

**NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT
CONJUNCTIVE USE PLAN - TRACY LAKE GROUNDWATER RECHARGE
PROJECT**

*Draft Prepared November 3, 2016
Approved by the NSJWCD Board of Directors on _____*

(I) Introduction and Purpose of Plan

Condition 10 of North San Joaquin Water Conservation District's ("NSJWCD" or "District") water rights permit number 10477 requires as follows:

With the exception of underground storage conducted pursuant to the North San Joaquin Pilot Recharge Project, the District must submit a conjunctive use plan to the Deputy Director prior to placing water into underground storage. The plan shall identify the proposed groundwater recharge or storage areas, the location of pumps and other facilities used for injection or percolation to storage, and the methods and points of measurement of the water diverted to and withdrawn from underground storage. The plan also must address whether and how placing water to underground storage and subsequently withdrawing the water, under Permit 10477 will prevent additional overdraft in the Eastern San Joaquin and Cosumnes groundwater subbasins and include measures to avoid any such impacts. If the Deputy Director determines that all or a portion of the plan is not acceptable, then the District must submit any modifications to the plan required by the Deputy Director within 60 days of being notified that the plan is not acceptable. Upon approval of the plan by the Deputy Director, the District shall implement the plan.

The purpose of this document is to comply with Condition 10 by providing a conjunctive use plan for the Tracy Lake Groundwater Recharge Project. The District is proposing to bring this project into operation during water year 2016-2017. The topics addressed below are:

- (II) The location of the proposed groundwater recharge areas.
- (III) The location of pumps and other facilities used for injection or percolation to storage.
- (IV) The methods and points of measurement of the water diverted to and withdrawn from underground storage.
- (V) The method for accounting and reporting the amount of water that is recharged into underground storage through percolation.
- (VI) How underground storage and subsequent withdrawal of water under Permit 10477 will prevent additional overdraft in the Eastern San Joaquin groundwater subbasin¹.

¹ Condition 10 to Permit # 10477 requires NSJWCD to assess how underground storage and subsequent withdrawal of water will prevent additional overdraft in the Eastern San Joaquin and Consumnes groundwater subbasins. However, following the Department of Water Resources'

(VII) The measures that have been designed to avoid exacerbating overdraft through operation of the Project.

(II) Location of the Proposed Groundwater Recharge Areas

The Tracy Lake Groundwater Recharge Project on the northern bank of the Mokelumne River approximately 2 miles west of Highway 99 and 1 mile south of the border between Sacramento and San Joaquin Counties. The recharge area is a pre-existing natural lakebed – known as Tracy Lake – that is located at the terminus of Jahant Slough. The map below demonstrates the relative locations of the proposed recharge area (shown in red), the point of diversion on the Mokelumne River, and the City of Lodi.

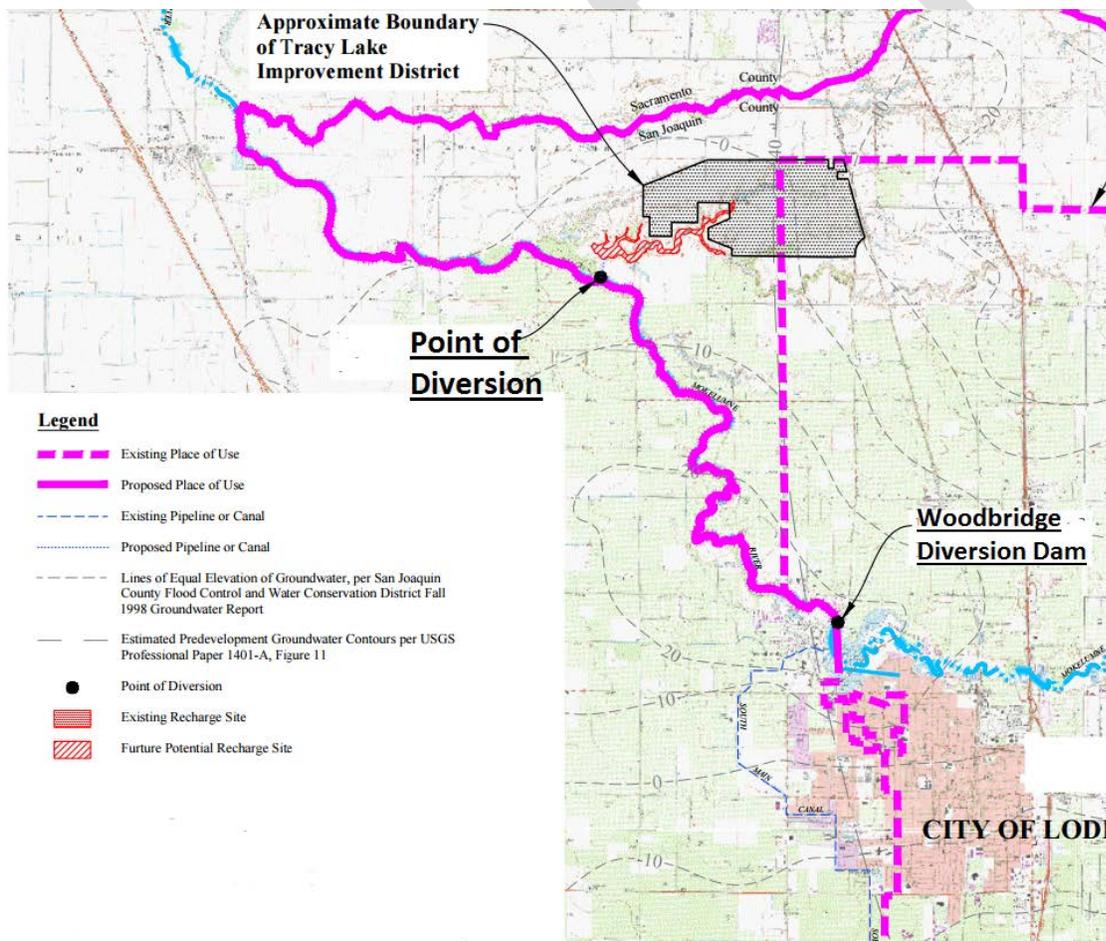


Figure 1 – Map of Tracy Lake Groundwater Recharge Project

recent approval of a basin boundary adjustment for the Consumnes and Eastern San Joaquin Groundwater Subbasins, NSJWCD no longer overlies any portion of the Consumnes Groundwater Subbasin. Because NSJWCD has no jurisdiction over the Consumnes Subbasin, this Conjunctive Use Plan will not address the impacts of groundwater recharge activities occurring in the Consumnes Subbasin.

(III) Location of Pumps and Other Facilities Used for Percolation to Storage

The Tracy Lake Groundwater Recharge Project receives water from an intake structure that is equipped with a state-of-the-art fish screen located on the north bank of the Mokelumne River approximately 5 miles downstream of the Woodbridge Irrigation District dam. Attached to the intake structure is a pump station and pipeline that convey the diverted water approximately one-quarter mile from the Mokelumne River to Tracy Lake. The water that is diverted outfalls into Tracy Lake and is then used to accomplish recharge in two ways: (1) directly, through natural percolation into the lake bottom, and (2) indirectly, through diversion by adjacent landowners – in lieu of groundwater extractions – for use in irrigation. Attachment A includes a detailed project description for the Tracy Lake Groundwater Recharge Project and location maps.



Figure 2 – The Tracy Lake Groundwater Recharge Project Fish Screen Intake Facility.

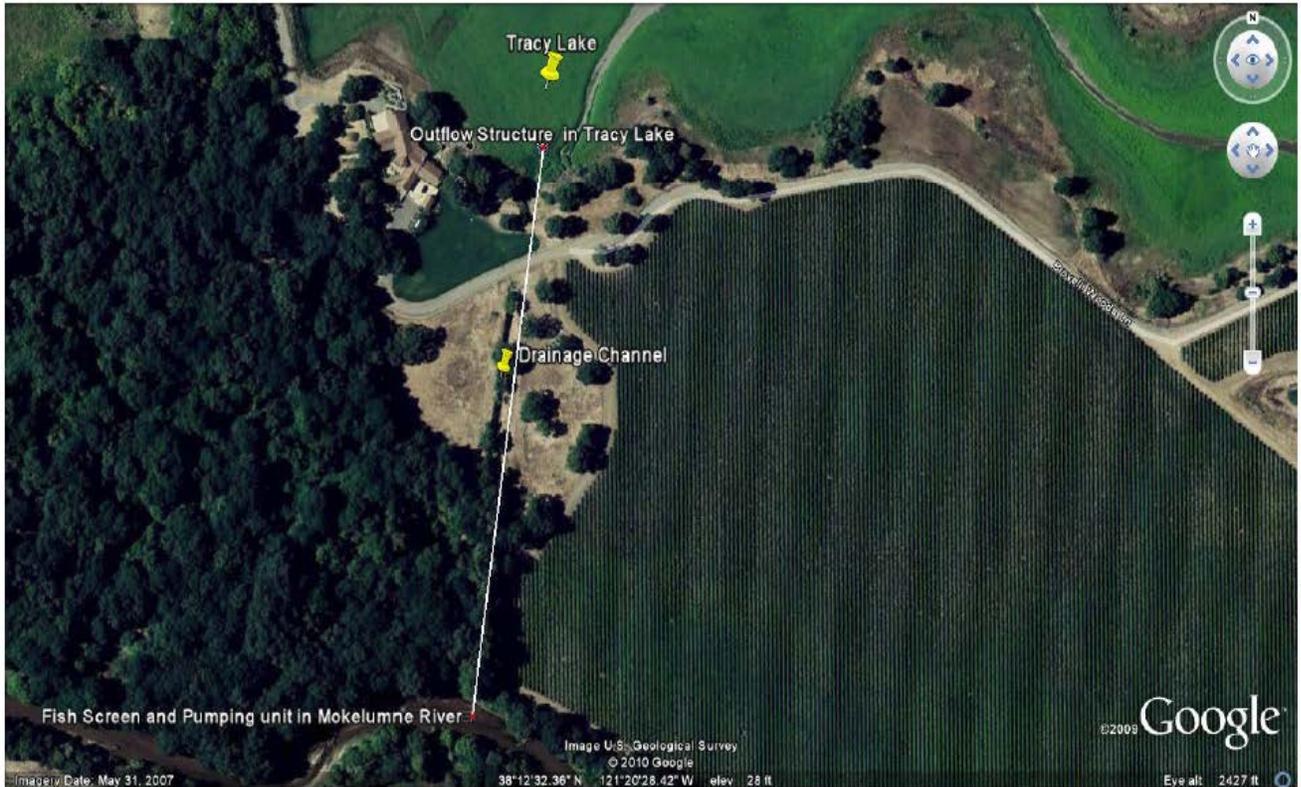


Figure 3 – Location of Tracy Lake pumping facility.

(IV) Methods of Measuring Water Diverted to and Withdrawn from Underground Storage

Mokelumne River water that is diverted into the Tracy Lake Groundwater Recharge Project is measured at multiple locations. First, water will be measured at the diversion pump with a device that measures flow rate and total amount diverted. This measurement will occur in real time. Second, water will be measured at the point of diversion for the vineyard irrigation system with a second flow meter. The district's Engineer will use data on water flow in and out of the lake, temperature, and lake area to compute the amount of water percolated for recharge, lost to evaporation and diverted for irrigation. All meters will be regularly calibrated.

(V) Accounting for the Amount of Water Percolated into Underground Storage

The District has developed a proposed operations plan for the Tracy Lake Groundwater Recharge Project that will allow for the measurement and reporting of water that is percolated into underground storage.

When the Project is in operation, water will be pumped from Mokelumne River into Tracy Lake to maintain a lake elevation of approximately 12-14 feet. Landowners in the Tracy Lake Improvement District will then pump the water out of the lake and use it for drip irrigation of approximately 1,300 acres of vineyards in lieu of pumping groundwater. Water pumped into the lake by the district, and water pumped out of the lake by the landowners will be measured as

described above. Surface evaporation will also be calculated using local weather station data. The amount of water that percolates underground will then be computed as the difference between the amount pumped into the lake minus the amount pumped out of the lake and the amount of evaporation.

Preliminary engineering estimates based on the current operational capacity indicate that approximately 3,157 acre-feet will be diverted from the river, with 2,275 acre-feet used for irrigation and 215 acre-feet lost through evaporation, the remaining 561 acre-feet will percolate into the soil to recharge the groundwater basin below.

(VI) Underground storage and subsequent withdrawal of water under Permit 10477 will prevent additional overdraft in the Eastern San Joaquin groundwater subbasin.

Prior groundwater gradient studies have concluded that groundwater recharge from the Tracy Lakes area will migrate to the north-east. There are thousands of acres of irrigated farmland north-east of Tracy Lake on the north side of the Mokelumne River which currently rely exclusively on groundwater. These properties all fall within the NSJWCD jurisdictional boundary. As a result, any water that percolates into the groundwater basin at Tracy Lake will recharge a portion of the Eastern San Joaquin groundwater basin where it will be available for extraction by groundwater pumpers located within the District's boundaries.

(VII) The measures that have been designed to avoid exacerbating overdraft through operation of the Project.

Given the relatively small quantity of water that is expected to be recharged and the expense associated with collecting groundwater extraction data for such a large number of pumpers, the District will initially collect only the pumping information from the landowners within the Tracy Lake Improvement District. These landowners are the same landowners who use the surface water from the Tracy Lake project, when available. When surface water is not available, they pump groundwater.

The TLID landowners farm approximately 1,300 acres of vineyards in this area and operate groundwater wells to irrigate these acres when surface water is not available from the District. Their annual water demand is 2,275 af, whether supplied by groundwater or surface water. Thus, the estimated recharge from one year of operation of the Tracy Lakes project (about 561 af) will be pumped and used by these lands for irrigation in the first quarter of the first irrigation season that surface water is not available from the District. The District only receives surface water under its permit in normal to wet years, thus the TLID landowners are expected to pump groundwater in at least 50% of all years.

The District, in cooperation with San Joaquin County, will also monitor the groundwater wells within the vicinity of the lake during the recharge period and during the subsequent extraction periods to evaluate the impact on groundwater levels of this project. Figure 4 shows the wells that are part of the DWR and County existing monitoring network. The District is currently working with the landowners surrounding the South Tracy Lake and to the north-east to add 4-5

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additional wells to the monitoring network. An updated map of all monitoring wells will be provided once complete.

Finally, pursuant to SGMA, the District has filed to become a GSA and will be complying with the various requirements of SGMA, including collecting and compiling data on groundwater use on a more specific level. The District intends to include the recharge accomplished through the Tracy Lake project as source of water to the basin in this data collection effort, which would then be matched with extractions for irrigation within the district on a larger scale.

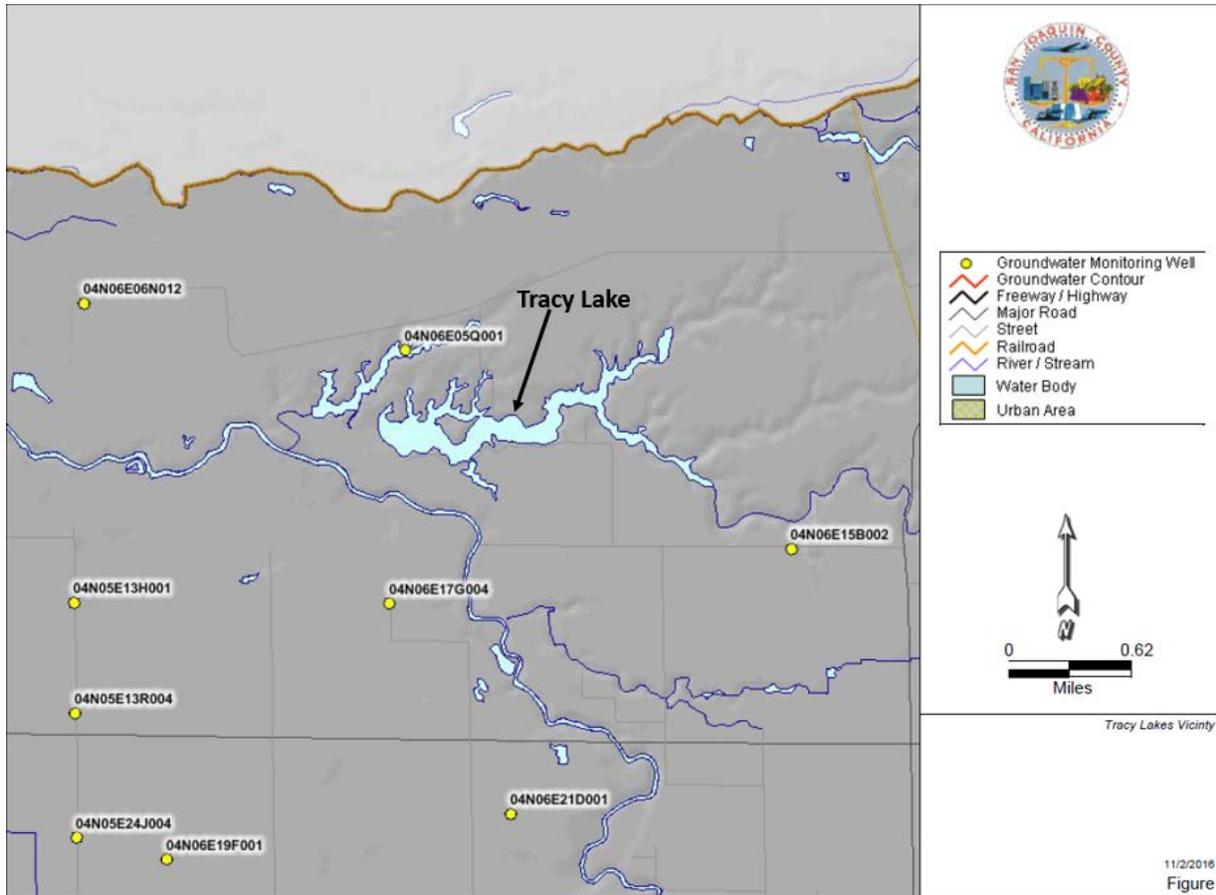


Figure 4 – Groundwater elevation monitoring stations located near Tracy Lake.