in the north to the semi-arid but fertile plains along the Kern River in the south. Initial features of the project were built primarily to protect California's Central Valley from crippling water shortages and menacing floods, but the CVP also improves Sacramento River navigation, supplies domestic and industrial water, generates electric power, conserves fish and wildlife, creates opportunities for recreation, and enhances water quality. The CVP serves farms, homes, and industry in California's Central Valley as well as major urban centers in the San Francisco Bay Area; it is also the primary source of water for much of California`s wetlands. In addition to delivering water for farms, homes, factories, and the environment, the CVP produces electric power and provides flood protection, navigation, recreation, and water quality benefits (Reclamation 2015).

### Jones Pumping Plant

The Jones Pumping Plant consists of an inlet channel, pumping plant, and discharge pipes. Water in the Delta is lifted 197 feet into the Delta-Mendota Canal (DMC). Each of the six pumps at Tracy is powered by a 22,500 horsepower motor and is capable of pumping 767 cubic feet per second (cfs). Power to run the huge pumps is supplied by CVP powerplants. The water is pumped through three 15-foot-diameter discharge pipes and carried about 1 mile up to the DMC. The intake canal includes the Jones Fish Screen, which was built to intercept downstream migrant fish so they may be returned to the main channel to resume their journey to the ocean. Although Cross Valley Contractor supplies are predominantly pumped at Banks, infrequently, if pumping capacity exists after all other CVP needs have been met (typically in the spring), Cross Valley Contractor water supplies have been pumped at Jones and moved over to the SWP at O'Neill Forebay for conveyance to the Cross Valley Canal.

### Delta-Mendota Canal

The DMC includes a combination of both concrete-lined and earthen-lined sections and is about 117 miles in length. The canal transports water from the Jones Pumping Plant to the Mendota Pool, located at the confluence of the San Joaquin River and the North Fork of the Kings River, approximately 30 miles west of the city of Fresno. The Mendota Pool is controlled by a concrete storage dam that was constructed in 1917 and serves as the terminus for the DMC. Capacity in the DMC is restricted by the physical limitations of the canal and the pumping limits of the Jones Pumping Plant.

## Joint Use Facilities

Some CVP facilities (i.e., the San Luis Unit) were developed in coordination with the State Water Project (SWP). Both the CVP and the SWP use the San Luis Reservoir, O'Neill Forebay, and more than 100 miles of the California Aqueduct/San Luis Canal and its related pumping and generating facilities. These operations are closely coordinated at a Joint Operations Center in Sacramento and join with other agencies such as the National Weather Service and the U.S. Army Corps of Engineers for joint action during flood emergencies (Reclamation 2015).

### *O'Neill Forebay*

This joint Federal/State facility is located on San Luis Creek, 2.5 miles downstream from San Luis Dam. The forebay, with a capacity of 56,400 acre-feet (AF), is used as a hydraulic junction point for Federal and State waters. The top 20,000 AF acts to re-regulate storage necessary to permit off-peak pumping and on-peak generation by the main San Luis Pumping-Generating Plant. The O'Neill Forebay Inlet Channel extends 2,200 feet from the DMC to deliver water to O'Neill Forebay. Six pumping units of the O'Neill Pumping-Generating Plant lift water 45 to 53 feet into the forebay.

### *California Aqueduct/San Luis Canal*

The California Aqueduct is a feature of the SWP and is operated by the California Department Water Resources (DWR). Water is exported from the Delta at the Clifton Court Forebay through the Banks Pumping Plant and is pumped into the California Aqueduct. From there, water flows south via gravity into the San Luis Joint-Use Complex, which was designed and constructed by the federal government and is operated and maintained by DWR. The San Luis Canal is the federal section of the California Aqueduct. The San Luis Canal extends 102.5 miles from O'Neill Forebay, near Los Banos, in a southeasterly direction to a point west of Kettlemen City. The principle purpose of the CVP portion of the facility is to furnish approximately 1.25 million AF of water as a supplemental irrigation supply to roughly 600,000 acres located in the western portion of Fresno, Kings, and Merced counties. After Kettlemen City, the California Aqueduct (SWP portion) conveys SWP water to serve southern California mainly for municipal and industrial purposes (M&I) purposes.

The California Aqueduct/San Luis Canal is concrete-lined canal with a capacity ranging from 8,350 to 13,100 cfs. The California Aqueduct-Delta Mendota Canal Intertie was installed north of the O'Neill Forebay pumping plant to provide connectivity between the California Aqueduct and the DMC. The intertie allows CVP and SWP water to be moved back and forth between these facilities.

### *Dos Amigos Pumping Plant*

This joint Federal/State facility, 17 miles south of O'Neill Forebay, is a relift plant in the San Luis Canal. The plant contains six pumping units, each capable of delivering 2,200 cfs at 125 feet of head.

## Friant Division

The Friant Division was authorized by Congress under the concept of conjunctive use where CVP water was meant to be a supplemental supply to alleviate groundwater overdraft in the area. Based on the conjunctive use concept within the Friant Division, contractors are expected to continue mixed use of CVP and other surface water supplies and groundwater, with greater

emphasis on groundwater use during dry periods when surface water is limited or expensive and percolate excess surface water in wet years. The Friant Division is an integral part of the CVP, but is hydrologically independent and therefore operated separately from the other divisions of the CVP (Reclamation 2012). Major facilities of the Friant Division include Friant Dam and Millerton Lake, the Friant-Kern Canal and the Madera Canal.

#### *Friant-Kern Canal*

The Friant-Kern Canal conveys water supplies stored in Millerton Lake from the San Joaquin River to water districts in Fresno, Tulare, and Kern Counties. The canal extends 152 miles south from Friant Dam in Fresno County to the Kern River in Kern County four miles west of Bakersfield. The Friant-Kern Canal annually delivers about seven million AF of water for agricultural, urban, and wildlife purposes.

## State Water Project

The SWP is a complex system of reservoirs, pumping and generating plants, and water conveyance facilities, including the California Aqueduct. The principal purpose of the SWP is to supply water to its 29 long-term urban and agricultural water supply contractors in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California (DWR 2015).

### Banks Pumping Plant

Located in the Sacramento-San Joaquin Delta, Banks lifts water 244 feet from the Clifton Court Forebay into the California Aqueduct. DWR has a priority system for pumping SWP and CVP water supplies at Banks. CVP water supplies have a lower priority compared to SWP uses. Prior to pumping CVP supplies at Banks (Joint Point of Diversion) there are environmental and water quality plans that must be submitted and approved and criteria that must be met. Under certain conditions, DWR does not have an opportunity to pump and convey the annual allocation of water supplies to the Cross Valley Contractors or pumping and conveyance may occur at a time that is outside of the growing season.

## Cross Valley Canal

The Cross Valley Canal is a locally-financed facility completed in 1975 and operated by the Kern County Water Agency (KCWA). The canal extends from the California Aqueduct near Tupman to Bakersfield. It consists of 6 pumping lifts, with a capacity of 1,400 cfs from the Aqueduct to Arvin-Edison Water Storage District's (Arvin-Edison) Intake Canal (also near the Friant-Kern Canal terminus and Kern River). The Cross Valley Canal "extension", an unlined canal, continues past Arvin-Edison's Intake Canal, which is rated 342 cfs and has an additional 2 pumping lifts. The Cross Valley Canal is a joint-use facility owned by various participants, including Cross Valley Contractors and Arvin-Edison. The Cross Valley Canal can convey water from the Aqueduct to the Kern Water Bank, the City of Bakersfield groundwater recharge facility, the Berrenda Mesa Property, the Pioneer Banking Project, the Kern River channel, to Arvin-Edison's Intake Canal, or to various member units of KCWA and other districts who have access to the Cross Valley Canal. When needed, the Cross Valley Canal is also capable of

conveying 500 cfs, in reverse flow-gravity mode, to the Aqueduct. In 2008, as part of the Cross Valley Canal expansion project, an additional 500 cfs turnout was constructed from the Friant-Kern Canal that can deliver water by gravity into either the AEWSD Intake Canal or the CVC.

## Kern River/Alejandro/Outlet Canals

The Kern River is about 165 miles long and is the southernmost river in the San Joaquin Valley. The river originates from the Sierra Nevada Mountains on the eastern side of Tulare County and terminates on the west side of Kern County where it is mainly diverted for local water supplies. The U.S. Army Corp of Engineers (Corps) operates Isabella Dam on the Kern River to serve agricultural, hydroelectric, and flood control uses. Flows downstream of the dam are monitored and managed by the Kern River Watermaster. Below the dam, the river is highly diverted through a series of canals to irrigate farms in the southern San Joaquin Valley and provide municipal water supplies to the City of Bakersfield and surrounding areas. The Kern River is one of the few rivers in the Central Valley which does not contribute water to the CVP; however, the Friant-Kern Canal joins the river approximately four miles west of downtown Bakersfield. Kern River water quality is generally similar to that in the Friant-Kern Canal since its origin is also from snow melt in the Sierra Nevada. The Kern River Canal can also be used to convey water from the Kern River to the California Aqueduct directly via the Alejandro Canal, the Buena Vista Aquatic Lakes and Outlet Canal and a pumping plant, or indirectly via an exchange.

Water from the Friant-Kern Canal, the Cross Valley Canal, or from the Kern River can be conveyed in the Kern River channel or in the Kern River Canal to the Pioneer Banking project or other recharge areas. Conveyance of water in the Kern River Canal requires an agreement with the City of Bakersfield. Conveyance of water in the Alejandro Canal requires an agreement with the Buena Vista Water Storage District. It should be noted that depending on groundwater pumping operations, water in the Buena Vista Aquatic Lake may contain high concentrations of arsenic. These high concentrations are caused when groundwater from nearby wells is pumped into the Buena Vista Aquatic lakes for agricultural use and to make up evaporation losses.

## Kern Water Bank Canal

The Kern Water Bank Canal is a bi-directional canal constructed by the Kern Water Bank Authority. The canal has a single pumping plant for delivering water for recharge. The forward flow capacity is 950 cfs. Reverse flow capacity is approximately 650 cfs. The canal is used to convey SWP water and other waters from the Aqueduct to the local banking projects for groundwater recharge. The canal is also used to convey pumped groundwater during a surface water short year, back to the Aqueduct, either directly or by exchange, to water districts for a supplemental water supply.

## Kings River

The Corps is the operator of Pine Flat Dam and releases water for flood control. During the irrigation season, (normally June through August) water is released from behind Pine Flat Dam

and the Kings River is controlled by the Kings River Water Association. In wet years the Kings River may flow to the Tulare Lake Basin. Only in very wet seasons does the Kings River flow north into Fresno Slough and into the San Joaquin River. The average annual runoff for the Kings River is approximately 1.7 million AF. The Kings River is managed similarly to a canal system providing water for irrigation and to meet flow requirements for fish and wildlife purposes.

## Kaweah and St. Johns Rivers

The Corps operates Terminus Dam on the Kaweah River for flood control and water supply. Downstream of Terminus Dam, the St. Johns River and Lower Kaweah River divides from the Kaweah River at McKay Point. The St. Johns River becomes Cross Creek north of Goshen. A few tributaries such as Dry Creek and Yokohl Creek, flow into the Kaweah and St. Johns Rivers. The Kaweah River ceases to be an identifiable stream south of Highway 245, and the river branches into Mill Creek and other major and minor streams creating a delta. During the irrigation season (June through August) the Kaweah Delta Water Conservation District manages the Kaweah River irrigation flows similarly to a canal facility to meet demands and on behalf of the watermaster for the Kaweah and St. Johns Rivers Association. The average annual runoff of the Kaweah River is 430,000 AF, and does not include various smaller creeks. The St. Johns River was permanently established during the fresher of 1861-62 and branches off the Kaweah River. The Lower Kaweah River, St. Johns River and smaller creeks are used for conveyance of irrigation water to ditch companies and water districts.

## Tule River

The Corps operates Success Dam for flood control and water supply. The Tule River above Success Reservoir is composed of three channels, the North Fork and the Middle Fork that join just above the community of Springville, and the South Fork that passes through the Tule River Indian Reservation before entering Success Reservoir at State Route 190. The main channel of the Tule River below Success Dam traverses about 50 miles to the pocket of the Tulare Lake Basin where the river joins the terminus of the South Fork of the Kings River. The Tule River bifurcates at Road 192 and a South Fork channel traverses 12 miles along with a third Middle Fork channel of 3 miles, all northerly of the community of Woodville. The average annual runoff of the Tule River is 141,630 AF.

The Tule River Association, made up of all water rights holders at and below Success Reservoir, administers the water and storage rights at and below Success Dam. The Corps controls storage in Success Reservoir through a Flood Control Diagram that limits irrigation storage during the period November 15th to May 1st of the following year. Irrigation water storage operations during the remainder of the year are controlled by the Tule River Association Watermaster.

The Tule River gross service area below Success Dam covers about 320,000 acres, of which 140,000 acres are within Tulare County, and 180,000 acres are within the Tulare Lake Basin of Kings County. Of the gross service area, approximately 240,000 acres are developed in irrigated agriculture with the remainder in urban and non-agriculture uses.