

North San Joaquin Water Conservation District Tracy Lake Improvement District 2016 Operation Plan

Background

The Tracy Lake Improvement District (TLID) was formed in 2011 by the North San Joaquin Water Conservation District (NSJWCD) and the landowners within the TLID (TLID Members) for the construction and operation of the Tracy Lake Pump Station (Pump Station) and outfall pipeline to divert water from the Mokelumne River into South Tracy Lake (Tracy Lake), the Project. Purpose of this diversion is to provide for recharge for the underlying groundwater basin either by direct recharge via percolation of surface water from Tracy Lake or by in lieu recharge resulting from TLID Members (Landowners) using surface water in lieu of groundwater to address irrigation demands.

The three different parties that have an interest in the Project, Brovelli Woods, LLC (Lake Owners), NSJWCD, and the Board of Directors of NSJWCD as Trustees for the TLID, and TLID Members, executed the South Tracy Lake Use Agreement (Agreement) on November 17, 2011. In this agreement the Lake Owners agreed to allow the District to divert water into Tracy Lake for storage and conveyance of surface water to TLID Lands and recharge of the local groundwater basin. A key issue regarding the operation of Tracy Lake, is the determination and agreement on the operating levels of Tracy Lake in a manner that achieves the objectives of all three parties.

In the Agreement there is the requirement that the Parties cooperate in good faith to come to an agreement on the "Lake Diversion Elevation" and the "Maximum Allowable Lake Elevation." This statement was made in acknowledgement that some of the physical operating parameters for the Lake such as percolation rate and the influence of water depth in Tracy Lake on that rates are unknown. As a result, estimates of these rates together with the existing topographic mapping were used to estimate the initial minimum Lake Diversion Elevation. In addition, the amount of water that would have to be diverted into the Tracy Lake to achieve the required Lake Diversion Elevation, with assumptions for percolation and evaporation were also estimated. Lake Diversion Level is the minimum elevation of the water surface in Tracy Lake which must be achieved that will allow the TLID Members (Land Owners) to divert irrigation water from Tracy Lake using a land owner constructed pump station.

During design and permitting of the project, location of the TLID Members pump station was discussed in detail by member of the Tracy Lake Coordinating Committee, which is composed of members from each of the three parties. This discussion was held as the physical location of the TLID Members pump station has a significant impact on the Lake Diversion Elevation and its influence on the land owners ability to divert irrigation water without additional capital facilities to convey flows to Forest Lake for pumping and irrigation. Due to the topography of the bottom of Tracy Lake, the farther west the pump station is located, the greater the Lake Diversion Elevation required for diversion of irrigation water. At the October 15, 2012 meeting of the Tracy Lake Coordinating Committee meeting, it was unanimously agreed by the Lake Owners, NSJWCD Board Members, and TLID Members that the Lake Diversion Elevation of 14 feet should be recommended to the NSJWCD Board. On October 29, 2012, at the NSJWCD Board meeting the issue was presented to the full Board for their concurrence.

It should be recognized that the “Lake Diversion Level” is a minimum elevation of operation of Tracy Lake as the water level will vary in response to demands from and inputs into the Lake. Thus, when the Agreement was executed, a major concern was the determination of the Maximum water level required to operate the Lake to protect the Lake Owner improvements and crops. To this extent, it was agreed in Section 1.d. as follows: “Lake Owners and District will establish the maximum water level objective to protect their respective interests and facilitate the operations of the parties herein. Such levels shall be based on recommendations prepared by a registered civil engineer.” During the design and permitting process for the pump station it became apparent that other land owners on Jahant Slough, tributary to Tracy Lake had concerns regarding the same issue. To address this concern, it was determined that 16 feet would be the maximum water surface elevation that would avoid backing water up Jahant Slough to avoid impacting adjacent properties. Another issue of concern that was identified and discussed in the Agreement was the concern that any excavation in either lake could not result in more River water having to be diverted into Tracy Lake so that the TLID Members could pump the same amount of water under either condition.

Objective of Operation Plan

The objective of this Operation Plan is to evaluate current and changing physical conditions in Tracy Lake and identify operational procedures for the Tracy Lake Pump Station and Tracy Lake that minimizes impacts to the Lake Owners and TLID members. It should be recognized that the original operation plan for Tracy Lake called for the volume of water in Tracy Lake to vary in response to changes in irrigation, percolation and evaporation demands during the course of the irrigation season together with diversion inputs from both Tracy Lake Pump Station, and any flow in Jahant Slough. In an effort to assist in maintaining the water level within a given range of elevations, the pump station was designed with a variable frequency drive to allow for changes in the diversion rate. Thus, it was anticipated that during the irrigation season, based on estimates of evaporation and percolation, the water volume and associated surface elevation would vary. This variation in elevation and associated volume stored is critical for balancing the varying water demands with the required constant water diversion rates from the Mokelumne River. Under this scenario, the reservoir was to be operated as a fill and draw reservoir, filling when the diversion from the Mokelumne River exceeds demands, and draw when demand exceeds diversion.

Pump Station

Operation of the Tracy Lake Diversion Pump Station in concert with water levels in Tracy Lake are controlled by the following: 1) TLID Members diversion pumping rate; 2) minimum pumping rate for the Tracy Lake Diversion Pump Station; and, 3) the Coordination Agreement for Operation of Tracy Lake Project between East Bay Municipal Utility District (EBMUD), Woodbridge Irrigation District (WID) and NSJWCD.

The design pumping rate for the new TLID Members pump station will range from 4,000 gpm to 8,000 gpm (9-18 cfs). This wide variation in demand is associated with changes in evapotranspiration rates for the crops being irrigated during the irrigation season in concert with the desire to only operate this

pump station during PG&E's off peak time. PG&E's peak time for May through October is 12 noon to 6:00 pm. This pump station will be discharging into the existing Forest Lake which is a regulation reservoir that operates on a fill and draw basis to provide water to the irrigation system pump station, which is diesel driven and thus can be operated 24/7 without concerns regarding time of day use on costs of operation.

The Tracy Lake Diversion Pump Station currently has a 25 cfs pump with a variable frequency drive (VFD) to vary the capacity of the pump discharge in response to a change in the rate of rotation. As this pump is a centrifugal pump, the change in output in response to a change in speed is also associated with a change in discharge pressure or head. It should be noted that the capacity range for the pump is limited by the minimum head that the pump must overcome to pump water. Based on the certified pump curve for this pump the minimum capacity is estimated to be approximately 9,500 gpm (20 cfs) under the current operating conditions. Thus the effective operating range of this pump is from 9,500 to 11,500 gpm.

During the permitting process for the Tracy Lake Groundwater Recharge Project, EBMUD, WID, and NSJWCD conferred on how they were going to coordinate operations to both enable NSJWCD to divert water into Tracy Lake for storage and conveyance and allow EBMUD and WID to address their obligations on the River. This effort culminated in a "Coordination Agreement for Operation of Tracy Lake Project" (Coordination Agreement) that was adopted by each agency. This Coordination Agreement acknowledges that NSJWCD's diversion into Tracy Lake are for purposes of regulating flows in an effort to keep the rate of diversion from the Mokelumne at a constant rate. Requests for changes in flow must be submitted on a weekly basis, and all parties agreed to cooperate in coordinating the diversion rate to match the water available and thereby avoid any waste of water.

Current Tracy Lake Conditions

The Lake Owners have a quarry permit from San Joaquin County, with a life of approximately 20 years, together with all other requisite permits to quarry soil from Tracy Lake. During the summer of 2015, material was quarried from Tracy Lake at the northwestern end, approximately 300 feet from the location of TLID Members proposed point of diversion or pump station. In anticipation of diversion of water by the Tracy Lake Pump Station the following year and the desire to be able to quarry in the bottom portion of Tracy Lake, a channel was excavated from the quarry area toward the Tracy Lake Pump Station discharge location. Currently the channel has been excavated a distance of approximately half way between the discharge location and the TLID Members proposed point of diversion. In January, 2016 a survey of the area quarried (borrow pit) was prepared, a rough estimate of the volume of material removed is approximately 20 acre-feet (AF).

The overall impact of the borrow pit and channel excavation, in accordance with the Agreement, has been to reduce, not increase, the Lake Diversion Level; thereby, decreasing the amount of water that must be pumped to reach the Lake Diversion Level. Bottom elevation of the borrow pit, in the area closest to the proposed location of the irrigation pump station, currently has an elevation of approximately 4.0 feet, which is approximately 8.0 feet below the natural ground surface elevation of 11.5 feet. It is assumed that this excavation will be extended westerly to a point closer to the Forest Lake irrigation pond at approximately the same bottom elevation. Based on observations of the water

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discharged during startup of the Tracy Lake Pump Station, the flow as it moves westerly follows the existing shallow natural channel with some flooding of the adjacent land. Once flow from Tracy Lake Pump Station reaches the new channel it will be contained within the channel and conveyed to the sump for the irrigation pump station. Under this condition the Lake Diversion Level will be approximately 10+ feet, the controlling surface elevation at the termination of the channel. With this Lake Diversion Level there will be plenty of submergence for the proposed TLID Members pump station, thus the water level will not have to be increased to achieve this operational objective of defining the minimum lake level required for operation of the TLID Members pump station. However, at this level there is basically no storage volume for the regulation of flows. Storage volume is a major operational parameter which was used in the design of the Project and subsequent construction of the Tracy Lake Pump Station. This storage volume is essential not only for operation of the diversion in compliance with the Coordination Agreement but also the long term operation of the Tracy Lake Pump Station in a reasonable manner that is consistent with the Agreement and will optimize the investment of the TLID Members.

Proposed Lake Operation

In the CEQA documents for the Tracy Lake Groundwater Recharge Project several tables were included presenting a water balance for Tracy Lake with a diversion of 15 cfs and 40 cfs. It was acknowledged that these tables were developed with estimated water losses associated with percolation and evaporation and therefore were for illustrative purposes only. Operation of the project is the only way that realistic values can be developed for percolation and a more detailed and accurate water balance can be developed for Tracy Lake to include all water demands. Operational data will help refine the diversion rates and frequency of operation necessary to maintain the water level at a mutually beneficial level for the various operational objectives associated with Tracy Lake in a manner that is compliant with the Coordination Agreement. Thus at this time no set schedule for operation can be developed.

Under various assumptions regarding percolation several water balances were developed that conformed to the operational requirements contained in the Coordination Agreement. Using the historical topographic data and supplementing it with the recent survey of the borrow area to develop a depth versus storage curve, it appears that Tracy Lake's maximum level can be held below 14 feet during a normal irrigation season. To achieve this objective and possibly operate Tracy Lake at a lower level will require on going coordination between NSJWCD, TLID Members and the Lake Owners.

Recommendations

Based on the current physical conditions of Tracy Lake and lack of knowledge regarding percolation rates, limited recommendations for operation of the Project can be offered at this time.

Recommendations that can be made are as follows:

- Establish the Maximum water level at 16 feet;
- Early in the operation of the Project, closely monitor the operation of the Pump Stations and water elevations in an effort to establish a reasonable value for percolation rates; and,
- Revisit and revise the Water Balance for Tracy Lake as appropriate to optimize the operation of all the facilities.