



ATTACHMENT 4 - PROJECT DESCRIPTION

This section includes a complete description of the proposed project and is organized as follows:

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- **Project Description**
 - Project Overview
 - Goals of the Project
 - Needed Facilities
 - Area Covered
 - Detailed Project Description
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 - Data, Methods and Analysis to be Used
 - New Knowledge and Improvement in Groundwater Management
 - Consistency with Groundwater Management Plan
- **On-Going Use**
 - Operation and Maintenance Funding
 - Adaptive Management Strategy

Exhibits

Exhibit 4.1 – Sample Encroachment Permit

Exhibit 4.2 – Sample Shallow and Deep Monitoring Well Designs

Exhibit 4.3 – Consolidated Irrigation District FY 2011-2012 Budget



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4.1 - Background Information on Consolidated Irrigation District

Origin

The Consolidated Irrigation District is an irrigation district organized under the California Irrigation District Law, Section 20500 *et seq.* of the California Water Code of the State of California. The District was formed in 1921 and its boundaries encompass over approximately 145,000 acres. The District has had a dramatic impact on southern Fresno County by providing surface water and managing groundwater for a successful agricultural economy in a region known as the “Raisin Capital of the World”.

Geography

The District encompasses an area of 145,000 acres (226 square miles) on the San Joaquin valley floor in Fresno County, about 15 miles south of the City of Fresno. CID extends from the Kings River on the east, to about 1 mile west of the town of Caruthers. CID generally shares its northern boundary with Fresno Irrigation District, and extends southerly to include small portions of northeastern Tulare County. **Figure 4.1** shows a district location map.

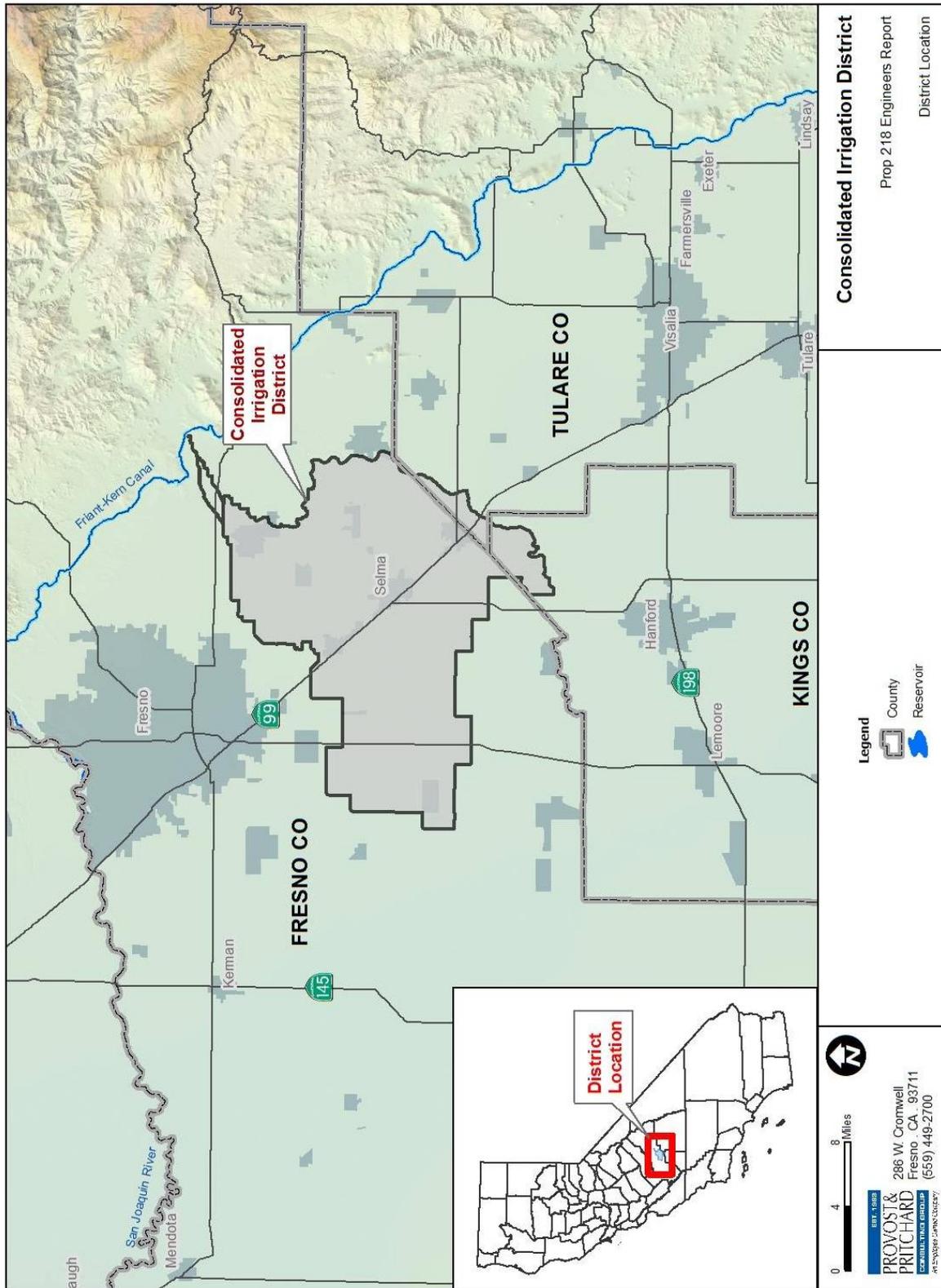


Figure 4.1 – District Location Map

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Geology and Hydrogeology

CID is located in the Kings Groundwater Subbasin (**Figure 4.2**). The generalized stratigraphy includes, from oldest to youngest: basement complex, unconsolidated and alluvial deposits, and topsoil. Recent standing groundwater levels in the unconfined aquifer average about 30 feet in the eastern to almost 160 feet in the western edge of the District below ground surface (bgs). The groundwater beneath the Consolidated Irrigation District (which is extremely good quality for irrigation) is heavily relied upon within the District. As the District's surface water supplies are generally available for only a couple months each year, agriculture, municipalities, and industry all regularly draw upon this valuable groundwater resource from individual wells.

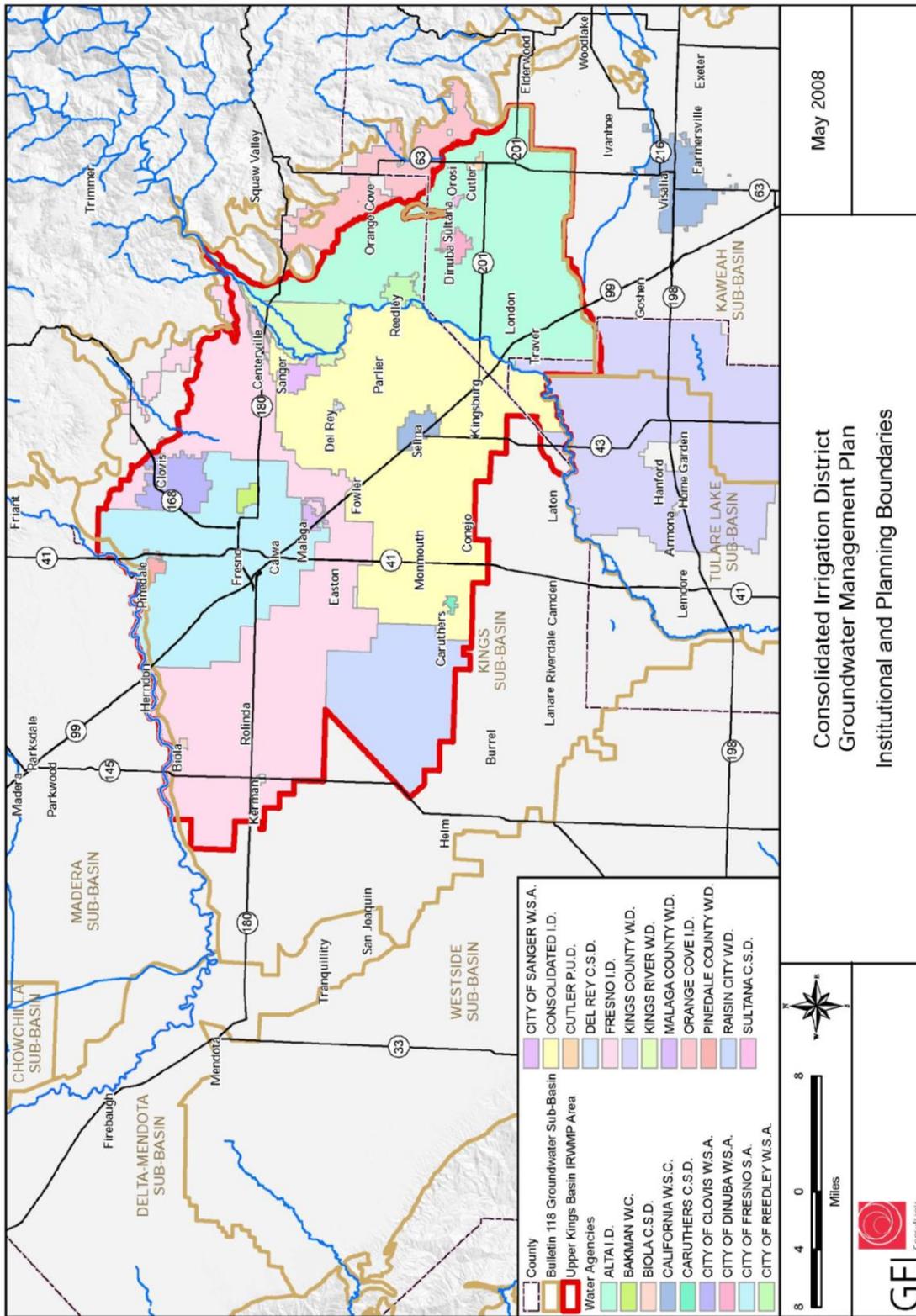


Figure 4.2 – Groundwater Sub-basin Map

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Confining layers associated with the Lacustrine and Marsh deposits are only present west of the District. The alluvial deposits within CID do not have laterally extensive confining layers that inhibit groundwater flow. The ancient sand dunes in the west-central region of the District do not inhibit groundwater flow and recharge potential.

Water Supplies

CID is a member of the Kings River Water Association (KRWA) and has a significant entitlement to supplies from the Kings River – approximately 290,000 acre-feet/year. However, CID's only surface water supply is from the Kings River. CID does not contract for Central Valley Project (CVP) Friant Division water supply from the San Joaquin River, nor is it able to develop additional water supplies through local streams.

CID diverts its Kings River entitlement through its headworks at the Fresno Weir to irrigate the 85,500 acres of land it services with surface water. CID's entitlement is dependent on the water year and the agreements with KRWA. To state it simply, the more precipitation on the Kings River watershed, the more water CID can divert. CID's diversions have been as low as 0 acre-feet in the 1976-1977 water year and as high as 536,275 acre-feet in the 1968-69 water year.

The District makes every effort to divert and recharge as much flood water as possible from the Kings River. All of the imported supplies have either recharged the groundwater through the use of the District's many recharge ponds or been diverted for direct surface irrigation within the District. Kings River water is usually taken in high flows for short durations.

Groundwater Monitoring

Unlike many irrigation districts in the region, CID owns a vast network of groundwater monitoring wells, both within and outside the District's boundary. In general, the network is comprised of 82 monitoring wells spaced on a 2 mile by 2 mile grid near county road intersections throughout the District. District wide monitoring is performed each spring and fall to develop groundwater contour maps and estimate changes in groundwater storage. CID owns rights-of-way for newer wells and does not use agricultural, municipal, or industrial production wells for groundwater monitoring.

Climate

The climate of the District is dry with mild winters and hot summers. Summer temperatures often exceed 100 degrees Fahrenheit. The average winter temperatures vary from the high 30's to low 40's at night to the low 50's during the day. During the periods of inversion, the temperatures vary only 5 or so degrees between day and night with the highest in the low 40's or high 30's. The average annual rainfall is 11.6 inches. Ninety percent of the annual precipitation falls in the six month period of November through April. As a result, agricultural crops are heavily dependent on irrigation to supply most of their water demands.

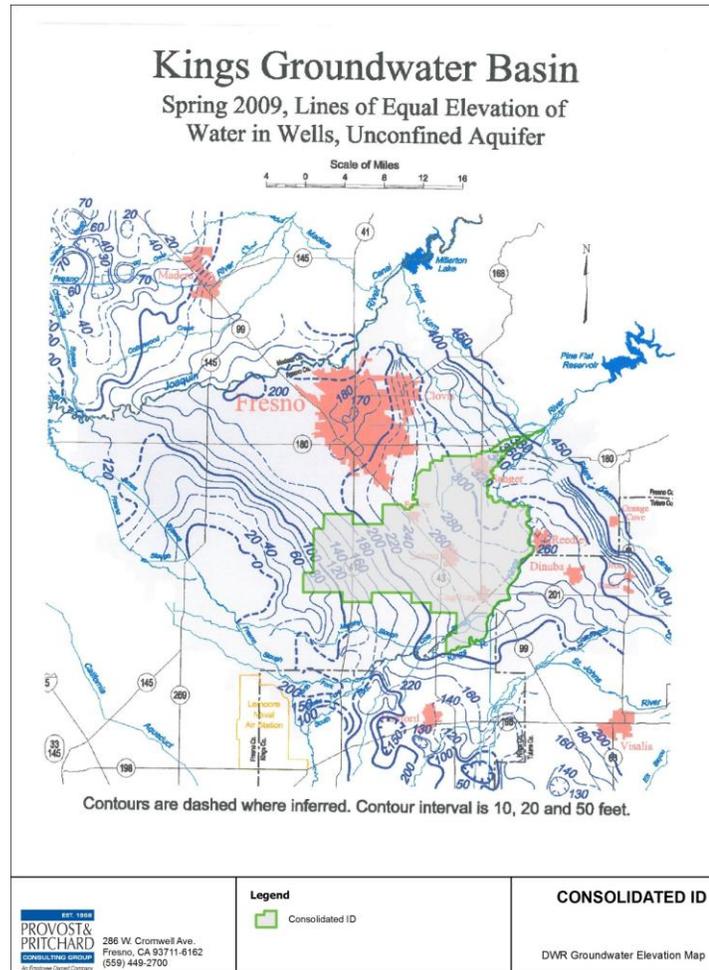
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Agriculture

Most of the District has been fully developed for irrigated agriculture. The primary crops include grape vineyards and deciduous fruits and nuts.

Conjunctive Use

The District has the oldest intentional groundwater recharge program in the State. There are documents that indicate that intentional recharge activities were ongoing and predate the District formation in 1921. Although the District is considered a conjunctive use irrigation district of surface water and groundwater, the District itself does not own or operate any production wells. The wells that affect the Kings Groundwater Basin beneath the District are privately owned irrigation wells or publically owned municipal wells. The irrigation wells are typically used for irrigation water by landowners and/or domestic water use. Private groundwater wells are used to supplement surface supplies in most years and during dry years to meet the water demand for the irrigated lands in the District or the lands that are unable to receive surface water. Municipal wells deliver water to the five cities and two unincorporated communities within CID. These wells pump approximately 19,000 acre-feet per year.



Groundwater Contour Map for CID

The District provides recharge through two methods: direct recharge and in-lieu recharge. The direct recharge occurs through seepage from earthen channels when they are used for water delivery and in dedicated recharge basins. Most canals within CID are left unlined because of their recharge benefit. The types of soils throughout much of the District allow for relatively rapid infiltration and recharge to the groundwater surface. The dedicated recharge system includes over 50 dedicated recharge basins with a surface area of approximately 1,300 acres. Timing of the deliveries to the recharge basins varies based on runoff conditions and available supplies. Typically, deliveries to the recharge basins occur when there are flood releases in the Kings River.



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In-lieu recharge in CID occurs when growers use surface water instead of groundwater. By foregoing pumping, groundwater can remain in storage or it can be used by other growers that do not have access to surface water or by municipalities.

4.2 - Project Description

Project Overview

The proposed project includes the construction of a combination of 12 shallow and deep groundwater monitoring wells to improve groundwater monitoring capabilities within CID. Many of the District's existing groundwater monitoring wells are very old and damaged or destroyed so that they are not usable for groundwater monitoring. The construction of new wells as part of the proposed project would replace many of these damaged or destroyed monitoring wells. For each new well, water quality will be sampled for baseline measurements. The hydrogeology and stratigraphy will be characterized using geologic logs and water quality results. The public will be involved through informational public meetings.

The project is critically needed to fill gaps in the District-wide monitoring network and improve the capabilities of managing groundwater resources in a region experiencing groundwater overdraft.

Goals of the Project

Specific goals for the project include:

- Replace old and damaged monitoring wells
- Fill gaps in a district-wide monitoring network
- Collect water quality samples in each new well to establish a water quality baseline
- Provide larger diameter wells that provide better access for water quality testing and pressure transducers

Long-term goals for the project include:

- Improve understanding of the local hydrogeology through data provided in well logs and water quality test results
- Improve capabilities to develop groundwater contour maps, and estimate groundwater gradients, groundwater overdraft and safe yield
- Improve capabilities to monitor effects of groundwater recharge and other overdraft mitigation measures

Needed Facilities

CID currently has 15 monitoring wells that the District has identified as being either damaged or destroyed and are not capable of providing groundwater monitoring. The District has also identified 2 new locations for additional wells to add to its existing monitoring network near the District's southern boundary. The anticipated casing depths of these wells vary from 80 feet to almost 200 feet. Thus, the estimated construction costs for the replacement monitoring wells would vary between wells. In

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order to maximize the groundwater monitoring benefit this grant funding would provide to this region, CID ranked these 17 monitoring wells in the order in which the available funding should be used for well replacement. The criteria used for the ranking included estimated construction cost, areas within CID that are in critical need of reliable groundwater monitoring (i.e., near cities, along the District boundary, etc.), and whether the well is in a location favorable to be a part of a future Kings River Conservation District (KRCD) groundwater quality monitoring program (discussed in **Section 4.3**).

It is estimated that available grant funding for this groundwater monitoring project would provide funding for 12 new shallow and deep monitoring wells. The well diameters and estimated casing depths are summarized in **Table 4.1**. The locations of these wells, along with the remaining wells within CID’s existing monitoring well network, is shown in **Figure 4.3**. A discussion on the estimated well construction costs is included in **Attachment 6**.

The estimated limit/threshold of available funding for the proposed list of monitoring wells is identified in **Table 4.1**. If well construction bids come in less than anticipated, additional monitoring wells below this threshold may be constructed. If bids come in higher than anticipated, this threshold could move up the list. In this case, CID would meet with DWR to discuss reducing the number of wells that would be constructed as part of this project.

Table 4.1 – Proposed Monitoring Wells (in ranked order)

CID Well No.	Type (M = Level, WQ = Water Quality)	Estimated Casing Depth (feet)	Casing Diameter (inches)	Estimated Construction Cost
24	M	80	2	\$7,400
36	M/WQ	80	2	\$7,400
39	M/WQ	95	2	\$8,400
16	M/WQ	80	2	\$7,400
45	M	130	4	\$20,800
77	M	110	4	\$20,800
53	M	195	4	\$26,600
8	M	80	2	\$7,400
52	M	175	4	\$26,600
67	M/WQ	120	4	\$20,800
80	M	100	2	\$8,400
13	M	75	2	\$7,400
55	M	195	4	\$26,600
42	M	90	2	\$8,400
57	M	170	4	\$26,600
Apex 1	M	80	2	\$7,400
Apex 2	M	80	2	\$7,400

Estimated Limit for Available Funding

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The estimated casing depth for a well was determined using information about other existing CID monitoring wells in the near vicinity of the well, including existing monitoring well depth and measured groundwater level. All proposed monitoring wells would have casings with bottoms 30 feet (minimum) below groundwater levels to ensure the wells will remain usable if groundwater levels drop. The final depths will be confirmed after drilling each borehole, and examining the geologic log. The well depths may change slightly so they collect water from a productive zone, but the potential change will probably not be large, and probably will not have a significant impact on the cost estimate.

Casing diameters were determined based on depth of well. For wells 100 feet in depth or less, a 2-inch diameter casing will be used. For wells deeper than 100 feet, a 4-inch diameter casing will be used. This will provide enough room to fit groundwater quality sampling pumps within the well casings for all new proposed wells, regardless if the well is currently designated for water quality monitoring.

Each 2-inch diameter casing (shallow wells) is anticipated to have a 30 foot long screened section, while 4-inch diameter casings (deep wells) will have 50 feet of screened section.

CID staff will measure groundwater level in its wells twice a year (spring and fall) using portable ultrasonic sounders. No permanent water level data loggers would be installed in the wells as part of this project.

CID owns rights-of-way for each monitoring well in its network recently constructed during the past 15 to 20 years. Older monitoring wells within CID do not have documented rights-of-way, but CID does have long-standing verbal agreements with landowners for monitoring well maintenance and access. During the last major monitoring well replacement project from 2001 through 2003, rights-of-way for the new wells were obtained cooperatively from landowners and no lands or easements were purchased by CID. However, similar to other irrigation districts in the region, CID will be locating future replacement monitoring wells within county road right-of-way. In general, CID's monitoring well network consists of wells located at or near county road intersections, providing adequate road right-of-way to locate a new monitoring well near the edge of the right-of-way.

Fresno County has been cooperative with irrigation district concerning the construction of monitoring wells within county right-of-way. In the experience of the District's consulting engineer, similar construction projects within county right-of-way requires a single \$500 encroachment permit that covers all wells as part of the improvement project that are to be located within county right-of-way. Constructing wells within county right-of-way is anticipated to have very little to no legal fees and will reduce potential delays in the construction process (permits typically acquired within one week).

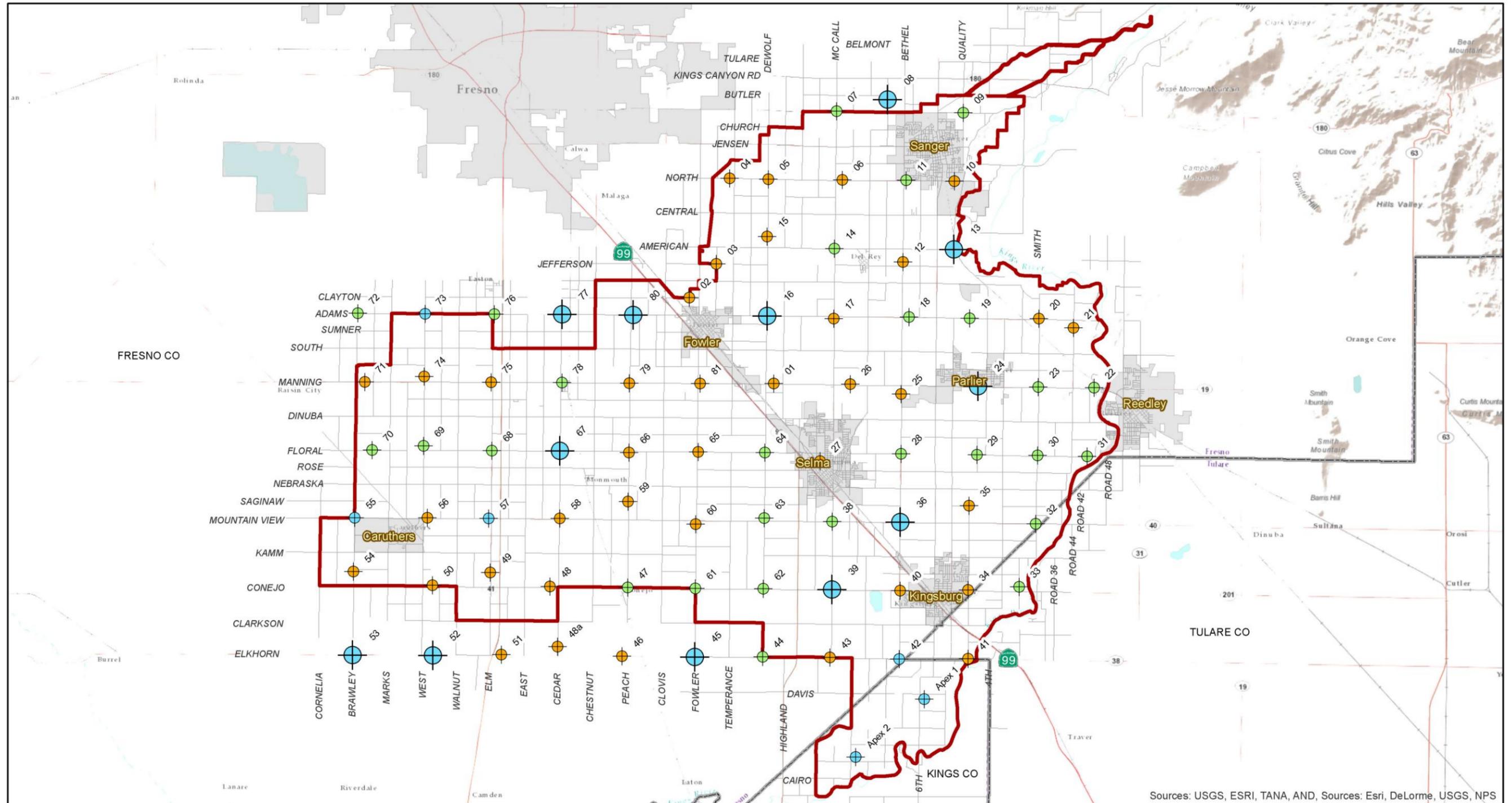


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An example monitoring well encroachment permit with the County of Fresno is included in **Exhibit 4.1**.

Area Covered

The area covered by the proposed project is shown on **Figure 4.3**. **Figure 4.3** shows all of CID's existing and proposed monitoring well locations. The new monitoring wells will provide new groundwater data throughout the District.



Sources: USGS, ESRI, TANA, AND, Sources: Esri, DeLorme, USGS, NPS

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Miles

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Legend

- CID Boundary
- County
- City/Community

Monitoring Well

- ⊕ Identified For Replacement (Top 12 Ranked)
- ⊕ Identified For Replacement (Lower Ranked, If Funding Is Available)
- ⊕ Recently Replaced by CID
- ⊕ Older Well To Remain

⊕ 40 CID Well No.

CONSOLIDATED ID

Groundwater Monitoring Improvement Project

Monitoring Well Network & Replacement Map

FIGURE 4.3

Detailed Project Description

The project will include the construction of an estimated 12 monitoring wells, depending on construction bid results, in the locations shown on **Figure 4.3**. Each well will have general dimensions and specifications as listed in **Table 4.1**. The wells will replace older existing damaged or destroyed monitoring wells. The project is critically needed to fill gaps in the District-wide monitoring network and improve the capabilities of managing groundwater resources in a region experiencing groundwater overdraft.

The wells will be designed in two phases comprised of conceptual design and final design. The contractor will be required to obtain well drilling and encroachment permits for the wells. A CEQA negative exemption will be filed. The project involves no federal funds or federal facilities, so NEPA does not apply.

The well contract will be publicly bid. The wells will be drilled using the casing hammer method (shallow wells to 100 feet deep) and using the mud rotary method (deep wells over 100 feet deep) by an experienced contractor. A geologist will log the soils during the drillings. The location and elevation of each well will be surveyed. The water quality in each casing will be tested for an agricultural suitability analysis, which tests for the primary constituents of interest in the predominantly agricultural area. A detailed hydrogeologic/stratigraphic analysis will characterize the local geology and provide insight into current hydrogeologic conditions.

The project is consistent with the District's existing well replacement program, which consists of repairing or replacing monitoring wells to maintain the monitoring network. The District has been monitoring groundwater levels since the 1920s, and many of the original monitoring wells are still in use. However, many are damaged or destroyed, necessitating the replacement of wells as part of this project. From the mid-1990s until 2003, CID replaced nearly half of its 80 monitoring wells. New wells were constructed with 4-inch or 6-inch diameter perforated casings. That well replacement program was funded with a combination of District reserves and an AB303 State Grant. These efforts are an indication of CID's on-going commitment to groundwater management.

The project is supported by the CID Board of Directors, which is comprised of local farmers and represents the local community. The project is also consistent with the region's Upper Kings Basin Integrated Regional Water Management Authority's Integrated Regional Water Management Plan and the Kings River Conservation District's ongoing efforts of monitoring region's water resources (discussed in **Section 4.3**). There is no known opposition to the project. No letters of opposition have been received, and no opposition has been voiced during public District meetings.

Public outreach will include newsletters and fliers published by the District and project discussions at public Board of Directors meetings. These efforts are intended to inform the public about the project and solicit input.

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4.3 – Public Outreach

Collaboration with Other Agencies

The District is located in the Kings Groundwater Basin, which extends beyond many political boundaries and includes other municipalities, irrigation districts, water districts, private water companies and private water users. This underscores the importance of inter-agency cooperation in the region, and the District has historically made efforts to work conjunctively with many other water management agencies as described below.

Upper Kings Basin Integrated Regional Water Management Authority

CID was one of four founding members of a Basin Advisory Panel that promoted regional water management in the area. This group grew and evolved into the Upper Kings Water Forum, and is now the Upper Kings Basin Integrated Regional Water Management Authority (Authority). The vision of the Authority is a sustainable supply of the Kings River Basin's finite surface and groundwater resources through regional planning that is balanced and beneficial for environmental stewardship, overall quality of life, a sustainable economy and adequate resources for future generations.

The Authority developed an Integrated Regional Water Management Plan in 2007 and will update the plan in 2012. One of the primary goals of the Upper Kings IRWMP is to reduce overdraft through conjunctive use and groundwater management using both structural projects (direct/in-lieu recharge) and non-structural management measures (monitoring; integration of land use and water supply plans; adaptive management; etc.).

As one of the larger stakeholders within the Authority, CID integrates the components from the Integrated Regional Water Management Plan into its own Groundwater Management Plan.

Kings River Conservation District

The Kings River Conservation District (KRCD) is the overseeing agency of the Upper Kings Basin Integrated Regional Water Management Authority. KRCD collaborates with water agencies in the Kings River Basin region to better manage and protect both surface water and groundwater resources. CID, along with other districts within Kings River Basin, supplies groundwater level data to KRCD twice a year. KRCD then compiles this regional data and reports the information back to the DWR. KRCD is in the process of developing a regional groundwater quality monitoring program, and the new wells as part of this project would be compatible with water sampling. Many of CID's existing monitoring wells are ½-inch to 1-inch in diameter, and too small to be compatible with standard water sampling tools.

Tribal Entities

No tribal entities are located in CID.

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Kings River Fishery Management Program

CID is currently working with the Kings River Water Association (KRWA), KRCD, a range of state and federal resources agencies, local fishery groups, and the other water districts on the Kings River Fishery Management Program. The Fishery Management Program is intended to protect fish populations within the Kings River and set required minimum river flows to promote fishery health. CID will continue to work cooperatively to avoid, minimize, and mitigate impacts to biological resources.

Public Education

CID Groundwater Summit

To increase participation and generate awareness regarding CID's Groundwater Management Plan, the CID Board hosted a "Groundwater Summit" in 2008. CID sent out invitations to members of the city council, city planning, and public works staff; developers; and business interests to inform the community regarding the planning process, schedule, GWMP content, and how the public could participate and provide comments. The purpose of the meeting was to obtain input from the community and to provide the CID Board an opportunity to inform the community on the conditions of the Kings Groundwater Basin, and the purpose and need for the CID GWMP. The meeting allowed various stakeholders to share their perspectives and expectations related to groundwater management within the CID planning area. During this meeting, persons were informed how the regular Board meetings would be used to provide additional opportunities to discuss the plan, and for staff and the consultant to appraise the Board of progress.

CID Board members and the public are briefed at their regularly scheduled public board meetings to keep them informed of the progress of the GWMP and the GWMP's future revisions.

4.4 - Information Dissemination

Information will be disseminated to the State of California, local water agencies, local growers and the general public through a variety of methods. Refer to **Section 5.9**, which provides a detailed discussion on information dissemination efforts.

4.5 – Need for the Project

The proposed monitoring wells are needed to fill gaps in an existing monitoring network. This will improve CID's ability to prepare contour maps, calculate groundwater flows, and estimate overdraft. CID has recognized the need for maintaining their monitoring network and has been replacing wells since the 1990's (see CID GMP pages 26-27). The monitoring system is still not comprehensive, but the proposed project will fill the most important gaps in network. Following are more detailed discussions on why the project is critically needed in CID.

1) Reliance on Groundwater as Firm Water Supply

CID practices conjunctive management through use of surface water and groundwater. CID also has a large groundwater recharge program and in the near future plans to develop a groundwater bank. Surface water is typically delivered only one to three months per year, and groundwater must be used the rest of the year to meet water demands. During the 1976 to 1977 drought no surface water was delivered to CID, and growers relied exclusively on groundwater. Consequently, groundwater is the most important water source since it is the only firm supply. Groundwater is also important since the majority of land is planted in permanent crops (vineyards, fruit and nut trees) that cannot be fallowed in dry years. Groundwater is the most important resource to CID, and monitoring is an essential facet of managing that resource.

2) Fill Gaps in Monitoring Network

Figure 4.3 shows the current CID groundwater monitoring network. The network includes a grid of dedicated monitoring wells spaced about every two miles. This has served as an excellent network for regional groundwater monitoring. However, some of the wells are at least 40 years old and approximately 15 out of the original 82 wells are currently damaged or destroyed. CID has been proactive in restoring this network since the 1990's. According to the CID GMP, "*From the mid-1990s until 2003, CID replaced nearly half of its monitoring wells.*" (pg 26-27). However, several wells still need to be replaced. After these gaps are filled CID will be able to create more accurate contour maps, and estimate groundwater inflow, groundwater outflow, overdraft and safe yield with greater certainty.

3) Monitor Groundwater Outflow

Groundwater outflow from CID is a large concern, as described in the CID Groundwater Management Plan:

"The area to the west of CID is reliant exclusively on groundwater. Pumping in this area creates a steep groundwater gradient from east to west, resulting in the movement of water from CID towards the trough in the lower part of the Kings Basin. Throughout the central and western portions of CID, the westward gradient has steepened and groundwater levels have dropped as much as 80 to 100 feet. The steepened gradient and the trend for declining water levels are likely to continue into the future." (pg 37)

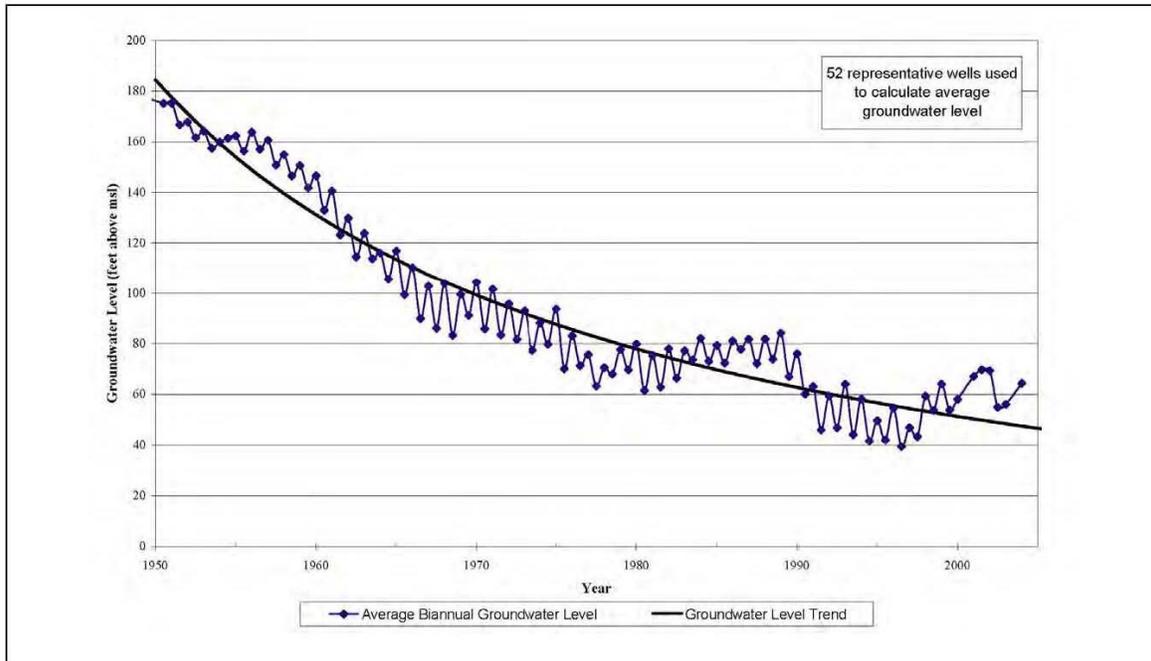
This outflow has a large impact on groundwater levels in CID, and the proposed monitoring wells will improve CID's ability to monitor the outflow.

4) Manage Groundwater Overdraft

CID has been experiencing groundwater overdraft for many years and groundwater levels dropped over 100 feet between 1950 and 2000. Consequently, DWR has declared the Kings Groundwater Sub-basin to be in a critical state of overdraft (DWR Bulletin 118, 2003). However, CID is making progress in correcting the overdraft

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through groundwater recharge and water conservation. **Figure 4.4** is a composite hydrograph for 60 wells in CID that shows a declining rate of overdraft.



Source: CID Groundwater Management Plan, Figure 4.11

Figure 4.4 – Groundwater Trends in Western CID

The overdraft situation in CID requires serious attention and an important part of that effort is groundwater level monitoring. The proposed wells will improve CID’s ability to monitor overdraft and evaluate the effects of overdraft reduction measures.

5) Monitor Recharge and Banking Programs

The District has the oldest intentional groundwater recharge program in the State. There are documents that indicate intentional recharge predates the District formation in 1921. The current recharge system includes over 50 recharge basins with a surface area of approximately 1,300 acres. In addition, canals are intentionally left unlined due to their recharge benefit. The recharge basins and canals are dispersed throughout the entire District. A comprehensive, district-wide monitoring network is needed to monitor impacts from such a spatially distributed recharge program. CID has also received a grant from DWR to develop the South and Highland Groundwater Banking Project. This project will have its own monitoring wells near recharge and recovery areas, but regional monitoring will also be needed to evaluate groundwater outflow from the project area.

6) Opportunities for Water Quality Testing and Data Loggers

The original monitoring wells in CID have diameters of ½ to 1-inch. These wells are difficult to monitor and are easily damaged. In addition, it is difficult to install pressure

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transducers and collect water quality samples in small diameter wells. The new wells will have diameters ranging from 2 to 4 inches and provide better access to the groundwater for monitoring purposes.

7) Improve Understanding of Groundwater Budget

Consolidated Irrigation District is located in the Kings Groundwater sub-basin (see **Figure 4.2**). According to DWR (2003), this basin has a groundwater budget type 'C', which indicates a low level of knowledge for budget components. The proposed monitoring wells will help to improve knowledge of groundwater levels, groundwater flow and the stratigraphy. This will be a small step in the right direction towards improving our understanding of the groundwater budget.

Summary

Protecting and preserving groundwater in CID is imperative. The proposed project will provide data to inform water managers about groundwater conditions, increase knowledge of the local hydrogeology, and provide data to more efficiently develop and manage groundwater recharge programs.

4.6 – New Data and Knowledge

Quality of Information Obtained

Several measures are in place to help ensure high quality information will be obtained. These measures are described in other sections of this application and are referenced below:

- Work will be performed using standard and accepted methods and analysis, as described below under 'Data, Methods and Analysis to be Used'.
- The project will be performed according to a detailed and focused Work Plan (**Section 5.4**).
- The public outreach/information dissemination efforts described in **Section 5.9** will help ensure that the project is proceeding in the right direction and that the project provides information that is needed, useful, and understood. Comments, suggestions and criticisms from the stakeholders will be used to improve the project.
- The quality assurance measures described in **Attachment 8** will also help to ensure that all information that is gathered is of high quality.

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Data, Methods and Analysis to be Used

The CID will use methods and analysis that are accepted in the engineering and hydrogeologic community, and have proven effective on similar well construction projects in CID. These methods are briefly described below, and will be expanded in considerable detail in the project specifications.

Well Drilling

Wells will be drilled by an experienced well driller with a C-57 well driller's license. The shallow monitoring wells (depths less than 100 feet) will be drilled by the hollow stem drilling method using standard procedures. The deep monitoring wells (depths greater than 100 feet) will be drilled by the mud rotary method using standard procedures. The contractor shall perform preliminary development by swabbing and airlifting followed by development by pumping.

Water Quality Sampling

Water quality samples will be collected from each casing by an experienced technician, geologist or engineer. The samples will be collected in accordance standard practice for agricultural suitability testing. Water quality testing will be performed by accredited, experienced, state-certified testing laboratories to ensure appropriate testing methods and chain of custodies. Field blank and duplicate samples will be collected to validate the results of the laboratory.

Monitoring Well Designs

The monitoring wells will be based on previous designs for similar monitoring wells in CID and other nearby irrigation districts, but will be modified as needed for site specific conditions. The previous well designs resulted in successful and useful monitoring wells. The well designs will include wellhead protection and accepted well construction standards (refer to **Exhibit 4.2** for an example of a similar monitoring well design). The wells will also be constructed according to the State and appropriate county well ordinances (CID is located within parts of Fresno, Tulare, and Kings counties).

Geologic Logging

The geologic logging of drill cuttings will be performed to gather new data to develop a better understanding of the subsurface conditions within CID. A professional geologist will perform the logging and will prepare a short memorandum summarizing the subsurface conditions encountered.

New Knowledge and Improvement in Groundwater Management

The proposed project will help improve knowledge of the local groundwater and result in a significant improvement in groundwater management.

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New Knowledge

The following is a list of new data that will be collected as part of the project, and on-going monitoring:

- Local stratigraphy (from geologic logs)
- Baseline water quality from each well
- Groundwater levels from each well

Improvement in Groundwater Management

The aforementioned data will allow for improved groundwater management in many ways, as described below:

- Additional groundwater level data will be available to three layers of groundwater monitoring:
 - Local – Consolidated Irrigation District
 - Regional – Kings River Conservation District Regional monitoring program
 - Statewide – California Statewide Groundwater Elevation Monitoring Program
- Better understanding of effects of intentional recharge on groundwater levels
- Baseline water quality data will be collected in each well
- Refined estimates of groundwater contours, groundwater gradient, overdraft and safe yield
- Better understanding of groundwater outflow conditions to the west, which have a significant impact on regional groundwater levels
- More accessible (larger diameter) wells that can be used for water quality sampling or fitted with pressure transducers
- More reliable, larger diameter wells that should have a longer life expectancy than the existing ½ to 1-inch diameter wells

Consistency with Groundwater Management Plan

The proposed project is consistent with several goals and objectives listed in the CID Groundwater Management Plan (**Exhibit 3.1**) and Upper Kings Basin Integrated Regional Water Management Authority's Water Management Plan (can be downloaded at http://www.krcd.org/water/ukbirwma/docs_gov.html), as shown in **Table 4.2**. Below are goals, objectives, and accomplishments discussed in the GWMP and IRWMP.



Table 4.2 – Consistency of Project with Groundwater Management Plan

Consolidated Irrigation District Groundwater Management Plan	
pg 26	“As groundwater levels have fallen or surface conditions have changed, CID has repaired or replaced the monitoring wells to maintain the monitoring program. From the mid-1990s until 2003, CID replaced nearly half of its monitoring wells. New wells were constructed with 4-inch or 6-inch diameter perforated casings and guard posts and lockable caps at the surface.”
pg 61	“Identify federal, state, and regional funding opportunities and seek grants and low interest loans to encourage conjunctive use and groundwater banking.”
pg 77	“Continue, and may expand, its current groundwater level monitoring program; including its monitoring and maintenance and replacement efforts.”
pg 77	“Produce an annual water resources report that: 1) Describes water resources and groundwater conditions; including groundwater levels hydrographs, groundwater contours, diversions, recharge estimates, and change in storage and 2) Describes the progress made in implementing management activities and the effects of these activities on meeting basin-wide and local management area BMOs.
pg 77	“Continue to participate in and support KRCD Groundwater Levels Monitoring and Annual Reporting program as defined in the Upper Kings IRWMP implementation plan (Upper Kings IRWMP Foundational Action No. 15 and No. 17).”
Upper Kings Basin Integrated Regional Water Management Authority Water Management Plan	
pg 7-13	“Monitoring and data management are needed to track the conditions of the resource, define new problems, and document the benefits from existing or planned projects and programs.”
pg 9-5	Kings IRWMP Region Foundational Action 15 – Groundwater Levels Monitoring Program – “KRCD, FID, CID, and AID water level monitoring and reporting program. Cities and drinking water purveyors also collect water level data.”
pg 10-4	<i>Monitoring, Measurement, and Reporting (MMR) of Plan Performance MMR Action 4 - Develop regional monitoring wells</i> KRCD, AID, CID, and FID will expand the regional monitoring well network as appropriate to fill data gaps, track aquifer response from pilot and full-scale groundwater recharge and production facilities. The need for additional monitoring wells, whether through construction of dedicated wells or collection of data at existing wells, will be assessed and a plan developed.

4.7 – On-going Use

Operation and Maintenance Funding

CID has adequate funding to continue monitoring the new wells in the long-term and has adequate funding to address well maintenance. After completion of the project, on-going monitoring and maintenance will be added to the duties of the existing District staff. Extra staff will not be needed to cover these additional work requirements. The requested funding will provide fully functioning facilities, not dependent on additional funds to be used.

Groundwater Monitoring and Maintenance Funds

Exhibit 4.3 includes the fiscal year 2011-2012 annual budget for CID. This budget is typical of past years and future years are expected to have similar budget categories and amounts. The budget includes the category “Groundwater Recharge/Monitoring” that is currently used for groundwater management and monitoring, along with maintenance of the District’s recharge ponds, as shown in **Table 4.3**.

Table 4.3 – CID Groundwater Recharge/Monitoring Budget

Category	FY 2011-2012 Adopted Budget
Labor	\$10,000
Supplies	\$1,000
Total	\$11,000

On-going Monitoring

Groundwater levels will continue to be measured twice a year (spring and fall). CID is collaborating with KRCD to develop and implement a regional groundwater monitoring program that will be managed and overseen by KRCD. On-going monitoring of both level and quality will require minimal effort and cost. The wells will be monitored with approximately 70 other wells that are part of the District’s monitoring effort. The costs to monitor the new wells can easily be accommodated with the available budgets listed in **Table 4.3**.

Monitoring Well Maintenance

The monitoring wells will be constructed according to standard practices to ensure quality and lasting construction. They will also be protected using bollards or other protective posts to reduce the potential from damage from vehicles. Thus, it is anticipated the wells will have a significant design life and maintenance costs will be minimal. Annual maintenance costs for wells can range from 0.5% to 1.5% of the

ATTACHMENT 4 – PROJECT DESCRIPTION

construction cost per year¹. Assuming maintenance costs of 1% per year, and a construction cost of \$170,000, the annual maintenance costs would be \$1,700/year. These costs can also be easily accommodated with the budgets listed in **Table 4.3**.

Cost share

The proposed project does not include any cost share.

Adaptive Management Strategy

Adaptive management of groundwater will be accomplished through the Kings River Conservation District and CID dispute resolution procedures.

Kings River Conservation District

The Kings River Conservation District, as part of the updated Upper Kings IRWMP, will begin preparing an annual 'state of the basin' report in 2012. The purpose of the report is to document progress using the performance measures and BMOs established for the IRWMP. The report would be produced as close to the end of the water year as possible (production goal of January) and will be presented to the KRCD Board and UKBIRWMA; and provided to individual stakeholders so that the findings can be presented to the other elected bodies in the Kings Region. In general, the report describes the status of project implementation, progress in meeting measurable basin management objectives, and specific actions on projects defined in the Upper Kings Basin IRWMP.

Dispute Resolution Procedures

CID board meetings are used to identify and address water management issues in the groundwater basin. Discussion of issues in CID board meetings, in an open and transparent process, result in a cooperative relationship between water users of the basin. CID continues to provide a forum for identification and discussion of groundwater issues in the basin. If groundwater disputes arise, then the monitoring program, including use of the new monitoring wells, may be modified to improve groundwater management.

The Fresno County LAFCO has initiated a mediation process with CID and CID Cities related to how they may better integrate land use and water supply plans and the planning process, and cooperatively develop funding and projects to resolve groundwater and storm water management issues. It is likely that this process will result in a standing group of CID and City representatives that will be tasked with further developing projects, policies, and programs.

¹Jensen, M. E. 'Design and Construction of Farm Irrigation Systems', 1980, pg 58.



EXHIBIT 4.1
SAMPLE ENCROACHMENT PERMIT

Department of Public Works and Planning
Maintenance & Operations Division
2220 Tulare Street, 8th Floor
Fresno, California 93721



COUNTY OF FRESNO

APPLICATION FOR ROAD ENCROACHMENT

Permit No **20648**

For Inspection Service
Telephone (559) 262-4107
Facsimile (559) 262-4166

In compliance with County of Fresno Ordinance Nos. 13.04.040, 13.08.010, 13.08.020 and Chapter 5.3 of Division 2 of the Streets and Highways Code, the undersigned hereby applies for permission to excavate, construct and/or otherwise encroach on the County right-of-way by performing the following work.

LOCATION OF PROPOSED WORK: ATTACHED LIST PART OF PERMIT

DESCRIPTION OF PROPOSED WORK:

Excavate within the dirt shoulder approximately 10 feet from the existing edge of pavement at the locations listed on the attached sheet for the installation of ground water monitoring wells.
(Local Groundwater Assistance Fund Observation Well Construction).
James Irrigation District.

County of Fresno
Department of Public Works & Planning
Address: 2220 Tulare Street, 8th Floor Fresno,
REG-RECEIPT: 787 - 7849
CASHIER ID : KDH1234 Apr 07 2010
Date Printed: 4/7/2010 11:17:21

Road Account 44	\$500.00
SubTotal	\$500.00
PST	
GST	
TOTAL DUE	
RECEIVED FROM :	
BRADLEY & SONS, INC	
CCARD	\$500.00
TOTAL TENDERED	\$500.00
CHANGE DUE	\$0.00

PERMIT QUANTITIES & INSPECTOR FEES

- A. _____ L.F. Plowed Cable, pipe,
- B. _____ L.F. Trenches (off
- C. _____ L.F. Trenches (in pavement)
- D. **4** Monitoring Wells **\$500.00**

04/07/10

Estimated Starting Date

04/23/10

Estimated Completion Date

Applicant's Name **Bradley & Sons, Inc.**

Address **3625 S. Highland Avenue**

City **Del Rey** State **California** Zip **93816**

atb (X) _____ Date _____

Home Phone () - _____ Work Phone **(559) 441-1401 x0**

In consideration of the granting of this application, it is agreed that the applicant shall indemnify the County of Fresno and any and all of its officers, employees and agents and shall defend and hold them harmless from any and all claim or liability for personal injury or property damage due to any acts or failure to act in connection with any work permitted herein. Applicant further agrees to comply with all terms, conditions and specifications contained below and on the reverse side hereof.

PERMIT APPROVAL

Permission is hereby granted to perform the above described work subject to all terms, conditions and restrictions contained below and on the reverse side hereof. This permit is to be strictly construed and no work other than that specified is authorized hereby. This permit is expressly conditioned upon performance of the work. Failure to so perform said work in accordance with County specifications shall be deemed an immediate revocation of this permit and without notice. Work shall be subject to County inspection. Permittee shall notify County Inspector Frank Garcia a minimum of 24 hours before starting work (Telephone 559/262-4107). THIS PERMIT SHALL BE VOID UNLESS THE WORK HEREIN CONTEMPLATED SHALL HAVE BEEN COMPLETED BEFORE **04/23/10**

To commence or complete work after said date requires approved application for permit renewal or time extension. Grantor reserves the right to complete the work to restore the right-of-way as provided in Section 10 on the reverse side hereof.

"ATTACHED ADDENDUM IS PART OF THIS PERMIT"

Account No. _____

0/49 Work Code _____

Work Code **9** **500**

Misc Area **02**

Permit Fee **\$500.00**

Alan Weaver, Director

Department of Public Works and Planning

By [Signature]
Darren Findley, Permit Engineer

Date **04/07/10**

R-83 (04/02)

WHITE - Office Copy

GREEN - Inspector Copy

CANARY - Permittee Copy

PINK - Accounting Copy

FOR OFFICE USE ONLY
GOLDENROD - Area Supervisor Copy

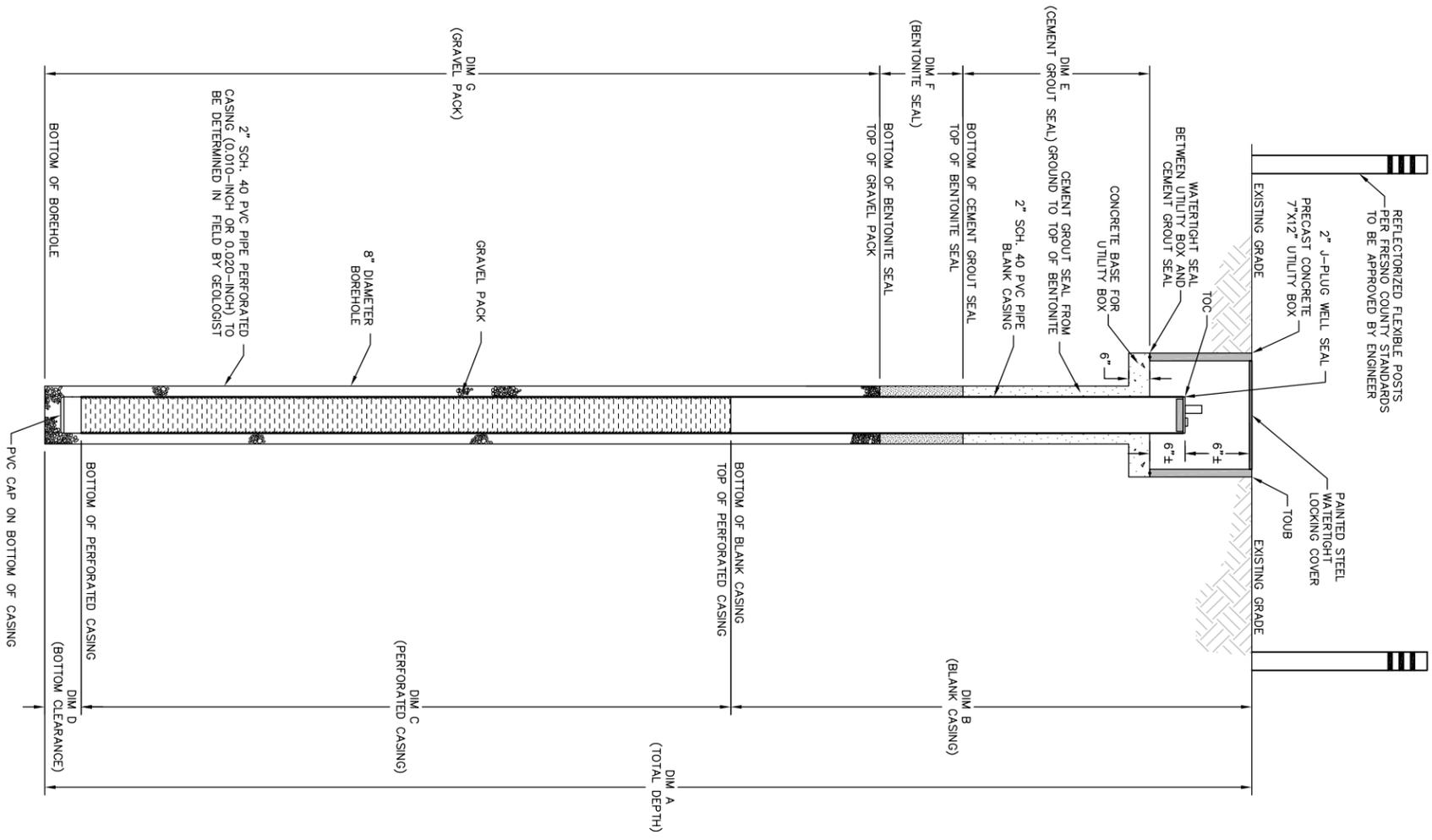
Permit No 20648

LOCATIONS :

1. Colorado Avenue - Approximately 180 feet S/O Floral Avenue DW-1
2. Yuba Avenue - Approximately 210 feet E/O Springfield Avenue DW-2
3. Manning Avenue - Approximately 200 feet E/O Contra Costa Avenue SW-2
4. Napa Avenue - Approximately 1/2 mile S/O Manning Avenue SW-4



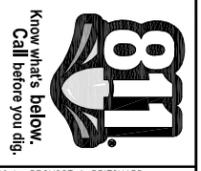
EXHIBIT 4.2
SAMPLE SHALLOW AND DEEP MONITORING WELL
DESIGNS



1 PROPOSED OBSERVATION WELL DETAIL
NOT TO SCALE

EXAMPLE

- NOTES:
- GRAVEL PACK SHALL BE #2/12 LONESTAR, OR APPROVED EQUIVALENT FOR 0.020" SLOTS, AND #10 LONESTAR, OR APPROVED EQUIVALENT, FOR 0.010" SLOTS



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RECORD DOCUMENT

DATE: _____
 THESE RECORD DOCUMENTS HAVE BEEN PREPARED IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT.

No.	REVISION	BY	DATE



DATE SIGNED: _____

PROVOST & PRITCHARD CONSULTING GROUP
 An Employee Owned Company
 2505 ALLUVAL AVENUE
 CLOVIS, CALIFORNIA 93811-9166
 559/326-1100 FAX 559/326-1090
 www.ppeng.com

LOCAL GROUNDWATER ASSISTANCE FUND
 OBSERVATION WELL CONSTRUCTION
 FRESNO COUNTY, CA
 EXHIBIT 4.2
 EXAMPLE SHALLOW
 MONITORING WELL DESIGN

DESIGN ENGINEER: OWEN KUBITT	LICENSE NO: 66,552
DRAFTED BY: CHECKED BY: KMM OEK	SCALE: AS SHOWN
DATE: 01/04/10	JOB NO: 105108C1
DWG. NO:	SHEET
2	OF 3



EXHIBIT 4.3
CONSOLIDATED IRRIGATION DISTRICT
FY 2011-2012 BUDGET

2011 – 2012

BUDGET

DRAFT	CONSOLIDATED IRRIGATION DISTRICT				
		July 31, 2011			
		2010-11 Budget			
	2009-2010	2010-2011			2011-2012
	Budget	Budget	Spent	Remaining	Adopted Budget
Water Rights/Assessments					
KRWA Assessment	130,000.00	\$121,641.37	\$122,739.54	-\$1,098.17	137,360.00
Pine Flat O&M	5,128.26	\$75,552.07	\$75,552.07	\$0.00	75,552.07
Fisheries Management	7,200.00	\$7,500.00	\$7,170.90	\$329.10	7,500.00
Water Rights Fee	17,792.96	\$17,792.96	\$17,792.96	\$0.00	17,792.96
Ag Waiver Monitoring	4,000.00	\$4,000.00	\$0.00	\$4,000.00	4,000.00
ACWA Dues	10,000.00	\$10,000.00	\$8,410.00	\$1,590.00	10,000.00
Total	\$174,121.22	\$236,486.40	\$231,665.47	\$4,820.93	\$252,205.03
Special Projects					
IRWMP	5,000.00	\$7,000.00	\$7,000.00	\$0.00	7,000.00
GIS Services	7,500.00	\$5,700.00	\$5,348.00	\$352.00	0.00
Headgates Design	19,000.00	\$0.00	\$0.00	\$0.00	67,000.00
Prop 50 Grant	0.00	\$192,891.00	\$28,164.03	\$164,726.97	71,000.00
Prop. 84 Grant	0.00	\$174,000.00	\$160,779.05	\$13,220.95	1,179,000.00
SB7X Studies/Volume Pric	0.00	\$50,000.00	\$0.00	\$50,000.00	50,000.00
Joint CID/FID Studies	0.00	\$25,000.00	\$20,896.10	\$4,103.90	0.00
Prop 218	0.00	\$75,000.00	\$0.00	\$75,000.00	75,000.00
AB 303	0.00	\$0.00	\$0.00	\$0.00	140,000.00
Redistricting	0.00	\$15,000.00	\$22,252.83	-\$7,252.83	15,000.00
Line Of Credit	0.00	0.00	0.00	0.00	508,500.00
Total	\$31,500.00	\$544,591.00	\$244,440.01	\$300,150.99	\$2,112,500.00
Engineering Services					
Surveying	2,000.00	\$2,000.00	5,282.42	-3,282.42	2,000.00
Rights of Way	1,000.00	\$1,000.00	0.00	1,000.00	1,000.00
Standards Review	1,000.00	\$1,000.00	0.00	1,000.00	1,000.00
Special Projects	150,000.00	\$2,000.00	11,628.16	-9,628.16	15,000.00
Special Projects (Reimburs	0.00	0.00	12,368.07	0.00	0.00
Total	\$154,000.00	\$6,000.00	\$29,278.65	-\$10,910.58	\$19,000.00

DRAFT	CONSOLIDATED IRRIGATION DISTRICT				
		July 31, 2011			
		2010-11 Budget			
	2009-2010	2010-2011			2011-2012
	Budget	Budget	Spent	Remaining	Adopted Budget
Grants Labor					
Grants Labor 50	\$0.00	\$21,000.00	\$0.00	\$21,000.00	23,000.00
Grants Labor 84	\$0.00	\$0.00	\$0.00	\$0.00	0.00
Total	\$0.00	\$21,000.00	\$0.00	\$21,000.00	\$23,000.00
Insur./Bonds/Benefits					
Workers Comp	60,000.00	\$50,000.00	79,597.00	-\$29,597.00	113,577.00
Property Insur.	4,000.00	\$4,000.00	3,797.00	\$203.00	4,000.00
Auto Insur.	5,000.00	\$5,500.00	5,119.00	\$381.00	5,500.00
Umbrella E&O Gen. Liabili	11,000.00	\$2,000.00	20,952.49	-\$18,952.49	48,165.00
Bonds	309.00	\$309.00	247.00	\$62.00	247.00
Social Security	66,000.00	\$77,569.95	67,991.05	\$9,578.90	84,360.00
Social Security Medicare	16,000.00	\$18,141.36	16,092.57	\$2,048.79	19,729.00
Unemployment Insur.	0.00	\$0.00	11,700.00	-\$11,700.00	23,400.00
Health	340,000.00	\$417,428.00	459,518.92	-\$42,090.92	543,875.00
Retirees Ins.	0.00	0.00	0.00	0.00	93,762.00
Group Annuity	89,000.00	\$100,537.26	89,900.30	\$10,636.96	115,100.00
Life Insur.	9,000.00	\$9,773.00	7,464.90	\$2,308.10	10,000.00
Dental	30,000.00	\$34,538.00	34,018.30	\$519.70	37,965.00
Disability Insur.	5,000.00	\$20,000.00	11,280.00	\$8,720.00	5,000.00
Vision	6,500.00	\$6,500.00	6,455.24	\$44.76	7,400.00
Total	\$641,809.00	\$746,296.57	\$814,133.77	-\$67,837.20	\$1,112,080.00
Administration					
Salaries	481,793.36	\$460,908.00	\$422,830.12	\$38,077.88	402,936.00
Collector's Expense	15,500.00	\$10,500.00	\$11,673.49	-\$1,173.49	11,000.00
Director's Per Diem	13,000.00	\$13,000.00	\$11,700.00	\$1,300.00	13,000.00
Director's Expense	2,000.00	\$1,500.00	\$1,335.16	\$164.84	1,500.00
Office Supplies	12,000.00	\$12,000.00	\$11,334.10	\$665.90	12,000.00
Telephone	3,500.00	\$3,500.00	\$2,945.19	\$554.81	3,500.00

DRAFT	CONSOLIDATED IRRIGATION DISTRICT				
		July 31, 2011			
		2010-11 Budget			
	2009-2010	2010-2011			2011-2012
	Budget	Budget	Spent	Remaining	Adopted Budget
Manager's/Admin. Expens	10,000.00	\$4,000.00	\$1,348.32	\$2,651.68	4,000.00
Legal Jensen	80,000.00	\$65,000.00	\$66,301.88	-\$1,301.88	65,000.00
Legal Browne	0.00	\$65,000.00	\$142,663.92	-\$77,663.92	100,000.00
Audit	8,000.00	\$8,000.00	\$10,952.00	-\$2,952.00	7,000.00
Election Expense	0.00	\$5,000.00	\$2,092.30	\$2,907.70	0.00
Memberships	4,537.50	\$5,537.50	\$4,537.50	\$1,000.00	5,200.00
Public Relations	1,000.00	\$1,000.00	\$3,544.86	-\$2,544.86	1,000.00
Software New/Upgrades	4,000.00	\$3,500.00	\$5,450.83	-\$1,950.83	4,096.00
Accounting Software Chan	0.00	\$0.00	\$0.00	\$0.00	3,000.00
Janitorial	4,044.00	\$4,044.00	\$4,044.00	\$0.00	4,044.00
Pest Control	300.00	\$300.00	\$260.00	\$40.00	260.00
Training	3,000.00	\$2,000.00	\$0.00	\$2,000.00	2,000.00
Total	\$637,674.86	\$664,789.50	\$703,013.67	-\$38,224.17	\$639,536.00
Operations					
Labor	286,204.36	\$303,155.00	\$412,992.40	-\$109,837.40	539,245.00
Utilities	16,000.00	\$16,000.00	\$22,321.91	-\$6,321.91	16,000.00
Cell Phones	14,000.00	\$14,000.00	\$13,382.21	\$617.79	14,000.00
Supplies	10,000.00	\$10,000.00	\$9,406.91	\$593.09	10,000.00
Training	5,000.00	\$3,000.00	\$6,350.28	-\$3,350.28	6,500.00
Total	\$331,204.36	\$346,155.00	\$464,453.71	-\$118,298.71	\$585,745.00
Class A /Building Maintenance					
Labor	354,934.00	\$349,271.00	\$328,656.59	\$20,614.41	313,275.00
Supplies	60,000.00	\$60,000.00	\$46,613.17	\$13,386.83	60,000.00
Dump fees	15,000.00	\$13,000.00	\$15,054.72	-\$2,054.72	13,000.00
Total	\$429,934.00	\$422,271.00	\$390,324.48	\$31,946.52	\$386,275.00
Groundwater Recharge/Monitoring					
Labor	15,000.00	\$10,000.00	\$1,684.59	\$8,315.41	10,000.00
Supplies	1,000.00	\$1,000.00	\$557.52	\$442.48	1,000.00
Total	\$16,000.00	\$11,000.00	\$2,242.11	\$8,757.89	\$11,000.00

DRAFT	CONSOLIDATED IRRIGATION DISTRICT				
		July 31, 2011			
		2010-11 Budget			
	2009-2010	2010-2011			2011-2012
	Budget	Budget	Spent	Remaining	Adopted Budget
Equipment Maintenance					
Labor	52,000.00	\$48,000.00	34,742.08	\$13,257.92	40,000.00
Supplies	55,000.00	\$55,000.00	94,424.44	-\$39,424.44	55,000.00
Fuel	115,000.00	\$100,000.00	154,740.92	-\$54,740.92	130,000.00
Total	\$222,000.00	\$203,000.00	\$283,907.44	-\$80,907.44	\$225,000.00
Weed Control Program					
Labor	52,000.00	\$50,000.00	\$31,199.83	\$18,800.17	30,000.00
Chemicals	100,000.00	\$130,000.00	\$190,729.90	-\$60,729.90	150,000.00
Supplies	2,000.00	\$2,000.00	\$1,331.28	\$668.72	2,000.00
Training	1,000.00	\$500.00	\$0.00	\$500.00	500.00
Total	\$155,000.00	\$182,500.00	\$223,261.01	-\$40,761.01	\$182,500.00
Capital Items					
Building Improvements	5,000.00	\$8,000.00	\$0.00	\$8,000.00	8,000.00
Office Equipment	10,000.00	\$10,000.00	\$5,276.57	\$4,723.43	3,000.00
Equip. Lease/Rental	112,174.80	\$49,276.74	\$70,585.91	-\$21,309.17	50,000.00
Vehicles/ Equip.	81,000.00	\$77,500.00	\$11,407.62	\$66,092.38	40,000.00
Shop Equipment	19,500.00	\$0.00	\$0.00	\$0.00	8,000.00
Small tools/Safety Equip.	1,000.00	\$1,000.00	\$0.00	\$1,000.00	1,000.00
Total	\$228,674.80	\$145,776.74	\$87,270.10	\$58,506.64	\$110,000.00
Total Of All Accounts	3,021,918.24	3,529,866.21	3,473,990.42	68,243.86	5,658,841.03