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DESIGN CRITERIA MEMORANDUM

To: Kevin Kauffman, Eastside Water District

From: Randy Hopkins

Subject: Eastside Water District, Diffused Surface Water Project

Date: March 20, 2015

Eastside Water District (EWD or District) is investigating potential recharge projects to capture diffused surface runoff waters within the District that tend to accumulate near the Turlock Irrigation District's (TID) Highline Canal, and conveying them to a location where they could be directly recharged to replenish the groundwater aquifer. EWD is working with TID to develop an operations framework in which EWD could utilize TID's Highline Canal to collect and convey the diffused surface water to preferred recharge sites. It is anticipated that these projects could generate an average annual supply of up to 10,000 to 15,000 AF.

As the design of the EWD Diffused Surface Water Project (Project) progresses, some design and operational issues and assumptions need to be clarified and confirmed. Many of the design features and assumptions are based on requests from EWD staff during project review meetings and discussions, and from experience gained from previous recharge basin projects. This memo establishes the design criteria and assumptions that will be used to develop the design for the Project.

Current Design Information and Assumptions

The design of the Project will move forward based on the following information and assumptions:

General

- Diffused water will be supplied to the sites through the TID Highline Canal and Cross Ditch No. 1.
- The project sites considered are:
    - 49 ac. Martelli property (APN's 019-041-035 and 019-041-036, 41 and 54 ac. respectively) located at the northwest corner of the Highline Canal and Keyes Road;
    - 39 ac. Medeiros property (APN 024-005-001, 104 ac.) located southeast of East Monte Vista Avenue and Hall Road; and
    - 30 ac. Stadtler property (APN 024-006-004, 81 ac.) located southeast of Hickman Road and the Cross-Ditch No. 1 Canal.

  - 7 ac. Santa Vista Orchards LLC property (APN 024-006-013, 145.9 ac.) located north of East Road and west of the Cross-Ditch No. 1Canal.

- All properties will contain a single basin. The basin will be designed to receive surface water for recharge purposes only.
- It is assumed the diffused surface water (the primary recharge source) will contain a high level of sediment and suspended solids. Therefore, water delivered to the basins will be routed through a settling channel where clarified water can be decanted from the top of the pool and then delivered to the basin for recharge. This will help to reduce the amount of fine soil introduced to the basin and will help to increase the time between basin maintenance and the overall longevity of the basin.
- Design flows for recharge will be 60 cfs total to the site from the Highline and Cross-Ditch Canals. The Highline Canal has a maximum capacity of 600 cfs without freeboard, however diffused surface water flows into the Highline canal are anticipated to be no greater than 60 cfs, based on discussions with TID staff.
  - Note, the 7 acre Stadtler property will only be capable of flows up to 10 cfs.
- A check structure, turnout and pipeline will be used to deliver water from the Highline Canal to the basin (Martelli and Medeiros properties only).
- A turnout and pipeline will be used to deliver water from the Cross-Ditch Canal to the basin (Stadtler & Santa Vista Properties).
- Monitoring wells will not be incorporated into the design at this time.
- Vehicle and equipment access will be incorporated in the following areas:
  - The northeast, southwest and southeast of the Martelli property;
  - The northwest, southwest and southeast of the Medeiros property:
  - The east and southwest of the Stadtler property; and
  - The west and southeast of the Santa Vista Orchards property.

Basins / Earthwork

- Levees will have a top width of 16 feet. Levees will be configured with a 2:1 exterior slope and a 5:1 interior slope. This assumption must be confirmed with a site specific geotechnical investigation.
- The tops of the levees will be sloped to drain to the inside of the basin.
- The floor of the new basin will be graded to drain away from the interbasin weir to allow the basin to maximize filling flows.
- If budget allows, the drive surfaces will be gravel, 2 inches thick. This will help to minimize dust in the dry season and create a stable drive surface during the wet season.

Operations

- The basins will operate in a “gravity in” manner.

- The basins will be designed such that the water level in the basin can become static with the adjacent canal, thereby reducing the risk of overtopping the levees.
- The levees of the new basins will be designed to provide approximately 1 foot of freeboard above the design high water level in the Canal. It is assumed that the top of the levee will match that of the adjacent Canal.
- A staff gage mounted on a steel post will be placed in the basins. This will allow the operators to record daily water level elevations so the District can understand how well the basin is functioning. It will also allow the operators to maintain a desired operating water level.

Flow Measurement

- Flows will be measured at the turnout from the canal to the basin.
- Propeller flowmeters will be used to measure deliveries to the Project.

Turnout & Basin Operations

- There are three modes of basin operation, these modes include:
    - Delivery to Projects Only, where the turnout in the Canal will be opened by TID staff manually and will deliver water to the basin, and the check structure will be "boarded up" to divert all flows in to the basin. The basin water level may be static with the canal.
    - Delivery to Project and deliveries down the Canal, where the check structure in the Canal will be operated to check water enough to send flows into the basin and to pass the downstream demand flows in the Canal. The basin water level may be static with the canal.
    - No deliveries to Project, where the check structure is operated "wide open" and the turnout will be closed.
- It should be noted that the operations of the proposed and existing facilities to deliver diffused surface water to the Projects will require coordination with TID.