State Water Resources Control Board

Division of Water Rights
1001 I Street, 14th Floor ♦ Sacramento, California 95814 ♦ 916.341.5300
Mailing Address: P.O. Box 2000 ♦ Sacramento, California 95812-2000
FAX: 916.341.5400 ♦ www.waterrights.ca.gov

Alan C. Lloyd, Ph.D.
Agency Secretary

Arnold Schwarzenegger
Governor

APPLICATION NO. 31536 and 31537

UNDERGROUND STORAGE SUPPLEMENT to APPLICATION TO APPROPRIATE WATER BY PERMIT

1. State amount of water to be diverted to underground storage from each point of diversion in item 3b of form APP.

a. Maximum Rate of diversions (1) 150 cfs (each Application) (2) _____ cfs
b. Maximum Annual Amount (1) 31,100 (each Application) (2) _____ acre-feet

2. Describe any works used to divert to offstream spreading grounds or injection wells not identified in item 7 of form APP.

Natural waterways will provide opportunities for enhanced infiltration and groundwater recharge. In addition, water diverted or re-diverted from natural channels will be conveyed by existing and proposed pump stations, gravity-flow turnouts, canals, and pipelines to various off-stream recharge facilities, including flooded fields (created by the construction of low berms), shallow excavated spreading basins, and deeper excavated pits. No injection wells are planned due to high pre-treatment and operational costs. Individual diversion rates are generally expected to be between 4 and 5 cfs, but the full range of diversions could be from 1 to 50 cfs. The actual diversion rate will be determined by the capability of individual recharge facilities to percolate the applied water. The report entitled Farmington Groundwater Recharge and Seasonal Habitat Study, Final Report, August 2001 by Montgomery Watson Harza (MWH Report) and an existing recharge project indicate that the rate of percolation in the region varies from 0.25 to well over 1.0 feet per day (Table V-6 in MWH Report).

3. Describe spreading grounds and identify its location and number of acres or location of upstream and downstream limits if onstream.

Enhanced percolation is expected to occur within Littlejohns and Rock Creeks with the addition of water during non-flow periods. In addition, water will be rediverted to off-stream recharge facilities described in Item 2 above. For infiltration rates in the range of 0.25 to 1.0 feet per day, between 170 and 680 acres of land would be required to infiltrate all of the water sought by this Application. Existing recharge facilities and certain future recharge sites have been identified on the Application map. Additional recharge facilities will be determined by field percolation studies, and the total of all recharge sites will not exceed 25,000 acres and will be located within the place of use identified on the map accompanying the Application.

4. State depth of groundwater table in spreading grounds or immediate vicinity: _____ feet below ground surface on _____ 19 __ measured at a point located within the _____ ¼ of _____ ¼ of Section _____, T _____, R _____, _____ B&M

See Attached

5. **Give any historic maximum and or minimum depths to the groundwater table in the area.**

Location _____ Maximum _____ feet below ground surface on _____ (date)
Location _____ Maximum _____ feet below ground surface on _____ (date)

See Attached

6. **Describe proposed spreading operation.** As described in Item 3, some water will be recharged through enhanced percolation in the natural channels identified on the Application map. Water will also be re-diverted to off-stream recharge facilities through existing and future re-conveyance and rediversion facilities. The capacity of individual facilities will be designed to match the recharge capabilities of specific recharge facilities depending upon percolation rate. Average percolation rates for sites identified to date range from 0.25 to over 1.0 foot of water per day. A 60-acre site that is currently under reconstruction is expected to accept approximately 25 cfs on a continuous basis. The MWH Report also recommends that recharge facilities be located over the vicinity of the saline contamination front in order to create a hydraulic barrier to prevent the further easterly migration of this front.

7. **Describe location, capacity and features of proposed pretreatment facilities and/or injected wells.** No injection well facilities are planned for this water due to high pre-treatment and operational costs. It is not anticipated that any pretreatment will be required prior to application of water to recharge facilities.

8. **Reference any available engineering reports, studies, or data on the aquifer involved.** The groundwater decline in the ESJCGB is well documented. Reference is made to the bibliographies of the MWH Report, as well as that report entitled *San Joaquin County Flood Control and Water Conservation District Water Management Plan, Phase 1 – Planning Analysis and Strategy, October 2001*, prepared by Camp, Dresser & McKee (CDM Report), copies of which are attached for reference as **Attachment 1**.

9. **Describe underground reservoir and attach a map or sketch of its location.** A general discussion of aquifer characteristics within the San Joaquin Valley is provided in Bulletin 118. Aquifers are generally described as being quite thick with "groundwater wells commonly extending to depth up to 800 feet." According to Bulletin 118, the ESJCGB covers approximately 707,000 acres and extends beyond the boundaries of SEWD. Figure 2-5 from the CDM Report (**Attachment 2**) shows groundwater contours in the regional area in the year 2000.

10. **State estimated storage capacity of underground reservoir.** The CDM Report states that groundwater levels in San Joaquin County are in a state of overdraft. While the capacity of the "underground reservoir" is not stated, it is estimated that between 1970 and 1993, approximately 2,800,000 acre-feet of groundwater was mined, or otherwise "lost" due to lateral inflow of poorer quality groundwater form the Delta area to the west. The CDM Report projects that continuance of current groundwater and surface water management practices will result in the depletion of an additional 2,000,000 acre-feet by 2030.

11. Describe existing use of the underground storage reservoir and any proposed change in its use. The ESJCGB is in overdraft and threatened with further saline intrusion from the Delta. A primary objective of SEWD since its formation in 1948 has been to manage the groundwater basin, and secure supplemental water to prevent further overdraft and saline contamination. The future use of the basin is expected to be consistent with historical use.

12. Describe the proposed method and location of measurement of water placed into and withdrawn from underground storage. Water supply will be determined by use of existing measuring devices and procedures for Littlejohns and Rock Creeks' diversion system, and at proposed measuring devices to be installed on the facilities that will redivert water into conveyance facilities and natural stream channels. Water delivered to recharge facilities will be determined by use of flow measuring devices at each facility or series of facilities.

Each water agency in the Basin, San Joaquin County, and others keep records of how much water is pumped from the ESJCGB each year. As described above, the County conducts extensive monitoring of the basin, and with the assistance of other local water agencies, has developed groundwater models that incorporate all input and extraction numbers for the Basin. These models predict both groundwater level trends and movement of the saline contamination of the Basin. The models rely on previous studies to determine anticipated input and Basin contributions to the Delta, and water agency data for extraction from the Basin. Upon initiation of the project, SEWD will provide input to these models of the quantities of water placed into underground storage.

All publicly owned and operated wells, those of private water companies and significant industrial operations are metered. Privately owned agricultural and domestic wells are generally not metered, however, groundwater use is estimated annually using cropping data, average crop water use statistics, and average domestic use statistics. Pursuant to Section 12 of the Stockton East Water District Act (Chapter 810 of the Statutes of 1971, as amended), all groundwater pumpers within the district are to file a water use statement with the district in January of each year showing the amount of water produced from the owners well(s) either by a water-measuring device approved by the district or by providing information the district determines to be reasonably necessary to permit the determination, or estimation with reasonable accuracy, of the amount of water produced during the preceding calendar year by the well(s). The district may require that all statements of fact in the water use statement be verified by a written declaration that they are made under the penalty of perjury. In addition, Central San Joaquin Water Conservation District prepares a groundwater use report annually which estimates the amount of groundwater pumped each year using crop and acreage information.

4. **State depth of groundwater table in spreading grounds or immediate vicinity:**

SEWD overlies the Eastern San Joaquin County Groundwater Basin ("ESJCGB" or "Basin"), which is a sub-basin of the San Joaquin Valley Basin. The Basin is in a state of critical overdraft. In 1980 it was determined to be one of only eight groundwater basins in California subject to critical conditions of overdraft. *Department of Water Resources Bulletin 118-80, 1980 at p. 44-45*. An average of 867,600 acre-feet is pumped from the Basin each year for agricultural and urban needs. An additional 144,000 acre-feet are lost from the basin annually to streams and lateral outflow. The Basin is recharged by an average of 904,577 acre-feet each year from rain, groundwater lateral flows, and natural and artificial percolation. This results in an average overdraft of approximately 150,000 acre-feet per year. *Eastern San Joaquin Groundwater Basin Groundwater Management Plan, September 2004.*

Because of the geologic conditions peculiar to the area, when groundwater elevations drop, saline groundwater underlying the Delta to the west of the basin flows into the basin, causing serious water quality deterioration and permanent destruction of that portion of the Basin. *Department of Water Resources Bulletin 118-80, 1980 at p. 44-45*. Salt-water intrusion has already severely impacted the groundwater in the vicinity of Stockton and wells have been abandoned. *Department of Water Resources Bulletin 118-80, 1980 at p. 44-45.* It is estimated that the saline front advances 145 feet east every year and will advance an additional two miles by the year 2020. *Brown and Caldwell, Eastern San Joaquin County Groundwater Study, October 1985, at p. 1-13.* Without additional surface water supplies, it is estimated that groundwater levels in the agricultural region east of Stockton will continue to decline an average of 1.7 feet per year. *Id.*

The legislature formed SEWD to address the problem of the critically overdrafted basin and the resulting salt-water intrusion (Chapter 819, Statutes of 1971, as amended, Section 3(B)). The legislature specifically found and declared:

> "...that this act is necessary to the solution of a problem arising out of the following unique and special circumstances: The water supplies in the underground basin in the area of the Stockton-East Water District are insufficient to meet the water demands of the area, and, because of the geologic conditions peculiar to the area and because excessive pumping has seriously depleted the underground water storage, there has been an intrusion of saline water into the underground water basin causing serious water quality deterioration and the destruction of the usefulness of a portion of the underground water basin. Further excessive pumping, without proper management of the underground water basin and the provision of supplemental water supplies, is <u>certain to destroy the usefulness of a major portion of the underground water basin and endanger the health and welfare of the district</u>." Chapter 1287, Section 3(b), Statutes of 1980.

To serve this purpose, the legislature granted SEWD all of the powers of a Water Conservation District in the Water Code, as well as the powers to take actions necessary to "replenish the underground water basin within the district, to manage, for the purpose of repelling saline intrusion, the underground basin within the district, for the common benefit of the district, to augment the common water supplies of the district, or to otherwise provide water for the beneficial use or uses of the district, its inhabitants, or the owners of rights to water in the district." *Chapter 1287, Section 5(a), Statutes of 1980;*

The place of use service area is within the boundary of the ESJCGB, identified as Subbasin Number 5-22.01 on the attached Figure 35 from California Department of Water Resources Bulletin 118 *California's Groundwater* (Update 2003). As shown, the ESJCGB is bounded on the north by the Sacramento/San Joaquin County line, on the south by the Stanislaus River, on the west by the San Joaquin River, and on the east by the interface of water-bearing alluvium and bedrock associated with the Sierra Nevada foothills. A discussion of groundwater conditions in the ESJCGB is provided in an earlier edition of Bulletin 118 (1980), which states the following:

> "Eastern San Joaquin County Basin. This basin for many years has experienced overdraft, the adverse effects of which include declining water levels that have induced the movement of poor quality water from the Delta sediments eastward near the City of Stockton. Migration of these saline waters has severely impacted the utility of ground water in the vicinity of Stockton. Wells have been abandoned and replacement water supplies have been obtained by drilling additional wells generally to the east. For partial mitigation of these adverse impacts, supplemental water from the Calaveras River through the Stockton-East Water District Aqueduct is being substituted for ground water.
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> To stop the easterly migration of poor quality water would require maintaining higher water levels in the basin and other measures, which, in turn, would probably reduce ground water inflow from the south. Under those higher water level conditions, the estimated supplemental water requirement would be materially greater than at the present. The exact amount of overdraft and supplemental water requirement is presently under study."

Groundwater conditions in the ESJCGB are also discussed in the report entitled *San Joaquin County Flood Control and Water Conservation District Water Management Plan, Phase 1 – Planning Analysis and Strategy, October 2001*, prepared by Camp, Dresser & McKee (CDM Report). Per Figure 2-5 of the CDM Report (**Attachment 2**) the groundwater elevation near the westerly boundary of SEWD in the year 2000 was about –10 MSL, corresponding to a depth below ground surface of about 20 feet. Near the easterly boundary of SEWD, the groundwater elevation in 2000 was about –60 MSL, corresponding to a depth below ground surface of about 160 feet.

5. **Give any historic maximum and or minimum depths to the groundwater table in the area.**

The estimated "predevelopment" water table is as shown on the attached Figure 11 **(Attachment 3)** taken from U.S. Geological Survey Professional Paper 1401-A. As shown, in the region covered by these applications, the elevation of the predevelopment water table varied from about Elevation 0 on the west near the San Joaquin River to about Elevation 160 on the east near the alluvium-bedrock interface. These contours are shown on the map accompanying these applications. The predevelopment water table would correspond to the historic minimum depth to groundwater, and in alluvial areas generally varied from about 0 on the west near the San Joaquin River to about 20 feet on the east near Bellota.

Section 2.3.1 of CDM Report states that groundwater levels within the ESJCGB show a historical trend of decline, and in some areas have fallen by 40 to 60 feet over the past 20 to 30 years. The main cone of depression is located east of the City of Stockton, where there is a large area with groundwater levels more than 50 feet below sea level. The attached hydrograph of Well Number 02N08E34E001M **(Attachment 4)**, obtained from DWR's Central District web site, illustrates the historic decline in groundwater between 1948 and 1996.

Groundwater data compiled by San Joaquin County shows that in the fall of 1998, depth to groundwater was about 20 feet on the west side of Stockton, and about 140 feet near Bellota. Although groundwater levels fluctuate from year-to-year based on hydrologic conditions, it is assumed that the fall 1998 level is at or near the historic maximum depth to groundwater. Review of more recent groundwater information, which the County is presently compiling, may show that the maximum depth has increased since 1998.