

# Glenn-Colusa Irrigation District Development of Conjunctive Water Management Facilities

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## 1. Project Description

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| <b><i>Project Type:</i></b>               | Conjunctive water management  |
| <b><i>Location:</i></b>                   | Glenn and Colusa counties   |
| <b><i>Proponent:</i></b>                  | Glenn-Colusa Irrigation District (GCID or District)   |
| <b><i>Project Beneficiaries:</i></b>      | GCID, in- and out-of-basin users, environment, Delta  |
| <b><u>Total Project Components:</u></b>   | Short-term components, development of District-owned/operated network of wells and related facilities   |
| <b><i>Potential Supply:</i></b>           | 100,000 to 110,000 acre-feet per year (ac-ft/yr)  |
| <b><i>Cost:</i></b>                       | \$80.3 million  |
| <b><i>Current Funding:</i></b>            | None  |
| <b><u>Short-term Components:</u></b>      | Utilization of a network of existing private landowner wells and pilot study/well development   |
| <b><i>Potential Supply (by 2003):</i></b> | 50,000 to 60,000 ac-ft/yr   |
| <b><i>Cost:</i></b>                       | \$2.9 million (cost for landowner well production-only component likely to be \$100,000 to \$300,000)   |
| <b><i>Current Funding:</i></b>            | None  |
| <b><i>Implementation Challenges:</i></b>  | Public perception, coordination among public and private entities, coordination between concurrent and similar regional projects, lack of sufficient groundwater data, water rights implications, environmental regulatory compliance, land acquisition, recharge basins                          |
| <b><i>Key Agencies:</i></b>               | GCID; Glenn, Colusa, and Tehama counties; local landowners; U.S. Bureau of Reclamation (USBR); California Department of Water Resources (DWR); environmental interest groups, U.S. Fish and Wildlife Service (USFWS); California Department of Fish and Game (CDFG); Sacramento-San Joaquin Delta |

## Summary

GCID is proposing to revise agreements with landowners to institute an annual conjunctive water management program that utilizes existing private wells located within GCID's boundary. The proposed conjunctive water management program would also include the development of a District-owned and -operated network of 35 groundwater production wells along the upper 25 miles of GCID's Main Canal, which overlies the Stony Creek Fan and lies hydraulically downgradient of potential groundwater recharge areas to the northwest.

GCID is located in the central portion of the Sacramento Valley on the west side of the Sacramento River, as illustrated on Figure 5B-1. The District's service area extends from northeastern Glenn County near Hamilton City to south of Williams in Colusa County. The east side of the District stretches toward the Coastal Range and Tehama-Colusa (TC) Canal. The service area's main facilities include a 3,000-cubic foot per second (cfs) pumping plant and fish screen structure, a 65-mile Main Canal, and approximately 900 miles of laterals and drains.

With 175,000 acres, GCID is the largest irrigation district not only in the Colusa Sub-basin, but also in the Sacramento Valley. The soils within this area generally consist of clay-like and loam characteristics and are considered some of the most productive soils for agriculture in the world. The low infiltration rates of the tight soils within much of the District are conducive to furrow and border irrigation. To that end, rice is the predominant cultivated crop and typically accounts for 75 percent of total district irrigated acreage. Other crops include, but are not limited to, tomatoes, vine crops, sunflowers, prunes, almonds, and walnuts.

### Glenn-Colusa Irrigation District Water Supply

The Sacramento River serves as the principal water source for GCID. Its diversion, the largest surface water diversion on the river, is located at the northern end of the District, just north of Hamilton City. Other surface water diversions to which GCID holds entitlements and uses to supplement its Sacramento River supply include Stony Creek, Hunters Creek, Stone Corral Creek, Tributary to Funks Creek, and the Colusa Basin Drain. GCID uses its entitlement to these water sources to convey water during the irrigation season, as well as to customers requiring water in the fall and winter months including neighboring wildlife refuges and landowners that require water for rice decomposition.

Restrictions on diversions related to the Endangered Species Act (ESA) prior to completion of the District's new fish screen facility prompted GCID to place more importance on groundwater supply through increased use of the Stony Creek Fan, the predominant aquifer within the District. If necessary, the District has the ability to supplement its operations with groundwater from local production wells. GCID has contracted with more than 100 private landowners who are reimbursed per acre-foot (ac-ft) contributed to GCID's supply. The District manages and operates this voluntary conjunctive water management program, which contributed up to an estimated 63,000 ac-ft (according to District staff) in 1994 in response to reductions in surface water supply.

The GCID annual diversions are bimodal, a reflection of the cultural practices of growing rice. Near the beginning of the irrigation season when farmers are flooding their rice fields,

May and June, the District typically meets or exceeds their allotted contractual amounts. The annual peak diversions occur during the hot, dry summer month of July and then gradually decrease until later in the year when a much smaller peak occurs. This last peak is again a result of farmers flooding their rice fields, this time post-harvest for straw decomposition.

### **Reuse and Downstream Users**

As discussed above, GCID's ability to divert their full entitlement was reduced until recently because of the endangered species limitations associated with the District's previous fish screen operation. In addition, 3 years within the last decade were classified as "critical years," and contract supplies were reduced to 75 percent of entitlements. The District managed several programs to supplement these reduced supplies, including the conjunctive water management program mentioned above. Other programs included a water conservation program, which at one time required water use patrols around the District, and a water reuse program.

An aggressive drainwater recapture program, which includes both groundwater seepage and tailwater runoff from cultivated fields from within GCID's service area, is a part of the District's overall water management program. GCID recaptures this water with both gravity and pump systems. Recaptured water is delivered to either laterals or the Main Canal for reuse by both in-District and out-of-District users. Much of GCID's drainwater is captured for use by downstream districts such as the Provident Irrigation District (PID), Princeton-Codora-Glenn Irrigation District (PCGID), and Maxwell Irrigation District (MID). Tailwater can be vital to downstream users' water supply and water management. For example, Colusa Basin Drain Mutual Water Company members (57,000 acres, gross) rely on tailwater from GCID and other upstream water users. Currently, GCID recycles approximately 155,000 ac-ft annually.

### **Existing Studies and Modeling**

At this time, a comprehensive groundwater model of the local aquifers does not exist. However, DWR is currently working with the Orland-Artois Water District (OAWD), Orland Unit Water Users' Association (OUWUA), and GCID to model the use of the Stony Creek Fan in Glenn and Tehama counties. The objectives of this modeling effort include developing an understanding of groundwater sub-basin characteristics, surface water/aquifer interactions, and interrelationship between the operational parameters of water users within the sub-basin. Preliminary efforts have begun related to identification of project goals and model selection.

Other conjunctive management proposals such as Projects 5E, 8A, and 9A are considering development of a common groundwater resource within the Stony Creek Fan Aquifer. These various projects will be evaluated and developed in a coordinated manner, potentially under the CALFED Integrated Storage Investigation (ISI)-sponsored investigation currently in progress with OAWD, OUWUA, and GCID.

### **Short-term Component**

GCID's development of conjunctive water management facilities is expected to be accomplished in two phases: Phase 1 (short-term component) and Phase 2 (long-term component). Phase 1, by definition of a short-term component, is proposed to be completed

by December 2003. Initial project benefits would be realized with water supply expected during the summer of 2003. With expedient organization and administration, the project could contribute to District water supply as early as the summer of 2002. The following components of Phase 1 are discussed in this section:

- Phase 1 Network of Groundwater Wells
- Pilot Study
- Recharge Basin Surveys
- Preliminary Environmental Work

### **Phase 1 Network of Groundwater Wells**

Facility operations during Phase 1 of the project are expected to include full utilization of a network of existing private landowner wells that are currently contracted with the District to supplement GCID supply if necessary. As of this date, an annual groundwater program has not been implemented. In the past, these wells have been employed only when surface water supply was low. However, with this project, the District is proposing to institute a program that would utilize privately owned wells on an annual basis in an effort to increase water supply reliability, as well as potentially reduce Sacramento River diversions and/or make water available for other in- or out-of-basin uses, presumably during the peak irrigation season and during dry years. Phase 1 is expected to yield a maximum supply of 60,000 ac-ft, not including any possible yield from the proposed pilot study discussed below. According to District staff, during June and July 2001, 61 of 180 participating wells produced 33,000 ac-ft of supply. The network was demonstrated to supply up to 63,000 ac-ft in 1994.

The short-term phase of this project would assist in the timing, administrative details, and operational changes with respect to the long-term conjunctive water management program. The infrastructure for this program, primarily the privately owned wells, is already in place. Further, contractual agreements with the participating landowners have been developed but would need to be refined to reflect an annual program.

Monitoring would be a necessary component of the project in order to observe groundwater levels and estimate connectivity between the aquifer, local stream flows, and Sacramento River flows. This monitoring program could be conducted by utilizing existing non-pumping groundwater wells. Data could be collected either periodically by field personnel (one person would be sufficient) and a sounder or continuously by equipping test wells with data loggers and pressure transducers. The method used to conduct monitoring would be based upon specific project requirements (i.e., how many data points are required), intended use (e.g., ongoing modeling efforts may find this data useful), and economics.

### **Pilot Study**

In addition to establishing the first phase of annual groundwater production through a network of private landowner wells, a pilot study is recommended as a precursor to Phase 2. The pilot study would produce vital information to the design and placement of the proposed 35 new production wells, such as drawdown, output, water quality, and interference with other adjacent wells. This information could be gathered using a small network of new wells specifically designed for the purpose of the study with the intention of incorporating these wells into the final project configuration. It is possible that existing

agricultural wells in the project area could be used. This possibility would have to be further explored by gathering more information regarding existing wells.

Groundwater wells placed within certain distances of each other can cause interference affecting local water levels and drawdown. Essentially, if wells are placed too close together, drawdown can be exaggerated because of the additive effects of interference. This may or may not be a desirable characteristic because of the anticipated shallow groundwater levels. It may be desirable to pull down water levels over a large area in order to institute artificial recharge. Well interference is just one parameter that the pilot study would need to examine. Any possible negative impacts to local agricultural groundwater well users would be unacceptable.

In determining interference between wells, two different tests could be performed: single aquifer tests or interference tests. The single-well tests include pumping from a single well and recording the pumping rate through time. Drawdown would be recorded in the pumping well and in a number of observation wells. The observation wells could be non-pumping production wells, monitoring wells, or piezometers. This test would provide information regarding the distribution of transmissivity, allowing forecasts of well interference to be produced. Alternatively or possibly additionally, the pilot study could incorporate an interference test where all test wells are operated simultaneously and sequentially turned on and off to determine a particular well's impact on interferences within the well field.

In addition to determining interference, drawdown, and actual production capacity, water samples would be taken periodically throughout the study. This area of Glenn County has historically demonstrated good quality of groundwater. A test well was installed for GCID in 1989 and yielded water quality results with total dissolved solids (TDS) averaging between 200 to 250 milligrams per liter (mg/L). However, with the prospect of new wells and annual use of these wells, water quality would be re-examined to confirm its adequacy for agricultural use. Other water quality parameters that may be of interest would be electrical conductivity (EC) and levels of constituents such as nitrates.

The pilot study would likely require several different types of equipment not only to gather the required information for design, but also to keep the study as non-intrusive as possible in the event that well locations happen to coincide with farmland. The non-intrusive aspect of the study would be especially important if existing wells are utilized. Likely equipment for this study would include data loggers, pressure transducers, and flow meters in addition to sampling equipment.

Finally, the discharge water from the tests would be considered. Significant volumes of water could result from these test depending upon frequency and duration. The water should be conveyed away from the area so as not to recharge the local groundwater levels and thus distort drawdown readings. Ideally, the study would focus on wells adjacent to the Main Canal, as that is the proposed location of the new well field. The discharge water from the tests could then be easily discharged into the Main Canal and add to the short-term component of groundwater supply. This additional supply could contribute up to 2,500 ac-ft, assuming five production wells operated at 3,500 gallons per minute (gpm) each over 30 to 35 pumping days.

## **Recharge Basin Surveys**

Recharge basins are expected to be included as part of the overall project facilities (as discussed below.) The design of these basins will require certain preliminary information including preliminary siting of the basins. The basins should be located up-gradient of the system so as to recharge the aquifer from which the District and possibly neighboring entities would be drawing. High infiltration rates are anticipated to occur around the gravel pits near Stony Creek. Infiltration rates are estimated between 0.2 inches per hour (in/hr) to greater than 10 in/hr. Soils investigations should be conducted to optimize basin location with regard to infiltration rates. The higher these rates, the more conducive to a ground-water recharge program the soil would be.

Development of the recharge basin sites could involve significant earthwork to shape the basins. Ideally, the basins would be located in an area that would minimize any required earthwork to minimize cost. Further, regional hydraulics and hydrology should be evaluated so any impacts the basins may have on area drainage can be anticipated and prevented, perhaps even exploited (e.g., capture winter flood flows). Finally, recharge basins should be located where they would have minimal to no environmental impact.

## **Preliminary Environmental Work**

Any project that proposes significant earthwork, taking land out of agricultural use, or examines conjunctive water management would come under intense scrutiny both politically and environmentally. Public outreach and environmental investigations should begin immediately and should be coordinated with other outreach activities such as those being conducted as part of the Stony Creek Fan Program being coordinated OAWD, OUWUA, and GCID. Environmental requirements are expected to be strict and could require substantial investigation, documentation, and permitting. This aspect of the project should begin with the project's inception to optimize and maintain the project schedule. Groundwater modeling of the region would also be initiated within the short-term component of this project. Efforts would be made to coordinate modeling needs of this project with other modeling efforts already underway on other similar projects within the area.

## **Long-term Component**

The primary purpose of this evaluation is to evaluate the potential for this project to provide water supply benefits in the short-term (by end of 2003). As part of this initial evaluation, potential long-term components of the proposed project (defined as any part of the project proceeding past or initiated after December 2003) have been considered on a conceptual level. Further consideration and technical evaluation of long-term component feasibility and cost will occur as the next level of review under the Sacramento Valley Water Management Agreement. Long-term-component project descriptions are included in these short-term project evaluations only as a guide to the reader to convey overall project intent.

With the completion of Phase 1 in December 2003, Phase 2 (long-term component) is expected to begin January 2004 and reach completion by December 2007. Phase 2 is anticipated to proceed only upon satisfactory completion of all elements in Phase 1. The District would not expect to continue with their groundwater program unless the project's

working assumptions (e.g., no adverse effects to local groundwater levels) are supported by the initial investigations and monitoring.

The proposed project, which includes a network of District-owned and operated groundwater wells and conveyance facilities would offer GCID the ability to provide a firm supply of groundwater to its users, an estimated maximum of 50,000 ac-ft (in addition to the supply from Phase 1, for a total of approximately 100,000 ac-ft), and potentially reduce Sacramento River diversions by an equal amount simultaneously. The facilities for this project would include the following:

- Groundwater Production Wells
- Distribution Pipelines
- Monitoring Wells
- Recharge Basins
- Surface Water Conveyance System

### **Groundwater Production Wells**

The design and layout of production wells would rely heavily on such factors as comprehensive groundwater modeling, seasonal yields, and operating agreements. As indicated by both anecdotal evidence and preliminary investigations by DWR, the project is estimated to include the installation of 35 groundwater production wells (five of which would be installed during Phase 1 as part of the proposed pilot study), each with a 3,500-gpm capacity. The wells would be located adjacent to the most upstream 25 miles of the GCID Main Canal, drawing from the Stony Creek Fan. Locating the wells along the Main Canal would facilitate the conveyance of the groundwater supply through GCID's system with minimal associated costs and hardware (e.g., additional easements and piping). Wells are assumed to be 200 to 300 feet deep on average with a 30- to 50-foot drawdown. The pilot study mentioned above would likely determine well spacing and design.

### **Distribution Pipelines**

The production wells may discharge directly into the GCID Main Canal or open-channel laterals. In some cases, it may be necessary to convey the groundwater from the wells to distribution facilities. The size and length of these pipelines would depend on the flow rates from the wells and the well location relative to existing or future distribution systems.

### **Monitoring Wells**

A network of monitoring wells would be required to track groundwater levels and provide critical information to ensure groundwater management objectives are being met during operation of the proposed system. The monitoring well data would help track key objectives such as total recharge and extraction volumes, hydraulic gradients and flow directions for the groundwater, and impacts to other parties. Groundwater quality (e.g., TDS) is fairly high in this area and may not need to be monitored. However, it may be beneficial to monitor parameters of political and practical concern such as nitrates.

### **Recharge Basins**

Recharge basins are proposed to be used to accelerate the recharge of water into the groundwater basin, using available excess surface water supplies in wet or average water years.

The recharge basins would be located to provide “inflow” to the basin near its up-gradient area, indicated by the groundwater flow and hydrogeology of the basin. The total acreage of basins required would depend on the targeted annual recharge quantity and the rate of infiltration from the basins to the underlying aquifer. Existing gravel mining sites along Stony Creek may provide suitable areas for such basins. An assumed conceptual-level sizing of the basins was estimated for this evaluation using the following parameters (assuming general soils characteristics of the area):

- An assumed average infiltration rate of 0.5 foot per day (ft/d) (highly dependent upon basin location since infiltration rates in the area can range from 0.1 ft/d to 20 ft/d)
- 120 days of recharge operation during wet years
- 50,000 ac-ft of minimum targeted recharge
- Use of approximately 200 acres of reclaimed existing gravel mining basins adjacent to Stony Creek
- 600 acres of new recharge basins

The recharge basins could potentially serve a second purpose as short-term off-canal storage facilities or drainage recapture/storage facilities.

### **Surface Water Conveyance System**

A new turnout structure and conveyance system would deliver excess surface water supply from the head of GCID Main Canal to the recharge basins. The size, length, and layout of these facilities are dependent upon flow rates, basin design and characteristics, and location.

### **Facility Operations**

GCID would fully implement their conjunctive water management program within 4 years of project approval. The entire project (short-term and long-term project components with possible maximum yields of 60,000 ac-ft and 50,000 ac-ft, respectively) is expected to yield a maximum groundwater supply of approximately 100,000 to 110,000 ac-ft annually over an assumed 100 pumping days. The operations could include the following:

- Wet Year
  - Aquifer recharge – October through May.
  - Groundwater deliveries – Minimal, expected to peak in July.
  - Recharge expected to be less than in an average water year because of higher groundwater tables, saturated soils, and minimal groundwater pumping. However, the season for recharge may in wet years extend into June or start as early as September, increasing the potential for delivery to the recharge basins.

- Average Year
  - Aquifer recharge – November through April.
  - Groundwater deliveries – Increased from wet years, expected to peak in July.
  - Recharge expected to peak during average years from a combination of lower groundwater tables, higher infiltration rates, available supply, and increased groundwater pumping.
- Dry Year
  - Aquifer recharge – None.
  - Groundwater deliveries – Maximized, potentially beginning as early as March and ending in September.

## 2. Potential Project Benefits/Beneficiaries

The proposed conjunctive water management project managed either alone or in concurrence with other potential programs of similar scope within the Stony Creek Aquifer is expected to produce numerous benefits to both local and regional water purveyors. The expected beneficiaries of this program include GCID, downstream users, the environment, and the Sacramento-San Joaquin Delta. The following benefits are discussed in this section:

- Water Supply/Management Benefits
- Environmental Benefits
- Water Quality Benefits

### Water Supply/Management Benefits

The viable water supply benefits under this program are expected to be three-fold.

#### Increased Reliability/Availability of Supply

A groundwater supply of up to 100,000 ac-ft is projected to be developed from full implementation of the short- and long-term components of this project. This would provide GCID customers, including the Sacramento Wildlife Refuge Complex, with increased reliability of supply during critically dry years when the possibility exists that allowable surface water supplies could be decreased to 75 percent of contractual amounts. Increased supply could also be made available to other in- or out-of-basin users, including environmental interests.

#### Increased In-stream Flows

When implementing the network of production wells, the surface water diversions could be decreased by an equal amount. The decreased surface water diversions could be mutually beneficial to downstream users, native species, and the Sacramento-San Joaquin Delta ecosystem. During dry years, the additional river flows afforded by the decreased GCID diversions would provide water to much-needed habitat of aquatic and riparian species, increased available supply to downstream users, and increased inflows to the Delta.

## **Aquifer Recharge**

During wet and average water years, GCID often does not require their full annual entitlement to meet the needs of their customers. The District could utilize any unused pumping station capacity within their entitlement to supply waters to recharge the Stony Creek Aquifer, thereby accelerating recharge into the basin and offsetting perceived concerns regarding overdraft. The aquifer recharge capacity of the project would likely be limited by economics (cost of the recharge basins) and local groundwater characteristics. A minimum of 50,000 ac-ft of recharge in addition to natural recharge during average and wet years is anticipated.

## **GCID Operations**

The District would not sacrifice flexibility with operational change. The wells would be located along the most upstream 25 miles of the GCID Main Canal. The location not only allows the District to efficiently pull water from the Stony Creek Fan, but also provides adequately timed supply to landowners throughout the District.

The District's ability to measure flows and supply would not be hindered but in some respects enhanced. Flow gages would be installed on each production well to measure the amount of groundwater contributing to GCID supply. This program could be incorporated with ongoing efforts by the District to both automate their conveyance system and more accurately define their system flows and outflows. GCID would be able to use excess winter flow for recharge and take advantage of storm peaks.

## **Environmental Benefits**

As GCID's primary source of supply, the Sacramento River would be directly and most beneficially influenced by the District's operation of an extensive conjunctive water management program. The environmental benefits associated with this project would be quantified throughout the various stages of the project, from the feasibility study through final design. The following preliminary environmental benefits have been identified at this level of investigation:

- Sacramento-San Joaquin Delta – Any decrease in surface water diversions and addition of artificial groundwater basin recharge has the potential for increasing available seasonal in-stream flows to the Delta. Decreased diversions would contribute toward supporting Sacramento River and Delta inflows.
- Aquatic/Riparian Habitat – Improved in-stream flows could generate fisheries habitat benefits depending on the timing of reduced diversions.

## **Water Quality Benefits**

Water quality benefits of the project generally stem from the increased in-stream flows. Improvements to both temperature and constituent properties of the river would be the most probable results of the increased flows. These benefits would need to be evaluated and modeled on a regional basis to determine impacts on water quality in the Sacramento River and the Delta.

### 3. Project Costs

The cost opinions shown, and any resulting conclusions on project financial or economic feasibility or funding requirements, have been prepared for guidance in project evaluation from the information available at the time of the estimate. It is normally expected that cost opinions of this type, an order-of-magnitude cost opinion, would be accurate within +50 to -30 percent. Project costs were developed at a conceptual level only, using data such as cost curves and comparisons with bid tabs and vendor quotes for similar projects. The costs were not based on detailed engineering design, site investigations, and other supporting information that would be required during subsequent evaluation efforts.

The final costs of the project and resulting feasibility will depend on actual labor and material costs, competitive market conditions, actual site conditions, final project scope, implementation schedule, continuity of personnel and engineering, and other variable factors. As a result, the final project costs will vary from the opinions presented here. Because of these factors, project feasibility, benefit/cost ratios, risks, and funding needs must be carefully reviewed prior to making specific financial decisions or establishing project budgets to help ensure proper project evaluation and adequate funding.

Table 5B-1 presents an order-of-magnitude project cost estimate for the short-term project component, Phase 1. Table 5B-2 presents an order-of-magnitude project cost estimate for the long-term project component, Phase 2. Future stages of the project, from feasibility study to final design, would include progressively detailed cost estimates for the new facilities.

**TABLE 5B-1**  
Conceptual Facility Features for Regional Black Butte to TC Canal Pipeline  
*Glenn-Colusa Irrigation District Development of Conjunctive Water Management Facilities*

| Item   | Quantity | Units | Unit Price<br>(\$) | Total Cost<br>(\$ x 1,000) | Assumptions                                    |
|--|----------|-------|--------------------|----------------------------|--|
| <b>Pilot Study</b>   |          |       |                    |                            |  |
| Land Acquisition   | 4        | Acres | 5,000              | 20                         |  |
| Production Wells   | 5        | Each  | 160,000            | 800                        | 300 ft deep, 18-in casing, 3,500 gpm           |
| Monitoring Wells   | 10       | Each  | 60,000             | 600                        |  |
| Pilot Study Subtotal ->  |          |       |                    | 1,420                      |  |
| Miscellaneous Appurtenances (10%) ->                                   |          |       |                    | 140                        |  |
| Sub-total Construction Costs ->  |          |       |                    | 1,560                      |  |
| Contingencies and Allowances (30%) ->                                  |          |       |                    | 470                        |  |
| Total Construction Costs ->  |          |       |                    | 2030                       |  |
| Environmental Mitigation (5%)  |          |       |                    | 100                        |  |
| Environ. Documentation, Design, Project Admin. of Pilot Study (25%) -> |          |       |                    | 510                        |  |
| Phase 1 Administration ->  |          |       |                    | 250                        | Program management of entire Phase 1 component |
| <b>Phase 1 Project Cost -&gt;</b>                                      |          |       |                    | <b>2,890</b>               |  |

### Initial Funding Requirements and Sources

Early phases of the project work would focus on refining the project scope and concepts through a feasibility study and preliminary design effort that should include a comprehensive modeling effort. Some aspects of the initial study work may be funded through

existing programs. For example, the ongoing ISI-supported Stony Creek Fan Program is expected to include conceptual development of conjunctive management alternatives in this area, as well as pilot projects to establish better estimates of recharge potential and other key factors. In addition, this Program would include development of a comprehensive integrated groundwater and surface water model. Currently, no other funding sources are in place for this project.

**TABLE 5B-2**  
 Planning-level Project Costs  
 Glenn-Colusa Irrigation District Development of Conjunctive Water Management Facilities

|  | Quantity  | Units       | Unit Price (\$) | Total Cost (\$ x 1,000) | Assumptions   |
|--|-----------|-------------|-----------------|-------------------------|---|
| Production Wells   | 30        | Each        | 160,000         | 4,800                   | 300 ft deep, 18-in casing, 3,500 gpm                        |
| Monitoring Wells   | 25        | Each        | 60,000          | 1,500                   |   |
| <b>Conveyance Facilities to Recharge Basins</b>                                    |           |             |                 |                         |   |
| Land Acquisition   | 20        | Acres       | 5,000           | 100                     | 10 mi. long x 10 ft wide                                    |
| Canal Excavation   | 400,000   | Cubic yards | 8               | 3,200                   | 10-ft base, 2:1 slopes, 2- to 14-ft access roads, 8 ft deep |
| Canal Embankment   | 400,000   | Cubic yards | 12              | 4,800                   | Balanced cut and fill                                       |
| Outlet   | 2         | Structure   | 75,000          | 150                     | SCADA   |
| Turnout  | 1         | Structures  | 75,000          | 75                      | SCADA   |
| <b>Conveyance System Total</b>   |           |             |                 | <b>8,330</b>            |   |
| <b>Recharge Basin</b>  |           |             |                 |                         |   |
| Land Acquisition   | 1,000     | Acres       | 5,000           | 5,000                   | 800 acres of basins   |
| Excavation   | 1,300,000 | Cubic yards | 8               | 10,400                  | 1 ft overburden removal                                     |
| Embankment   | 1,300,000 | Cubic yards | 12              | 15,600                  | Balanced cut and fill                                       |
| Distribution Pipe (48 inch)  | 6,000     | Linear feet | 8               | 50                      |   |
| Pump Station   | 75        | Horsepower  | 1,500           | 110                     |   |
| I&C for Monitoring/Telemetry   | 1         | Each        | 20,000          | 20                      |   |
| <b>Recharge Basin Total</b>  |           |             |                 | <b>31,180</b>           |   |
| Subtotal ->  |           |             |                 | 45,810                  |   |
| Contingencies and Allowances (30%) ->  |           |             |                 | 13,740                  |   |
| Total Construction Costs ->  |           |             |                 | 59,550                  |   |
| Environmental Mitigation (5%)  |           |             |                 | 2,980                   |   |
| Engineering, Environmental, Compliance Construction Management and Admin. (25%) -> |           |             |                 | 14,890                  |   |
| <b>Total Initial Project Cost -&gt;</b>  |           |             |                 | <b>77,420</b>           |   |

SCADA = Supervisory Control and Data Acquisition

## 4. Environmental Issues

As noted in Section 2, this project is anticipated to provide benefits in the form of increased water supply, more flexible water management, and improved water quality – all of which could improve the greater Sacramento River ecosystem.

Project implementation would also result in impacts to the environment, notably through the artificial manipulation of groundwater levels. In some areas of the state, these types of projects have resulted in public concern and controversy, which tends to heighten scrutiny of the environmental effects of such projects. Efforts to address these concerns are noted in Section 5, Implementation Challenges. Construction-related impacts would also occur prior to project implementation. Construction-related impacts would be similar to other, common

construction projects that occur near seasonal drainages and waterways. It is likely that the appropriate level of environmental documentation necessary for this project would be an environmental impact statement/environmental impact report (EIS/EIR).

Implementation of the project would also require issuance of permits from various regulatory agencies. Following is a summary of the likely permitting requirements. Additional permitting requirements may be identified pending further project refinement.

- **State Water Resources Control Board** – Applications for new water rights and changes in point of diversion would be required.
- **Regional Water Quality Control Board** – Large amounts of earthwork would be required for the recharge basins. Depending upon project configuration and location, Water Quality Certification under the federal Clean Water Act may be required for construction.
- **Federal and State Endangered Species Act** – Consultation with state and federal resource agencies (e.g., USFWS, NMFS, CDFG) may be required to protect special-status species and their habitat.
- **U.S. Army Corps of Engineers (COE)** – The project may affect wetland habitat and require a permit for discharge of dredged or fill material pursuant to Section 404 of the federal Clean Water Act.
- **State Lands Commission** – The project would need to consult with the State Lands Commission on the public agency lease/encroachment permitting for use of state lands.
- **State Reclamation Board** – The project may be subject to rules regarding encroachment into existing floodways.
- **Federal Emergency Management Agency (FEMA)** – Letters of map revision need to be filed with FEMA for projects that affect Flood Insurance Rate Maps.
- **Advisory Council on Historic Preservation** – Consultation under Section 106 of the National Historic Preservation Act may be necessary if historical resources are affected by construction of the project.
- **California Department of Fish and Game** – If alterations to streams or lakes are required as part of project implementation, a Streambed or Lakebed Alteration agreement may be required.
- **Division of Safety of Dams (DSOD)** – Design and configuration of the recharge basins may require permitting and compliance with DSOS because of the height of the retention walls. DSOD is structured within DWR.
- **Local governments and special districts** – Specific agreements for rights-of-way, encroachments, use permits, or other arrangements may need to be made with local entities in the vicinity of the project.

A draft CEQA environmental checklist has been prepared for this proposed project and is included as an attachment to this evaluation. The checklist provides a preliminary assessment of the environmental areas of concern, as well as areas that are not likely to be of

concern, associated with this project. The checklist would be finalized as part of the environmental compliance required for project implementation.

## 5. Implementation Challenges

### Key Stakeholders

Table 5B-3 lists the key stakeholders that are expected to be associated with or impacted by this conjunctive water management and recharge project. Also listed are the anticipated roles, concerns, and/or issues corresponding to each stakeholder.

**TABLE 5B-3**  
 Stakeholder Roles and Issues  
*Glenn-Colusa Irrigation District Development of Conjunctive Water Management Facilities*

| <b>Stakeholder</b>            | <b>Role/Concerns/Issues</b>  |
|-------------------------------|--|
| GCID                          | <ul style="list-style-type: none"> <li>Project proponent and direct beneficiary</li> </ul>   |
| Ouwua                         | <ul style="list-style-type: none"> <li>Significant interest in Stony Creek Fan, exploring similar projects within the area</li> </ul>  |
| OAWD                          | <ul style="list-style-type: none"> <li>Significant interest in Stony Creek Fan, exploring similar projects within the area</li> </ul>  |
| Glenn County                  | <ul style="list-style-type: none"> <li>Groundwater management objectives, compliance with AB 3030 plans</li> <li>Significant interest in regional drainage and flooding</li> </ul> |
| Tehama County                 | <ul style="list-style-type: none"> <li>In early stages of groundwater management and developing county objectives; significant interests in Stony Creek Fan</li> </ul>             |
| Colusa County                 | <ul style="list-style-type: none"> <li>Significant interests in Stony Creek Fan</li> <li>Significant interest in regional drainage and flooding</li> </ul>                         |
| Local landowners              | <ul style="list-style-type: none"> <li>Impacts on groundwater levels both short-term and long-term</li> <li>Acquisition of possible land easement and/or purchase</li> </ul>       |
| USBR, DWR                     | <ul style="list-style-type: none"> <li>Water rights</li> <li>Integration with other regional management concepts such as ISI program</li> </ul>                                    |
| Environmental interest groups | <ul style="list-style-type: none"> <li>In-stream flow impacts, fishery impacts, upland habitat and ESA issues, land use, water quality impacts</li> </ul>                          |
| USFWS/NMFS/CDFG               | <ul style="list-style-type: none"> <li>Compliance with environmental regulations particularly ESA/California ESA</li> <li>Possible habitat created by recharge basins</li> </ul>   |
| Sacramento-San Joaquin Delta  | <ul style="list-style-type: none"> <li>Possible increased inflows</li> </ul>   |

The project implementation would occur in several incremental stages, each of which could have significant challenges. Many of these challenges would be inherent to any project of this size and complexity. Key environmental issues are related to long-term management of the Stony Creek watershed, with the groundwater impacts and fishery issues being of greatest concern. The project would need to be developed in a manner that supports the objectives of the Stony Creek management plan. The following lists some of the implementation challenges anticipated to be associated with this project.

## **Public Perception**

Landowners have significant concern regarding possible groundwater overdraft. While the aquifer recharge aspects of this project may go a long way to alleviate these concerns, overdraft likely would remain a concern throughout the various stages of this project from feasibility analysis through construction and very likely to continue thereafter.

Monitoring and modeling of groundwater levels would not only be an essential part of this project technically, but also politically. Further, public concern accompanies any water delivery project (particularly during dry years) with regard to whom any project may or may not benefit. As a result, Glenn County has passed several ordinances and set numerous groundwater management objectives. To that end, the county has set strict guidelines for such water management programs as water transfers that dictate the priority of transfers taking into consideration primarily for the intended recipient of the water.

## **Coordination among Public and Private Entities**

Strong coordination would be required among local, state, and federal entities such as GCID, USFWS, USBR, and DWR. The governmental agencies would have strong interests associated directly with the project and indirectly as it may affect other interests in the area. It is highly probable that because of the complexity and far-reaching implications of the project, competing interest may arise. Reliable communication and integrated coordination would be required to create a successful project.

## **Coordination between Concurrent Projects**

Numerous parties are examining similar projects throughout the valley and within the Stony Creek Fan. For instance, the Stony Creek Fan Program currently being conducted by OAWD, OUWUA, and GCID (Project 8A would evaluate the feasibility of developing standard landowner contract forms and groundwater management agreements for selected wells within the OAWD, OUWUA, and GCID service areas). To optimize the effectiveness of said projects, coordination between the projects would be required from the onset. The strongest motivation for such an effort is three-fold: (1) to avoid duplication of effort and as a result efficiently use available funds, (2) to avoid the nullification of project benefits through competing projects, and, perhaps most importantly, (3) to optimize the benefits of these projects to the watershed.

## **Lack of Sufficient Groundwater Data**

A key element in this proposal is the assumption that the drawdown of the groundwater levels in the Stony Creek fan will not have a substantial effect on dry season flows in local streams and the Sacramento River. At present, there is not enough data to support this assumption. Glenn County has limited groundwater information available. A Memorandum of Understanding has been signed by GCID, OUWUA, and OAWD with the intention of eventually producing a working and comprehensive groundwater model for Stony Creek Fan, directly involving Tehama and Glenn counties. This work should be incorporated into this effort since adequate analysis of the proposed system and safe yield estimates cannot be accomplished without detailed knowledge of the area's hydrogeology.

## **Water Rights Implications**

GCID participation would be predicated on the operation of such a program and would occur within the guise of the District's existing water rights. Decreases in surface water diversions would be anticipated in some years, while full contract quantities would be used in other years.

## **Environmental Regulatory Compliance**

Extensive environmental documentation, surveying, monitoring, and permitting would be required for this project. Project scheduling would have to reflect environmental regulatory requirements including any limitation on windows of construction.

## **Land Acquisition**

It is probable that land would have to be acquired for the production wells, recharge basins, and conveyance systems. Some landowners may be resistant to the land purchases.

## **Recharge Basins**

Siting of the recharge basins could be politically and environmentally challenging. The basin siting would have to rely heavily on groundwater modeling results, public outreach, and close coordination with environmental interest groups and government agencies (e.g., USFWS).

A draft CEQA environmental checklist has been prepared for this proposed project and is included as an attachment to this evaluation. The checklist provides a preliminary assessment of the environmental areas of concern, as well as areas that are not likely to be of concern, associated with this project. The checklist would be finalized as part of the environmental compliance required for project implementation.

# **6. Implementation Plan**

The following major steps would be required to implement the project. Each step depends on successful completion of the previous supporting steps and findings that support further actions, although the long-term project could be implemented in the absence of the proposed short-term component. Figure 5B-3 shows an assumed implementation schedule based on typical time requirements for each step in a project of this scale.

## **Phase 1**

**1.1 Administration and management of privately owned wells**—Operations and management of Phase 1 privately owned wells could begin immediately upon project funding. Management plans, objectives, and administrative details would have to be developed. (6 months to 1 year)

**1.2 Privately owned wells on-line**—Once a network of project administration is in place, Phase 1 would begin to be tested by December 2002, to allow for refinements to new system and potential operational changes. Reliable water supply would be delivered to GCID's system no later than the summer of 2003.

**1.3 Pilot study design**— A pilot study would need to be designed specifically to address the needs of the project both in short-term and long-term scope. (3 months)

**1.4 Pilot study**— After testing procedures are selected, equipment purchased, and the study is fully configured, the pilot study would be run to lay the foundation for design and implementation of Phase 2. (3 months in 2002 and 3 months in 2003 for two sets of data)

**1.5 Feasibility study and conceptual design of Phase 2**— The District would analyze the details of facility operations concurrently with Phase 1 operations. Feasibility studies, preliminary environmental surveys/investigation, and conceptual design would develop specific project components, general features, operating concepts (long-term), and potential benefits. (9 months)

**1.6 Other studies (e.g., groundwater modeling)**— These supporting studies would provide more detailed evaluation of specific aspects of the project, such as groundwater impacts. (1 year)

## **Phase 2**

**2.1 Preliminary design**— The preliminary design would involve engineering design of the major facilities to a 30-percent design level. This level of design would include such details as sizes, locations, and footprints of all major facilities. This information would support key implementation steps such as right-of-way acquisition, soils testing, mapping, and permitting and environmental studies. Possible review by resource agencies and local sponsor may occur following the preliminary design so that comments may be incorporated into the final design. (4 months)

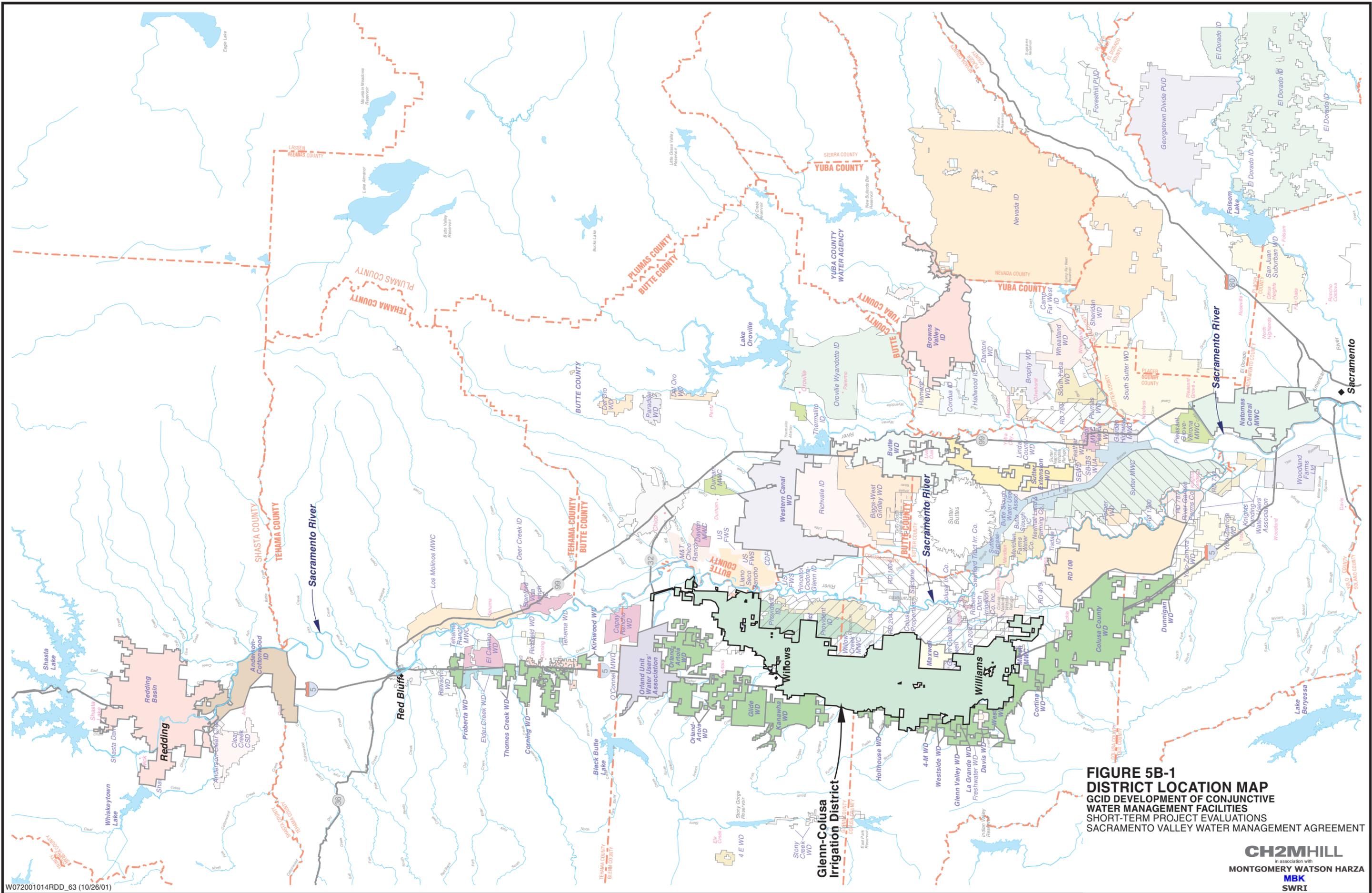
**2.2 Environmental assessment/environmental impact report (EA/EIR)**— The EA/EIR would be based on the preliminary design and would confirm the potential impacts and required mitigation, if any, for the project. (1 year)

**2.3 Final design**— Final design would proceed following the EA/EIR work, focusing on the preferred alternative. This would involve producing engineering drawings, specifications, and other final contract documents suitable to bid and construct the project facilities. Possible review by resource agencies and local sponsor may occur following the final design. (1 year)

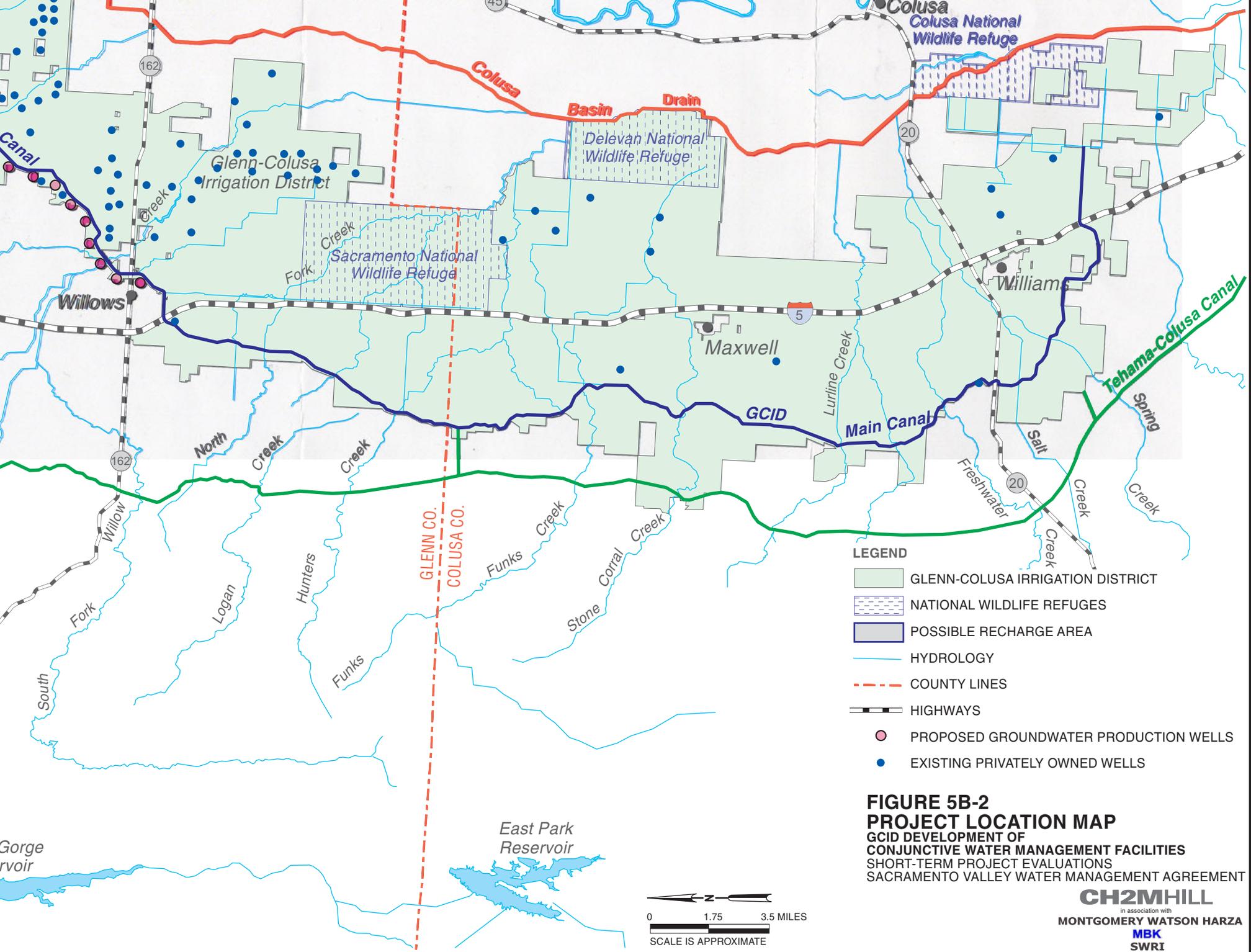
**2.4 Permitting**— The various permits would be obtained using the final design as the basis for permitting requirements. This process may be initiated before completion of final design. (9 months)

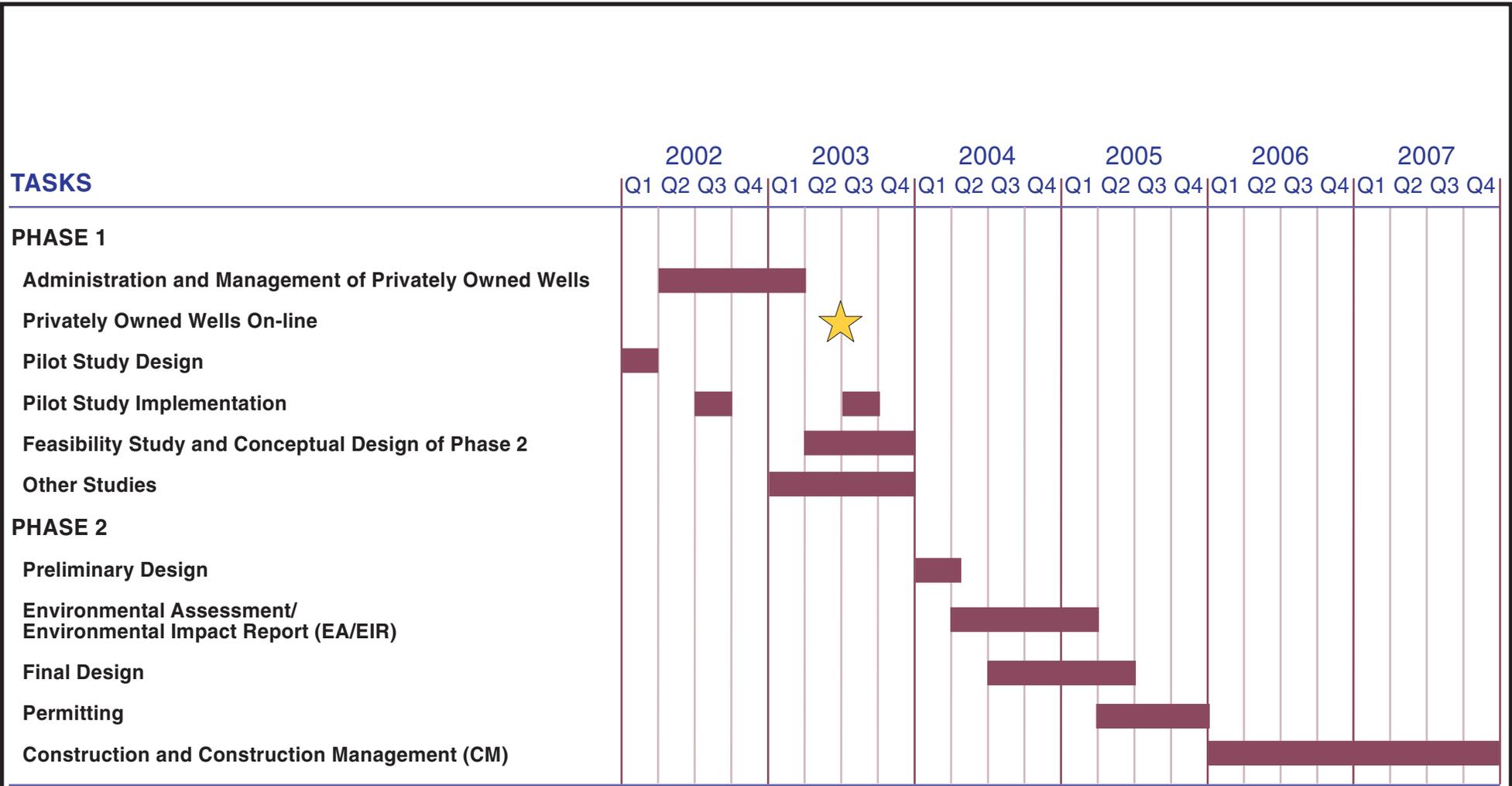
**3.1 Construction and construction management (CM)**— Construction oversight is required to enforce contract requirements and ensure a quality, functional end-product. Typical CM activities include (1) evaluating bids; (2) reviewing, approving, and testing proposed products and materials; (3) observing, photographing, and documenting all aspects of construction; (4) managing changes during construction; and (5) estimating contractor inventories, progress, and progress payments. Construction would potentially be phased over several years, given the size and complexity of the project. (2 years)

**4.1 Operation and monitoring**— Long-term operations and monitoring of the project would begin following completion of construction.



**FIGURE 5B-1**  
**DISTRICT LOCATION MAP**  
 GCID DEVELOPMENT OF CONJUNCTIVE  
 WATER MANAGEMENT FACILITIES  
 SHORT-TERM PROJECT EVALUATIONS  
 SACRAMENTO VALLEY WATER MANAGEMENT AGREEMENT





**FIGURE 5B-3  
PRELIMINARY IMPLEMENTATION SCHEDULE**

GCID DEVELOPMENT OF CONJUNCTIVE WATER MANAGEMENT FACILITIES  
SHORT-TERM PROJECT EVALUATIONS  
SACRAMENTO VALLEY WATER MANAGEMENT AGREEMENT

**CH2MHILL**  
in association with  
**MONTGOMERY WATSON HARZA**  
**MBK**  
**SWRI**

**Project 5B – Draft CEQA  
Environmental Checklist**

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# Project 5B—Environmental Factors Potentially Affected:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a “Potentially Significant Impact” as indicated by the checklist on the following pages.

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> Aesthetics                    | <input type="checkbox"/> Agriculture Resources              | <input type="checkbox"/> Air Quality            |
| <input type="checkbox"/> Biological Resources          | <input type="checkbox"/> Cultural Resources                 | <input type="checkbox"/> Geology/Soils          |
| <input type="checkbox"/> Hazards & Hazardous Materials | <input type="checkbox"/> Hydrology/Water Quality            | <input type="checkbox"/> Land Use/Planning      |
| <input type="checkbox"/> Mineral Resources             | <input type="checkbox"/> Noise                              | <input type="checkbox"/> Population/Housing     |
| <input type="checkbox"/> Public Services               | <input type="checkbox"/> Recreation                         | <input type="checkbox"/> Transportation/Traffic |
| <input type="checkbox"/> Utilities/Service Systems     | <input type="checkbox"/> Mandatory Findings of Significance |   |

## Determination:

(To be completed by the Lead Agency)

On the basis of this initial evaluation:

- I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
- I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
- I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
- I find that the proposed project MAY have a “potentially significant impact” or “potentially significant unless mitigated” impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
- I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
For

| Issues:   | Potentially Significant Impact      | Less Than Significant With Mitigation Incorporation | Less Than Significant Impact        | No Impact                           |
|---|-------------------------------------|---|-------------------------------------|-------------------------------------|
| <u>I. AESTHETICS</u> —Would the project:  |                                     |   |                                     |                                     |
| a) Have a substantial adverse effect on a scenic vista?   | <input type="checkbox"/>            | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?  | <input type="checkbox"/>            | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| c) Substantially degrade the existing visual character or quality of the site and its surroundings?<br><i>Short-term impacts from increased noise and dust emissions could occur as a result of construction. Mitigation measures implemented for noise and air quality would reduce any impacts to a less than significant level.</i>  | <input type="checkbox"/>            | <input checked="" type="checkbox"/>                 | <input type="checkbox"/>            | <input type="checkbox"/>            |
| d) Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?  | <input type="checkbox"/>            | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| <u>II. AGRICULTURE RESOURCES</u> —Would the project:  |                                     |   |                                     |                                     |
| a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?<br><i>Recharge basins may be used to accelerate the recharge of water into the groundwater basin, using available excess surface water supplies in wet or average water years. Approximately 200 acres of reclaimed existing gravel mining basins adjacent to Stony Creek, and 600 acres of new recharge basins would be constructed for use as recharge basins. The recharge basins may require a permanent conversion of potential Prime Farmland, Unique Farmland, or Farmland of Statewide Importance.</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?<br><i>See response to II (a) above.</i>  | <input checked="" type="checkbox"/> | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?<br><i>See response to II (a) above.</i>   | <input checked="" type="checkbox"/> | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| <u>III. AIR QUALITY</u> —Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:  |                                     |   |                                     |                                     |
| a) Conflict with or obstruct implementation of the applicable air quality plan?   | <input type="checkbox"/>            | <input type="checkbox"/>                            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |

| Issues:  | Potentially Significant Impact      | Less Than Significant With Mitigation Incorporation | Less Than Significant Impact        | No Impact                           |
|--|-------------------------------------|---|-------------------------------------|-------------------------------------|
| b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?<br><i>Increased air emissions could result from construction of the project. Implementation of best management practices (BMP) during construction would reduce the amount of emissions and reduce the impact to a less than significant level.</i>   | <input type="checkbox"/>            | <input checked="" type="checkbox"/>                 | <input type="checkbox"/>            | <input type="checkbox"/>            |
| c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).  | <input type="checkbox"/>            | <input type="checkbox"/>                            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| d) Expose sensitive receptors to substantial pollutant concentrations?   | <input type="checkbox"/>            | <input type="checkbox"/>                            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| e) Create objectionable odors affecting a substantial number of people?  | <input type="checkbox"/>            | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| <b>IV. BIOLOGICAL RESOURCES</b> —Would the project:  |                                     |   |                                     |                                     |
| a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?<br><i>Known Endangered Species Act (ESA)-listed species such as the valley elderberry longhorn beetle and the giant garter snake are within the area. Additionally, sensitive riparian habitat exists in and around the project site. Project scheduling would have to reflect environmental regulatory requirements including any limitation on windows of construction.</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?<br><i>See response to IV (a) above.</i>   | <input checked="" type="checkbox"/> | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act, (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?<br><i>See response to IV (a) above.</i>  | <input checked="" type="checkbox"/> | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or, impede the use of native wildlife nursery sites?<br><i>See response to IV (a) above.</i>   | <input checked="" type="checkbox"/> | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input type="checkbox"/>            |

| Issues:   | Potentially<br>Significant<br>Impact | Less Than<br>Significant<br>With Mitigation<br>Incorporation | Less Than<br>Significant<br>Impact  | No<br>Impact                        |
|---|--------------------------------------|--|-------------------------------------|-------------------------------------|
| e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?<br><br><i>The removal of some vegetation may be required for construction of the project. Mitigation measures would be implemented to replace any vegetation removed during construction, which would reduce the impact to a less than significant level.</i> | <input type="checkbox"/>             | <input checked="" type="checkbox"/>                          | <input type="checkbox"/>            | <input type="checkbox"/>            |
| f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?<br><br>See response to IV (e) above.   | <input type="checkbox"/>             | <input checked="" type="checkbox"/>                          | <input type="checkbox"/>            | <input type="checkbox"/>            |
| <b>V. CULTURAL RESOURCES</b> —Would the project:  |                                      |  |                                     |                                     |
| a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?<br><br><i>A significant impact would occur if a cultural resource were to be disturbed by activities associated with project development. In the event that an archaeological resource was discovered, appropriate measures would be undertaken to minimize any impacts.</i>           | <input type="checkbox"/>             | <input checked="" type="checkbox"/>                          | <input type="checkbox"/>            | <input type="checkbox"/>            |
| b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?<br><br>See response to V (a) above.   | <input type="checkbox"/>             | <input checked="" type="checkbox"/>                          | <input type="checkbox"/>            | <input type="checkbox"/>            |
| c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?<br><br>See response to V (a) above.   | <input type="checkbox"/>             | <input checked="" type="checkbox"/>                          | <input type="checkbox"/>            | <input type="checkbox"/>            |
| d) Disturb any human remains, including those interred outside of formal cemeteries?<br><br>See response to V (a) above.  | <input type="checkbox"/>             | <input checked="" type="checkbox"/>                          | <input type="checkbox"/>            | <input type="checkbox"/>            |
| <b>VI. GEOLOGY AND SOILS</b> —Would the project:  |                                      |  |                                     |                                     |
| a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:  |                                      |  |                                     |                                     |
| i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.  | <input type="checkbox"/>             | <input type="checkbox"/>                                     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| ii) Strong seismic ground shaking?  | <input type="checkbox"/>             | <input type="checkbox"/>                                     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| iii) Seismic-related ground failure, including liquefaction?  | <input type="checkbox"/>             | <input type="checkbox"/>                                     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| iv) Landslides?   | <input type="checkbox"/>             | <input type="checkbox"/>                                     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| b) Result in substantial soil erosion or the loss of topsoil?.  | <input type="checkbox"/>             | <input type="checkbox"/>                                     | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |

| Issues:  | Potentially Significant Impact | Less Than Significant With Mitigation Incorporation | Less Than Significant Impact        | No Impact                           |
|--|--------------------------------|---|-------------------------------------|-------------------------------------|
| c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?   | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?   | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| <b><u>VII. HAZARDS AND HAZARDOUS MATERIALS—</u></b>  |                                |   |                                     |                                     |
| Would the project:   |                                |   |                                     |                                     |
| a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| <i>Construction equipment would require the use of potentially hazardous materials. The potential for significant hazardous material spill would be unlikely because of the limited amount of such materials that would be used onsite. If a spill or release of such materials were to occur, it could potentially be significant unless BMPs were implemented.</i> |                                |   |                                     |                                     |
| b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| <i>See response to VII (a) above.</i>  |                                |   |                                     |                                     |
| c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?   | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?   | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| h) Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| <b><u>VIII. HYDROLOGY AND WATER QUALITY—</u></b>   |                                |   |                                     |                                     |
| Would the project:   |                                |   |                                     |                                     |

| Issues:   | Potentially Significant Impact      | Less Than Significant With Mitigation Incorporation | Less Than Significant Impact        | No Impact                           |
|---|-------------------------------------|---|-------------------------------------|-------------------------------------|
| <p>a) Violate any water quality standards or waste discharge requirements?</p> <p><i>Increases in turbidity would be likely to occur during any in-stream construction work. Additionally, there is a potential for an increase of erosion and sedimentation from construction activity. This could be a significant impact and would require an erosion control plan and the implementation of BMPs to reduce any impacts to waterways in and around the project area.</i></p>   | <input checked="" type="checkbox"/> | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| <p>b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).</p> <p><i>There are serious concerns about the long-term draw-down of the groundwater table and land subsidence, particularly in dry years. Model development would help determine the effects of increased groundwater pumping. The impact that groundwater withdrawal would have on existing groundwater supplies is as yet undetermined; however, it is potentially significant because of the complexity of the issue.</i></p> | <input checked="" type="checkbox"/> | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| <p>c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?</p> <p><i>Locations of recharge basins and/or additional conveyance facilities may have some affect on drainage patterns of naturally existing waterways. These facilities would be located in such a way as to minimize any impact to existing drainage of the project area.</i></p>   | <input type="checkbox"/>            | <input checked="" type="checkbox"/>                 | <input type="checkbox"/>            | <input type="checkbox"/>            |
| <p>d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?</p> <p><i>See response to VIII (c) above.</i></p>  | <input type="checkbox"/>            | <input checked="" type="checkbox"/>                 | <input type="checkbox"/>            | <input type="checkbox"/>            |
| <p>e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?</p>  | <input type="checkbox"/>            | <input type="checkbox"/>                            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| <p>f) Otherwise substantially degrade water quality?</p>  | <input type="checkbox"/>            | <input checked="" type="checkbox"/>                 | <input type="checkbox"/>            | <input type="checkbox"/>            |
| <p>g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?</p>   | <input type="checkbox"/>            | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| <p>h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?</p>  | <input type="checkbox"/>            | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| <p>i) Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam?</p>  | <input type="checkbox"/>            | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| <p>j) Inundation by seiche, tsunami, or mudflow?</p>  | <input type="checkbox"/>            | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |

| Issues:  | Potentially Significant Impact | Less Than Significant With Mitigation Incorporation | Less Than Significant Impact        | No Impact                           |
|--|--------------------------------|---|-------------------------------------|-------------------------------------|
| <u>IX. LAND USE AND PLANNING</u> —Would the project:   |                                |   |                                     |                                     |
| a) Physically divide an established community?   | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?<br><i>Short-term impacts from increased noise and dust emissions could occur as a result of construction. Mitigation measures implemented for noise and air quality would reduce any impacts to a less than significant level.</i> | <input type="checkbox"/>       | <input checked="" type="checkbox"/>                 | <input type="checkbox"/>            | <input type="checkbox"/>            |
| c) Conflict with any applicable habitat conservation plan or natural community conservation plan?  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| <u>X. MINERAL RESOURCES</u> —Would the project:  |                                |   |                                     |                                     |
| a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?   | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| <u>XI. NOISE</u> —Would the project result in:   |                                |   |                                     |                                     |
| a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.<br><i>Short-term noise levels are expected to increase for the duration of construction. These noise increases would be temporary, and mitigation measures would be implemented to reduce any impact to less than significant levels.</i>  | <input type="checkbox"/>       | <input checked="" type="checkbox"/>                 | <input type="checkbox"/>            | <input type="checkbox"/>            |
| b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?   | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.   | <input type="checkbox"/>       | <input checked="" type="checkbox"/>                 | <input type="checkbox"/>            | <input type="checkbox"/>            |
| e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?   | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| <u>XII. POPULATION AND HOUSING</u> —Would the project:   |                                |   |                                     |                                     |

| Issues:   | Potentially Significant Impact | Less Than Significant With Mitigation Incorporation | Less Than Significant Impact        | No Impact                           |
|---|--------------------------------|---|-------------------------------------|-------------------------------------|
| a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).   | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?   | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?   | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| <b>XIII. PUBLIC SERVICES—Would the project:</b>   |                                |   |                                     |                                     |
| a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services? | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| Fire protection?  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| Police protection?  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| Schools?  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| Parks?  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| Other public facilities?  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| <b>XIV. RECREATION—Would the project:</b>   |                                |   |                                     |                                     |
| a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| b) Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| <b>XV. TRANSPORTATION/TRAFFIC—Would the project:</b>  |                                |   |                                     |                                     |
| a) Cause an increase in traffic, which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?   | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?   | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?  | <input type="checkbox"/>       | <input type="checkbox"/>                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |

| Issues:  | Potentially<br>Significant<br>Impact | Less Than<br>Significant<br>With Mitigation<br>Incorporation | Less Than<br>Significant<br>Impact  | No<br>Impact                        |
|--|--------------------------------------|--|-------------------------------------|-------------------------------------|
| e) Result in inadequate emergency access?  | <input type="checkbox"/>             | <input type="checkbox"/>                                     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| f) Result in inadequate parking capacity?  | <input type="checkbox"/>             | <input type="checkbox"/>                                     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?   | <input type="checkbox"/>             | <input type="checkbox"/>                                     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| <b><u>XVI. UTILITIES AND SERVICE SYSTEMS—</u></b>  |                                      |  |                                     |                                     |
| Would the project:   |                                      |  |                                     |                                     |
| a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?  | <input type="checkbox"/>             | <input type="checkbox"/>                                     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?   | <input type="checkbox"/>             | <input type="checkbox"/>                                     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?  | <input type="checkbox"/>             | <input type="checkbox"/>                                     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?   | <input type="checkbox"/>             | <input type="checkbox"/>                                     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| e) Result in a determination by the wastewater treatment provider, which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?   | <input type="checkbox"/>             | <input type="checkbox"/>                                     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?   | <input type="checkbox"/>             | <input type="checkbox"/>                                     | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| g) Comply with federal, state, and local statutes and regulations related to solid waste?  | <input type="checkbox"/>             | <input type="checkbox"/>                                     | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| <b><u>XVII. MANDATORY FINDINGS OF SIGNIFICANCE</u></b>   |                                      |  |                                     |                                     |
| a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory? | <input checked="" type="checkbox"/>  | <input type="checkbox"/>                                     | <input type="checkbox"/>            | <input type="checkbox"/>            |
| b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?   | <input type="checkbox"/>             | <input checked="" type="checkbox"/>                          | <input type="checkbox"/>            | <input type="checkbox"/>            |
| c) Does the project have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly?   | <input type="checkbox"/>             | <input checked="" type="checkbox"/>                          | <input type="checkbox"/>            | <input type="checkbox"/>            |