# Attachment 8 – Benefits and Cost Analysis

# Project A: Fresno Irrigation District – Phase 1 Southwest Groundwater Banking Project

## Monetized Benefits

The monetized project benefits include groundwater recharge and energy conservation from raising groundwater levels and reducing pumping lifts. These benefits were quantified in Section 7 – Technical Justification of Projects, and are monetized using the DWR Method. The guidelines and assumptions used in the analysis include the following:

1. Without-Project and With Project. Without the project none of the costs will be incurred and no benefits will be realized. With the project all the costs will be incurred and all benefits are expected to be realized.
2. Period of Analysis: The period of analysis is 50 years. The mechanical components (gates, valves, and flowmeters) and monitoring wells have a 25-year life and will be replaced once during the project. Other project features such as the pipelines, levees, and check structure are assumed to have 50-year life expectancies. These life expectancies are based on standard values used in economic analyses for similar facilities, and practical experience by District staff.
3. Sunk Costs: The project does not include sunk costs.
4. Opportunity Costs: The project does not include opportunity costs.
5. Discount Rate: A 6% discount rate was used in the analysis.
6. Dollar Value Base Year: All values are based on 2012 dollars.

### Average Annual Project Extraction

The project will include 5,500 AF/year of recharge. The average annual project extraction is estimated to be 5,080 AF with the remainder left behind as a net benefit to the aquifer. The project yield of 5,080 AF will be made available to other agencies in the Kings River region.

In order to estimate the market value of the water yielded by this project, a review of potential markets, state-wide water supply issues, and recent water sales in the area was conducted.

### Marketability

Potential Markets

Opportunities exist to extract and transfer the recharged water, especially in dry years. In addition, some growing municipalities look for additional supplies almost every year. Potential markets include the Kings River Water Association (KRWA) service area and Central Valley Project (CVP) users through FID and JID's CVP contract, including the Westside districts and State Water Project users through the Cross-Valley Canal. With the San Joaquin River (SJR) restoration underway, new facilities and programs are planned that can deliver water to the

Westside of the San Joaquin Valley, and to Friant CVP contractors through the SJR water re-circulation program.

Recent Sales History

As with any commodity when supplies are low, prices increase, and when supplies are high, prices decrease. The recent drought and delta pumping restrictions have limited supplies to the south of the delta water users on the federal and state systems. Recent sales in central San Joaquin Valley have yielded wholesale prices, primarily between $300 and $500 per acre-foot. A summary is presented below in **Table 8-1** of recent sales.

**Table 8-1 - Summary of Recent Water Sales**

| Year | Supply From | Supply To | Price ($/AF) | Volume (AF) | % Kings River Water Year |
|---|---|---|---|---|---|
| 2012 | Ag-East side | Ag – West side | 100 | 5,000 | 55% |
| 2010 | Ag – East side | Ag – West side | 275 | 30,000 | 121% |
| 2010 | Ag – East side | Ag – West side | 200 | 15,000 | 121% |
| 2009 | Ag – East side | Ag – West side | 400 | 12,000 | 79% |
| 2009 | Ag – East side | Ag – East side | 50 | 5,000 | 79% |
| 2009 | Ag – West side | Ag – West side | 400 | 12,000 | 79% |
| 2009 | Ag – East side | Ag – West side | 100 | 10,000 | 79% |
| 2009 | Ag | Urban | 500+ | 14,000 | 79% |
| 2009 | Ag | Urban | 500+ | 3,000 | 79% |

Notes: The water contractors that participated in these sales did not grant permission for their names to be released.

From the information provided it is clear that water demand continues to cause the value of water to rise. The price that has been paid in recent years varies from about $100/AF in normal years to a high of $400/AF in the most recent dry year. It is questionable whether the $400/AF is an anomaly or is sustainable given current agricultural economics.

Urban demand continues to expand. Cities, municipalities, and developers continue to search and acquire water supplies for new development. As shown in **Table 8-1**, the price for dependable supplies to urban uses is greater than that for agriculture. Urban water costs have continued to rise and are expected rise in the future.

Based on this comparison, a value of $225/AF was assumed as the project benefit. This is considered the most likely alternative for acquiring a new water supply that, like the water yielded by this project, does not contribute to further overdraft. It should be noted that this amount is considered conservative, as the proposed project will provide a dry-year supply, and will have a direct connection to CVP purveyors through James ID.

**Energy Conservation**

The value of energy conserved from recharging water and temporarily raising groundwater levels is estimated to be $5,000/year (see Attachment 7 for more details). This benefit is minor compared to the water supply benefits and therefore was not included in the economic tables.

The monetized project benefits are calculated in **Table 8-2** (DWR Table 15 Fresno Irrigation District) found at the end of this attachment.

## Non-Monetized Benefits

Non-monetized benefits are listed in **Table 8-3** (DWR Table 12 for Fresno Irrigation District) found at the end of this Attachment. A brief discussion of each non-monetized benefit is provided below.

**Benefit No. 3: Help avoid, reduce or resolve various public water resources conflicts?**

Groundwater overdraft is one of the largest problems, and consequently a source of conflict, in the Kings Groundwater Sub-basin. This project will help to reduce local overdraft and reduce potential conflicts with neighboring agencies. The project will recharge water in the area most critically overdrafted within the Kings Groundwater sub-basin.

**Benefit No. 9: Provide other environmental stewardship benefits.**

The project will create 60-acres of temporary aquatic, wetland and waterfowl habitat for a variety of wildlife, including birds on the Pacific Flyway. The project will also provide a water supply for terrestrial species.

**Benefit No. 10: Improve the overall, long-term management of California groundwater resources?**

The project will recharge, on average, 5,500 AF/year in the Kings Basin. The Kings Basin is in a state of overdraft, and the project will make a significant contribution to reducing overdraft, and help the Kings Basin Water Authority meet their goal of reducing net overdraft to zero within twenty years.

**Benefit No. 13: Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**

The groundwater recharge will temporarily raise groundwater levels in the local area and reduce groundwater pumping lifts. This will result in a reduction of 349 metric tons of $CO_2$ emission per year.

**Benefit No. 14: Improve water supply reliability in ways not quantified in Attachment 7?**
Water supply reliability will be improved by increasing groundwater reserves for use in droughts.

**Benefit No. 15: Other: Flood Damage Reduction**
Flood damage benefits include diversion of Kings River floodwater, local stream floodwater, and urban stormwater. The project will provide storage of 270 AF of storage. A simulation shows that over a 55 year period diversions of floodwater and stormwater are estimated to be 306,000 AF.

## Project Costs

### Construction and Engineering Costs

The total estimated costs for engineering, surveying, permitting, construction management and construction are presented in detail in Attachment 4 – Budget. These costs must be expended before the project can operate.

### Administration Costs

The project will have nominal administrative costs averaging $10,000/year based on costs associated with similar projects. This estimate is based on costs for FID to administer similar groundwater banks.

### Pumping Costs

Groundwater pumping costs are estimated to be $47/acre-foot based on pumping records from James Irrigation District wells. This unit price is based on pumping costs and operational records for nearby groundwater banks operated by James Irrigation District and Fresno Irrigation District. The total pumping costs are therefore $47 x 5,080 AF = $238,760.

### Operation and Maintenance Costs

Operation and maintenance will include operating the valves and weirs, recording flowmeter data, maintaining levees, monitoring wells, and disking and ripping the basin interior each year to loosen soils and maintain a good recharge rate. Most of these tasks will require minimal effort, and be performed as part of the regular duties of district staff. The primary water supply would come from Kings River floodwater, which is free to FID and JID since they are members of the Kings River Water Association. Other water supplies will include urban stormwater, which is also free, and Kings River Fishflows, which are waters that are already paid for but have historically gone unused because they are available when demands are low. Other banking projects in the region have maintenance costs that are roughly 0.5% of the project capital costs (including land purchase). Maintenance costs were assumed to be 0.5% of capital cost for this project. This equates to 0.5% x $3,486,000 = $17,430/year. This is believed to be reasonable based on experience at existing FID banking facilities.

**Replacement Costs**

Replacement costs are assumed to be needed after 25 years for mechanical equipment (gates, valves, and flowmeters), and monitoring well equipment. The mechanical equipment has a value of $20,000 and the three monitoring wells are valued at $60,000. For estimating purposes, it is assumed that basin levees, pipelines, and turnout improvements are expected to last the duration of the economic analysis (50 years).

**Monitoring costs**

A cost of $20,000/year was assumed for monitoring. This is based on costs to monitor existing banking facilities of this size, and practical experience by the Fresno Irrigation District and James Irrigation District. Costs associated with monitoring include site visits for data collection, Groundwater Monitoring Committee meetings, and summarization of data collected into an annual report.

The lifecycle project costs are provided in **Table 8-4** (DWR Table 19 Fresno Irrigation District) found at the end of this Attachment.

## Benefit Cost Analysis

A financial analysis was performed over a 50-year period using a six percent discount rate. The costs (initial, maintenance and replacement) and benefits (recharged water) were calculated over a 50-year period. The project benefit cost ratio is provided below:

$$\frac{\text{Project Benefits}}{\text{Project Costs}} = \frac{\$18,180,000}{\$9,360,000} = \mathbf{1.94}$$

**Table 8-2 DWR Table 15 – Annual Benefit**

(All benefits should be in 2012 dollars)

**Proposal Title: Kings Basin Water Authority Implementation Grant**

**Project Title: Project A - Fresno Irrigation District - Southwest Groundwater Banking Project**

| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
|---|---|---|---|---|---|---|---|---|---|
| Year | Type of Benefit | Measure of Benefit (Units) | Without Project | With Project | Change Resulting from Project (e) – (d) | Unit $ Value [1] | Annual $ Value [1] (f) x (g) | Discount Factor [1] | Discounted Benefits [1] (h) x (i) |
| 2014 | | | | | | | | 1.000 | |
| 2015 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.943 | $1,077,849 |
| 2016 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.890 | $1,017,270 |
| 2017 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.840 | $960,120 |
| 2018 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.792 | $905,363 |
| 2019 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.747 | $854,116 |
| 2020 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.705 | $805,770 |
| 2021 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.665 | $760,160 |
| 2022 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.627 | $717,132 |
| 2023 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.592 | $676,540 |
| 2024 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.558 | $638,245 |
| 2025 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.527 | $602,118 |
| 2026 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.497 | $568,036 |
| 2027 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.469 | $535,883 |
| 2028 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.442 | $505,550 |
| 2029 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.417 | $476,934 |
| 2030 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.394 | $449,938 |
| 2031 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.371 | $424,470 |
| 2032 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.350 | $400,443 |
| 2033 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.331 | $377,776 |
| 2034 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.312 | $356,393 |
| 2035 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.294 | $336,220 |
| 2036 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.278 | $317,188 |
| 2037 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.262 | $299,234 |
| 2038 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.247 | $282,296 |
| 2039 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.233 | $266,317 |
| 2040 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.220 | $251,243 |
| 2041 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.207 | $237,022 |
| 2042 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.196 | $223,605 |
| 2043 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.185 | $210,948 |
| 2044 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.174 | $199,008 |
| 2045 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.164 | $187,743 |
| 2046 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.155 | $177,116 |
| 2047 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.146 | $167,091 |
| 2048 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.138 | $157,633 |
| 2049 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.130 | $148,710 |
| 2050 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.123 | $140,293 |
| 2051 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.116 | $132,352 |
| 2052 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.109 | $124,860 |
| 2053 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.103 | $117,792 |
| 2054 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.097 | $111,125 |
| 2055 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.092 | $104,835 |
| 2056 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.087 | $98,901 |
| 2057 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.082 | $93,303 |
| 2058 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.077 | $88,021 |
| 2059 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.073 | $83,039 |
| 2060 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.069 | $78,339 |
| 2061 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.065 | $73,904 |
| 2062 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.061 | $69,721 |
| 2063 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.058 | $65,775 |
| 2064 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.054 | $62,052 |
| 2065 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.051 | $58,539 |
| 2066 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.048 | $55,226 |
| Last Year of Project Life: 2065 | Water Sales | AF | 0 | $5,080 | $5,080 | $225 | $1,143,000 | 0.046 | $52,100 |
| | | | | | | | | Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table, rounded to nearest $10,000) | $18,180,000 |

**Comments:**

**- Assumes an average of 5,080 AF of banked water is sold at $225/AF each year (90% of the 4,200 AF banked at the 60-acre ponds and 100% of the 1,300 AF conveyed to JID).**

*(1) Complete these columns if dollar value is being claimed for the benefit.*

| Table 8-3 DWR Table 12 - Non-monetized Benefits Checklist<br>Proposal Title: Kings Basin Water Authority Implementation Grant<br>Project Title: Project A - Fresno Irrigation District - Southwest Groundwater Banking Project | | |
|---|---|---|
| **No.** | **Question** | **Enter "Yes", "No" or "Neg"** |
| | **Community/Social Benefits**<br>**Will the proposal** | |
| **1** | **Provide education or technology benefits?** | **No** |
| 2 | **Provide social recreation or access benefits?** | **No** |
| **3** | **Help avoid, reduce or resolve various public water resources conflicts?** | **Yes** |
| 4 | **Promote social health and safety?** | **No** |
| 5 | **Have other social benefits?** | **No** |
| | **Environmental Stewardship Benefits:**<br>**Will the proposal** | |
| 6 | **Benefit wildlife or habitat in ways that were not quantified in Attachment 7?** | **No** |
| 7 | **Improve water quality in ways that were not quantified in Attachment 7?** | **No** |
| 8 | **Reduce net emissions in ways that were not quantified in Attachment 7?** | **No** |
| 9 | **Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?** | **Yes** |
| | **Sustainability Benefits:**<br>**Will the proposal** | |
| 10 | **Improve the overall, long-term management of California groundwater resources?** | **Yes** |
| 11 | **Reduce demand for net diversions for the regions from the Delta?** | **No** |
| 12 | **Provide a long-term solution in place of a short-term one?** | **No** |
| 13 | **Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?** | **Yes** |
| 14 | **Improve water supply reliability in ways not quantified in Attachment 7?** | **Yes** |
| 15 | **Other (If the above listed categories do not apply, provide non-monetized benefit description)?** | **Yes** |

**Table 8-4 DWR Table 19 – Annual Costs of Project**

(All costs should be in 2012 Dollars)

**Proposal Title: Kings Basin Water Authority Implementation Grant**

**Project Title: Project A - Fresno Irrigation District - Southwest Groundwater Banking Project**

| | Initial Costs Grand Total Cost from Table 7 (row (i), column (d)) | Adjusted Grant Total Cost[1] | Annual Costs [2] | | | | | | Discounting Calculations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Admin | Operation | Maintenance | Replacement | Other (Monitoring) | Total Costs (a) +…+ (g) | Discount Factor | Discounted Project Costs (h) x (i) |
| Year | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| 2014 | $ 4,562,000 | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 4,848,190 | 1.000 | $4,848,190 |
| 2015 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.943 | $269,877 |
| 2016 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.890 | $254,709 |
| 2017 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.840 | $240,400 |
| 2018 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.792 | $226,689 |
| 2019 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.747 | $213,858 |
| 2020 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.705 | $201,753 |
| 2021 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.665 | $190,333 |
| 2022 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.627 | $179,559 |
| 2023 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.592 | $169,395 |
| 2024 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.558 | $159,807 |
| 2025 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.527 | $150,761 |
| 2026 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.497 | $142,228 |
| 2027 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.469 | $134,177 |
| 2028 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.442 | $126,582 |
| 2029 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.417 | $119,417 |
| 2030 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.394 | $112,658 |
| 2031 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.371 | $106,281 |
| 2032 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.350 | $100,265 |
| 2033 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.331 | $94,589 |
| 2034 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.312 | $89,235 |
| 2035 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.294 | $84,184 |
| 2036 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.278 | $79,419 |
| 2037 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.262 | $74,924 |
| 2038 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.247 | $70,683 |
| 2039 | | | $ 10,000 | $238,760 | $17,430 | $80,000 | $ 20,000 | $ 366,190 | 0.233 | $85,322 |
| 2040 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.220 | $62,907 |
| 2041 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.207 | $59,347 |
| 2042 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.196 | $55,987 |
| 2043 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.185 | $52,818 |
| 2044 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.174 | $49,829 |
| 2045 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.164 | $47,008 |
| 2046 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.155 | $44,347 |
| 2047 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.146 | $41,837 |
| 2048 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.138 | $39,469 |
| 2049 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.130 | $37,235 |
| 2050 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.123 | $35,127 |
| 2051 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.116 | $33,139 |
| 2052 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.109 | $31,263 |
| 2053 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.103 | $29,493 |
| 2054 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.097 | $27,824 |
| 2055 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.092 | $26,249 |
| 2056 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.087 | $24,763 |
| 2057 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.082 | $23,362 |
| 2058 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.077 | $22,039 |
| 2059 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.073 | $20,792 |
| 2060 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.069 | $19,615 |
| 2061 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.065 | $18,505 |
| 2062 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.061 | $17,457 |
| 2063 | | | $ 10,000 | $238,760 | $17,430 | | $ 20,000 | $ 286,190 | 0.058 | $16,469 |
| | | | | | | | | **Total Present Value of Discounted Costs (Sum of column (j), rounded to nearest $10,000)** | | **$9,360,000** |
| | | | | | | | | **Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries** | | |

**Comments:**

**- Assumes 50 year project life.**

**- Operation (Pumping) costs assume $47/AF for 5,080 AF/yr (90% of the 4,200 AF banked at the 60-acre ponds and 100% of the 1,300 AF conveyed to JID).**

**- Annual maintenance costs are assumed to be 0.5% of initial capital costs (land plus facilties) ($3,496,000).**

(1) If any, based on opportunity costs, sunk costs and associated costs

(2) The incremental change in O&M costs attributable to the project

# Project B: Laguna Irrigation District Recharge Basin 11 Project

## Monetized Benefits

The monetized project benefits include groundwater recharge and energy conservation from raising groundwater levels and reducing pumping lifts. These benefits were quantified in Section 7 – Technical Justification of Projects, and are monetized using the DWR Method. The guidelines and assumptions used in the analysis include the following:

1. Without-Project and With Project. Without the project none of the costs will be incurred and no benefits will be realized. With the project all the costs will be incurred and all benefits are expected to be realized.
2. Period of Analysis: The period of analysis is 50 years. The mechanical components (gates, valves, and flowmeters) have a 25-year life and will be replaced once during the project. Other project features such as the pipelines, levees, and check structure are assumed to have 50-year life expectancies. These life expectancies are based on standard values used in economic analyses for similar facilities, and practical experience by District staff.
3. Sunk Costs: The project does not include sunk costs.
4. Opportunity Costs: The project does not include opportunity costs.
5. Discount Rate: A 6% discount rate was used in the analysis.
6. Dollar Value Base Year: All values are based on 2012 dollars.

**Groundwater Recharge**

The annual recharge benefit is 2,650 AF/year based on a hydrologic simulation of Kings River water. The value of the recharged water is based on the cost to purchase Kings River water in the local area. This is the most likely alternative water supply that, like the recharged water, would not cause additional overdraft. Data was available on two recent local transfers and are summarized in **Table 8-5**.

**Table 8-5 – Recent Sales Data for Kings River Water**

| Year | Price ($/AF) | Cost after 25% Losses | Volume |
|---|---|---|---|
| 2009 | $50 | $67 | 5,000 AF |
| 2012 | $100 | $133 | 5,000 AF |
| | Average | $100 | |

Notes:
1 - The prices are for water at Pine Flat Dam, which impounds the Kings River. It is assumed that 25% losses occur between the Dam and water user, which are typical losses for Kings River contractors.
2 - The agencies selling and receiving the water were agricultural water contractors. They did not grant permission for their names to be provided.

The estimated value of $100/AF was used in the financial analysis. This value is relatively low compared to other water costs in the State, and low compared to spot-market water costs in the Kings River area. Water costs can be even higher in dry years. Therefore, the assumed water values are considered conservative.

**Energy Conservation**

The value of energy conserved from recharging water and temporarily raising groundwater levels is estimated to be $23,000/year (see Attachment 7 for more details).

The monetized project benefits are calculated in **Table 8-6** (DWR Table 15 Laguna Irrigation District).

## Non-Monetized Benefits

Non-monetized benefits are listed in DWR Economic **Table 8-6** (DWR Table 12 Laguna Irrigation District). A brief discussion of each non-monetized benefit is provided below.

**Benefit No. 3: Help avoid, reduce or resolve various public water resources conflicts?**

Groundwater overdraft is one of the largest problems and consequently a source of conflict in the Kings Groundwater Sub-basin. This project will help to reduce local overdraft and reduce potential conflicts with neighboring agencies.

**Benefit No. 5: Have other social benefits?**

The project will have secondary benefits to disadvantaged Communities including the Camden Mobile Home Park and Community of Riverdale. The recharged water may eventually flow to these communities and help to improve their water quality and raise groundwater levels. Riverdale Public Utilities District recognized this potential benefit in their Letter of Support (see **Attachment 7d**).

**Benefit No. 9: Provide other environmental stewardship benefits.**

The project will create 50-acres of temporary aquatic, wetland and waterfowl habitat for a variety of wildlife, including birds on the Pacific Flyway. The project will also provide a water supply for terrestrial species. The flat interior slopes (5H:1V) will promote wetland vegetation.

**Benefit No. 10: Improve the overall, long-term management of California groundwater resources?**

The project will recharge, on average, 2,650 AF/year in the Kings Basin. The Kings Basin is in a state of overdraft, and the project will make a significant contribution to reducing overdraft, and help the Kings Basin Water Authority meet their goal of reducing net overdraft to zero within twenty years.

**Benefit No. 13: Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**

The groundwater recharge will temporarily raise groundwater levels and reduce groundwater pumping lifts. This will result in a reduction of 126 metric tons of $CO_2$ emission per year.

**Benefit No. 14: Improve water supply reliability in ways not quantified in Attachment 7?**
Water supply reliability will be improved by increasing groundwater reserves for use in drought periods.

**Benefit No. 15: Other: Flood Damage Reduction**
Flood damage benefits include diversion of an average amount of 2,650 AF/yr, which is much larger in wet years and can be as high as 70 cfs at times. The locations benefitting from reduced flooding cannot be precisely known. They could be anywhere along more than 100 miles of Kings River channels. Therefore it is not possible to estimate the monetary value of reduced flood damage, but these benefits could be substantial.

## Project Costs

**Construction and Engineering Costs**
The total estimated costs for engineering, surveying, permitting, land acquisition, construction management and construction are presented in detail in Attachment 4 – Budget. These costs must be expended before the project can operate.

**Operation and Maintenance Costs**
Operation and maintenance will include operating the valves, recording flowmeters, measuring basin water levels, maintaining levees, monitoring four new observation wells, and disking and ripping the basin interior each year to loosen soils and maintain a good recharge rate. Most of these tasks will require minimal effort, and be performed as part of the regular duties of district staff. The primary costs will be levee maintenance and basin disking/ripping, which are estimated to cost $5,000/year, based on data provided by Laguna ID ($2,000/year for level maintenance, 15 hours x $65/hour = $975 for disking, and 20 hours x $100/hour = $2,000/year for ripping). The water supply would come from Kings River floodwater, which is free to Laguna ID since they are a member of the Kings River Water Association.

**Replacement Costs**
Replacement costs will be needed for mechanical equipment (gates, valves, and flowmeters) and monitoring wells. All these items have assumed replacement periods of 25 years, based on typical design lives. These items are estimated to cost $84,000. By the designated replacement period, the items will either be obsolete or have decreasing output, and high enough maintenance costs to warrant replacement. These items were assumed to have no salvage value. Other project features such as the pipelines, levees, and check structure are assumed to have life expectancies of 50 years, so no replacement costs were included in the analysis.

The lifecycle project costs are shown in DWR Economic **Table 19 (Laguna Irrigation District).**

## Cost Analysis

A financial analysis was performed over a 50-year period using a six percent discount rate. The costs (initial, maintenance and replacement) and benefits (recharged water and energy conservation) were calculated over a 50-year period. The project benefit cost ratio is provided below:

$$\frac{\text{Project Benefits}}{\text{Project Costs}} = \frac{\$4,814,000}{\$1,311,000} = \mathbf{3.7}$$

**Table 8-7 DWR Table 15 - Annual Benefit**

(All benefits should be in 2012 dollars)

**Proposal Title: Kings Basin Water Authority Implementation Grant**

**Project Title: Project B - Laguna Irrigation District Recharge Basin 11**

| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
|---|---|---|---|---|---|---|---|---|---|
| Year | Type of Benefit | Measure of Benefit (Units) | Without Project | With Project | Change Resulting from Project (e) – (d) | Unit $ Value [1] | Annual $ Value [1] (f) x (g) | Discount Factor [1] | Discounted Benefits [1] (h) x (i) |
| **2012** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 1.000 | **$265,000** |
| **2012** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 1.000 | **$23,000** |
| **2013** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.943 | **$249,895** |
| **2013** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.943 | **$21,689** |
| **2014** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.890 | **$235,850** |
| **2014** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.890 | **$20,470** |
| **2015** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.840 | **$222,600** |
| **2015** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.840 | **$19,320** |
| **2016** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.792 | **$209,880** |
| **2016** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.792 | **$18,216** |
| **2017** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.747 | **$197,955** |
| **2017** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.747 | **$17,181** |
| **2018** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.705 | **$186,825** |
| **2018** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.705 | **$16,215** |
| **2019** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.665 | **$176,225** |
| **2019** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.665 | **$15,295** |
| **2020** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.627 | **$166,155** |
| **2020** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.627 | **$14,421** |
| **2021** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.592 | **$156,880** |
| **2021** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.592 | **$13,616** |
| **2022** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.558 | **$147,870** |
| **2022** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.558 | **$12,834** |
| **2023** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.527 | **$139,655** |
| **2023** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.527 | **$12,121** |
| **2024** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.497 | **$131,705** |
| **2024** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.497 | **$11,431** |
| **2025** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.469 | **$124,285** |
| **2025** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.469 | **$10,787** |
| **2026** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.442 | **$117,130** |
| **2026** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.442 | **$10,166** |
| **2027** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.417 | **$110,505** |
| **2027** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.417 | **$9,591** |
| **2028** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.394 | **$104,410** |
| **2028** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.394 | **$9,062** |
| **2029** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.371 | **$98,315** |
| **2029** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.371 | **$8,533** |
| **2030** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.350 | **$92,750** |
| **2030** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.350 | **$8,050** |
| **2031** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.331 | **$87,715** |
| **2031** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.331 | **$7,613** |
| **2032** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.312 | **$82,680** |
| **2032** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.312 | **$7,176** |
| **2033** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.294 | **$77,910** |
| **2033** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.294 | **$6,762** |
| **2034** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.278 | **$73,670** |
| **2034** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.278 | **$6,394** |
| **2035** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.262 | **$69,430** |
| **2035** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.262 | **$6,026** |
| **2036** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.247 | **$65,455** |
| **2036** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.247 | **$5,681** |
| **2037** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.233 | **$61,745** |
| **2037** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.233 | **$5,359** |
| **2038** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.220 | **$58,300** |
| **2038** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.220 | **$5,060** |
| **2039** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.207 | **$54,855** |
| **2039** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.207 | **$4,761** |

| Year | Type of Benefit | Measure of Benefit (Units) | Without Project | With Project | Change Resulting from Project (e) – (d) | Unit $ Value [1] | Annual $ Value [1] (f) x (g) | Discount Factor [1] | Discounted Benefits [1] (h) x (i) |
|---|---|---|---|---|---|---|---|---|---|
| **2040** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.196 | **$51,940** |
| **2040** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.196 | **$4,508** |
| **2041** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.185 | **$49,025** |
| **2041** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.185 | **$4,255** |
| **2042** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.174 | **$46,110** |
| **2042** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.174 | **$4,002** |
| **2043** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.164 | **$43,460** |
| **2043** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.164 | **$3,772** |
| **2044** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.155 | **$41,075** |
| **2044** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.155 | **$3,565** |
| **2045** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.146 | **$38,690** |
| **2045** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.146 | **$3,358** |
| **2046** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.138 | **$36,570** |
| **2046** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.138 | **$3,174** |
| **2047** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.130 | **$34,450** |
| **2047** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.130 | **$2,990** |
| **2048** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.123 | **$32,595** |
| **2048** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.123 | **$2,829** |
| **2049** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.116 | **$30,740** |
| **2049** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.116 | **$2,668** |
| **2050** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.109 | **$28,885** |
| **2050** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.109 | **$2,507** |
| **2051** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.109 | **$28,885** |
| **2051** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.109 | **$2,507** |
| **2052** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.097 | **$25,705** |
| **2052** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.097 | **$2,231** |
| **2053** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.092 | **$24,380** |
| **2053** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.092 | **$2,116** |
| **2054** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.087 | **$23,055** |
| **2054** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.087 | **$2,001** |
| **2055** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.082 | **$21,730** |
| **2055** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.082 | **$1,886** |
| **2056** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.077 | **$20,405** |
| **2056** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.077 | **$1,771** |
| **2057** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.073 | **$19,345** |
| **2057** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.073 | **$1,679** |
| **2058** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.069 | **$18,285** |
| **2058** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.069 | **$1,587** |
| **2059** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.065 | **$17,225** |
| **2059** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.065 | **$1,495** |
| **2060** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.061 | **$16,165** |
| **2060** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.061 | **$1,403** |
| **2061** | Recharge | Acre-feet | 0 | $2,650 | $2,650 | 100 | $265,000 | 0.058 | **$15,370** |
| **2061** | Energy Conserved | kw-hours | 0 | $179,000 | $179,000 | 0.13 | $23,000 | 0.058 | **$1,334** |
| | | | | | | | **Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)** | | **$4,814,208** |

**Comments:**

*(1) Complete these columns if dollar value is being claimed for the benefit.*

| Table 8-6 DWR Table 12 – Non-monetized Benefits Checklist<br>Proposal Title: Kings Basin Water Authority Implementation Grant<br>Project Title: Project B - Laguna Irrigation District Recharge Basin 11 | | |
|---|---|---|
| **No.** | **Question** | **Enter "Yes", "No" or "Neg"** |
| | **Community/Social Benefits**<br>**Will the proposal** | |
| **1** | **Provide education or technology benefits?** | **No** |
| 2 | **Provide social recreation or access benefits?** | **No** |
| **3** | **Help avoid, reduce or resolve various public water resources conflicts?** | **Yes** |
| 4 | **Promote social health and safety?** | **No** |
| 5 | **Have other social benefits?** | **Yes** |
| | **Environmental Stewardship Benefits:**<br>**Will the proposal** | |
| 6 | **Benefit wildlife or habitat in ways that were not quantified in Attachment 7?** | **No** |
| 7 | **Improve water quality in ways that were not quantified in Attachment 7?** | **No** |
| 8 | **Reduce net emissions in ways that were not quantified in Attachment 7?** | **No** |
| 9 | **Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?** | **Yes** |
| | **Sustainability Benefits:**<br>**Will the proposal** | |
| 10 | **Improve the overall, long-term management of California groundwater resources?** | **Yes** |
| 11 | **Reduce demand for net diversions for the regions from the Delta?** | **No** |
| 12 | **Provide a long-term solution in place of a short-term one?** | **No** |
| 13 | **Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?** | **Yes** |
| 14 | **Improve water supply reliability in ways not quantified in Attachment 7?** | **Yes** |
| 15 | **Other (If the above listed categories do not apply, provide non-monetized benefit description)?** | **Yes** |

**Table 8-8 DWR Table 19 - Annual Costs of Project**

(All costs should be in 2012 Dollars)

**Proposal Title: Kings Basin Water Authority Implementation Grant**

**Project Title: Project B - Laguna Irrigation District Recharge Basin 11**

| | Initial Costs Grand Total Cost from Table 7 (row (i), column (d)) | Adjusted Grant Total Cost[1] | Annual Costs [2] | | | | | | Discounting Calculations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Admin | Operation | Maintenance | Replacement | Other | Total Costs (a) +…+ (g) | Discount Factor | Discounted Project Costs (h) x (i) |
| Year | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| 2012 | $1,208,000 | | | | $5,000 | | | $1,213,000 | 1.000 | **$1,213,000** |
| 2013 | | | | | $5,000 | | | $5,000 | 0.943 | **$4,715** |
| 2014 | | | | | $5,000 | | | $5,000 | 0.890 | **$4,450** |
| 2015 | | | | | $5,000 | | | $5,000 | 0.840 | **$4,200** |
| 2016 | | | | | $5,000 | | | $5,000 | 0.792 | **$3,960** |
| 2017 | | | | | $5,000 | | | $5,000 | 0.747 | **$3,735** |
| 2018 | | | | | $5,000 | | | $5,000 | 0.705 | **$3,525** |
| 2019 | | | | | $5,000 | | | $5,000 | 0.665 | **$3,325** |
| 2020 | | | | | $5,000 | | | $5,000 | 0.627 | **$3,135** |
| 2021 | | | | | $5,000 | | | $5,000 | 0.592 | **$2,960** |
| 2022 | | | | | $5,000 | | | $5,000 | 0.558 | **$2,790** |
| 2023 | | | | | $5,000 | | | $5,000 | 0.527 | **$2,635** |
| 2024 | | | | | $5,000 | | | $5,000 | 0.497 | **$2,485** |
| 2025 | | | | | $5,000 | | | $5,000 | 0.469 | **$2,345** |
| 2026 | | | | | $5,000 | | | $5,000 | 0.442 | **$2,210** |
| 2027 | | | | | $5,000 | | | $5,000 | 0.417 | **$2,085** |
| 2028 | | | | | $5,000 | | | $5,000 | 0.394 | **$1,970** |
| 2029 | | | | | $5,000 | | | $5,000 | 0.371 | **$1,855** |
| 2030 | | | | | $5,000 | | | $5,000 | 0.350 | **$1,750** |
| 2031 | | | | | $5,000 | | | $5,000 | 0.331 | **$1,655** |
| 2032 | | | | | $5,000 | | | $5,000 | 0.312 | **$1,560** |
| 2033 | | | | | $5,000 | | | $5,000 | 0.294 | **$1,470** |
| 2034 | | | | | $5,000 | | | $5,000 | 0.278 | **$1,390** |
| 2035 | | | | | $5,000 | | | $5,000 | 0.262 | **$1,310** |
| 2036 | | | | | $5,000 | | | $5,000 | 0.247 | **$1,235** |
| 2037 | | | | | $5,000 | $84,000 | | $89,000 | 0.233 | **$20,737** |
| 2038 | | | | | $5,000 | | | $5,000 | 0.220 | **$1,100** |
| 2039 | | | | | $5,000 | | | $5,000 | 0.207 | **$1,035** |
| 2040 | | | | | $5,000 | | | $5,000 | 0.196 | **$980** |
| 2041 | | | | | $5,000 | | | $5,000 | 0.185 | **$925** |
| 2042 | | | | | $5,000 | | | $5,000 | 0.174 | **$870** |
| 2043 | | | | | $5,000 | | | $5,000 | 0.164 | **$820** |
| 2044 | | | | | $5,000 | | | $5,000 | 0.155 | **$775** |
| 2045 | | | | | $5,000 | | | $5,000 | 0.146 | **$730** |
| 2046 | | | | | $5,000 | | | $5,000 | 0.138 | **$690** |
| 2047 | | | | | $5,000 | | | $5,000 | 0.130 | **$650** |
| 2048 | | | | | $5,000 | | | $5,000 | 0.123 | **$615** |
| 2049 | | | | | $5,000 | | | $5,000 | 0.116 | **$580** |
| 2050 | | | | | $5,000 | | | $5,000 | 0.109 | **$545** |
| 2051 | | | | | $5,000 | | | $5,000 | 0.109 | **$545** |
| 2052 | | | | | $5,000 | | | $5,000 | 0.097 | **$485** |
| 2053 | | | | | $5,000 | | | $5,000 | 0.092 | **$460** |
| 2054 | | | | | $5,000 | | | $5,000 | 0.087 | **$435** |
| 2055 | | | | | $5,000 | | | $5,000 | 0.082 | **$410** |
| 2056 | | | | | $5,000 | | | $5,000 | 0.077 | **$385** |
| 2057 | | | | | $5,000 | | | $5,000 | 0.073 | **$365** |
| 2058 | | | | | $5,000 | | | $5,000 | 0.069 | **$345** |
| 2059 | | | | | $5,000 | | | $5,000 | 0.065 | **$325** |
| 2060 | | | | | $5,000 | | | $5,000 | 0.061 | **$305** |
| 2061 | | | | | $5,000 | | | $5,000 | 0.058 | **$290** |
| | | | | | | | | | **Total Present Value of Discounted Costs (Sum of column (j))** | **$1,311,152** |
| | | | | | | | | | **Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries** | |

**Comments:**

(1) If any, based on opportunity costs, sunk costs and associated costs

(2) The incremental change in O&M costs attributable to the project

# Project C: Bakman Water Company Water Supply Reliability and Conservation Project

## Monetized Benefits

The monetized project benefits include reduced groundwater delivery costs due to lower water demands and the avoided costs of installing a new well. These benefits were quantified in Section 7 – Technical Justification of Projects, and are monetized using the DWR Method. The guidelines and assumptions used in the analysis include the following:

1. Without-Project and With Project. Without the project none of the costs will be incurred and no benefits will be realized. With the project all the costs will be incurred and all benefits are expected to be realized.
2. Period of Analysis: The period of analysis is 30 years for the water meters and the rehabilitated well. The water meters are expected to last 30 years based on the experience of the nearby City of Clovis water meter program. Wells typically have a 50 year lifespan, but since it is an existing well a 30-year life span was assumed.
3. Sunk Costs: The project does not include sunk costs.
4. Opportunity Costs: The project does not include opportunity costs.
5. Discount Rate: A 6% discount rate was used in the analysis.
6. Dollar Value Base Year: All values are based on 2012 dollars.

### Reduced Well Pumping Costs

The installation of water meters is expected to reduce water demands by 20% since customers will purchase water on a volumetric basis. This will reduce the cost to pump, treat, operate and maintain groundwater wells. Groundwater pumping is expected to reduce by 869 AF/year. Bakman estimated the total value of their water supply to be $465/AF in their 2010 Urban Water Management Plan. A detailed review of financial records concluded that about 50% of the costs are fixed and 50% variable. Therefore, the value of conserved water is estimated to be $465/AF x 50% = $233. This is the value of local potable water and was used in the economic analysis. Groundwater pumping and delivery is the least expensive and most likely alternative water supply, and is therefore considered appropriate for the economic analysis.

See **Table 8-9** (DWR Table 15 Bakman Water Company) for a summary of the fiscal benefits associated with these items.

### Avoided Cost of New Well Construction

Installing wellhead treatment and implementing a blending program will allow Bakman to utilize an existing well in an area of that lacks significant redundancy. Improving redundancy in this area could only be achieved by drilling a new well with treatment facilities and additional transmission mains to connect the supply to the system. Further discussion of the 'avoided

project' can be found in Attachment 7. The avoided cost of this benefit is the initial capital cost of constructing a well (see **Attachment 8a**) and the annual O&M of the well and treatment. The annual O&M was estimated by assuming 10% of a staff members time would be dedicated to this task. The burdened hourly rate for the staff is $60, so the annual O&M is $12,480 (208*$60). The capital construction cost is $1,046,200.

See **Table 8-10** (DWR Table 16 Bakman Water Company) for a summary of the fiscal benefits associated with these items.

## Non-Monetized Costs

Non-monetized benefits are listed in **Table 8-11** (DWR Table 12 Bakman Water Company). A brief discussion of each non-monetized benefit is provided below.

**Benefit No. 3: Help avoid, reduce or resolve various public water resources conflicts?**

As discussed previously, the project will achieve or help achieve compliance with State legislation AB2572 and SBx7-7. Installation of meters is required by AB2572 and with installation of meters; the Water Company should achieve the majority of the required 20% water consumption reduction required by SBx7-7.

**Benefit No. 5: Have other social benefits?**

The project will benefit the entire region, but most specifically the customers within the Bakman Service area. The service area is comprised of portions of seven census tracts, all of which have an MHI below the DAC threshold (see Attachment 10 for further discussion). This project will benefit those residents by encouraging water conservation, which will lower many of the customers' monthly bills.

**Benefit No. 7: Improve water quality in ways that were not quantified in Attachment 7**

While not quantifiable at this time, the project also provides a water quality benefit in that the reduction in groundwater pumping will slow the movement of contamination plumes in the area. Also, the treatment of nitrate and DBCP, both finite contaminants in the aquifer, will aid in the ongoing remediation efforts. Ultimately, this will provide an economic benefit of avoided treatment costs and/or avoided drilling of new wells. At this time, it is not possible to quantify those benefits because it is not known when contamination of the existing wells would occur due to the movement of these contaminants, nor the extent of the contamination problem that would occur.

**Benefit No. 10: Improve the overall, long-term management of California groundwater resources?**

Installation of meters encourages conservation and also aids in leak detection. By reducing demand and groundwater extraction and reducing leaks, this project is contributing to the improved management of the groundwater resource for the entire region. Furthermore, by treating the contaminated groundwater to a safe drinking water level, the groundwater is being beneficially used, rather than pumped, treated to a lower level and discharged into the canal system. By utilizing the groundwater supply for beneficial use, additional pumping solely for remediation purposes will be reduced. Bakman's service area is in the very near vicinity of a cone of depression beneath the Fresno metropolitan area; any reduction in groundwater pumping will improve the aquifer conditions.

**Benefit No. 13: Promote Energy Savings:**
Installation of water meters will reduce groundwater pumping on a permanent basis, and thereby reduce the energy needed to pump the groundwater.

See DWR Economic **Table 8-11** (DWR Table 12 Bakman Water Company) for a checklist of the non-fiscal benefits associated with this item.

## Project Costs

**Construction and Engineering Costs**
The total estimated costs for engineering, surveying, permitting, construction management and construction are presented in detail in Attachment 4 – Budget. These costs must be expended before the project can operate.

**Administration Costs**

The project administrative costs will include office staff time to implement the volumetric rates structure and coordinate the treatment operations and supplies procurement. It is estimated administration will take 5% of office staff time (104 hours per year). The burdened hourly rate for this staff is $60. The administrative costs will average approximately $6,240 per year ($60*104).

**Operation Costs**

The project operational duties will be primarily performed by the system manager and should take approximately 5% of that person's time. The burdened hourly rate associated with this staff is approximately $60. Based on these assumptions, the operation cost will be $6,240 per year ($60*104).

**Maintenance Costs**

The water meters will require minimal routine maintenance; assuming the first five years will operate with no maintenance cost during the warranty period. It is anticipated approximately

50 meters per year will require maintenance after year 5. The wellhead treatment will require routine maintenance semi-monthly.

The maintenance will be performed by field staff who has a burdened hourly rate of $60. The maintenance should take no more than 6% of their time (approximately 2 hours per meter – 100 hours per year plus 6 hours per quarter for the wellhead treatment), which equate to a cost of $7,440 per year after year 5; the wellhead maintenance will begin in the first year of operation (24x$60=$1,440).

**Replacement Costs**

The GAC media will require replacement approximately every three years at a cost of $38,000. Further wellhead treatment or meter replacement costs are not anticipated during the project life.

**Monitoring Costs**

No additional monitoring costs are associated with this project; well sampling is already required on the well. Meter readings and associated administrative costs are included in administration costs above.

The lifecycle project costs are provided in DWR Economic **Table 8-12** (DWR Table 19 Bakman Water Company).

## Benefit Cost Analysis

A financial analysis was performed over a 30-year period using a six percent discount rate. The costs (initial, administration, operation, and maintenance) and benefits (reduced groundwater pumping and avoided well construction) were calculated over a 30-year period. The project benefit cost ratio is provided below:

$$\frac{\text{Project Benefits}}{\text{Project Costs}} = \frac{\$\ 3{,}766{,}000}{\$3{,}305{,}000} = 1.14$$

The B/C would be higher if not for the very conservative estimation of physical benefits associated with the project. As previously stated in Attachment 7:

> "It is important to note that Bakman does not have a surface water supply and is entirely dependent on groundwater to meet the demands. It could be argued that securing a treated surface water source should be included in the avoided costs of the benefit analysis, particularly when considering that groundwater pumping in an overdrafted aquifer with contamination plume concerns cannot continue to increase. Similar avoided costs were included in previous water meter grant applications for proponents that already have access to a surface water supply. Although not used in the

> benefit analysis, Bakman could contract with the City of Fresno for additional water supply, if needed. As noted in the 2012 City of Fresno Performance Measure summary, the average cost for the City of Fresno to produce 1 acre-foot of safe drinking water from their Northeast Surface Water Treatment Facility was approximately $450. This is the minimum cost per acre-foot additional supply from surface water sources could cost Bakman."

Were Bakman able to defer to another water supply as an avoided project and cite those as avoided costs, the B/C would likely be higher.

**Table 8-9 DWR Table 15 – Annual Benefit**

(All benefits should be in 2012 dollars)

**Proposal Title: Kings Basin Water Authority Implementation Grant**

**Project Title: Project C - Bakman Water Company Water Supply Reliability and Conservation Project**

| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
|---|---|---|---|---|---|---|---|---|---|
| **Year** | **Type of Benefit** | **Measure of Benefit (Units)** | **Without Project** | **With Project** | **Change Resulting from Project (e) – (d)** | **Unit $ Value [1]** | **Annual $ Value [1] (f) x (g)** | **Discount Factor [1]** | **Discounted Benefits [1] (h) x (i)** |
| **2012** | Reduced Water Deliveries | $/AF | 0 | 0 | 0 | $0 | $0.00 | 1.000 | - |
| **2013** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.943 | **$174,546** |
| **2014** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.890 | **$164,736** |
| **2015** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.840 | **$155,481** |
| **2016** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.792 | **$146,597** |
| **2017** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.747 | **$138,267** |
| **2018** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.705 | **$130,493** |
| **2019** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.665 | **$123,090** |
| **2020** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.627 | **$116,056** |
| **2021** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.592 | **$109,577** |
| **2022** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.558 | **$103,284** |
| **2023** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.527 | **$97,546** |
| **2024** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.497 | **$91,993** |
| **2025** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.469 | **$86,810** |
| **2026** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.442 | **$81,813** |
| **2027** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.417 | **$77,185** |
| **2028** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.394 | **$72,928** |
| **2029** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.371 | **$68,671** |
| **2030** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.350 | **$64,784** |
| **2031** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.331 | **$61,267** |
| **2032** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.312 | **$57,750** |
| **2033** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.294 | **$54,419** |
| **2034** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.278 | **$51,457** |
| **2035** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.262 | **$48,495** |
| **2036** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.247 | **$45,719** |
| **2037** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.233 | **$43,128** |
| **2038** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.220 | **$40,721** |
| **2039** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.207 | **$38,315** |
| **2040** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.196 | **$36,279** |
| **2041** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.185 | **$34,243** |
| **2042** | Reduced Water Deliveries | $/AF | 869 | 0 | -869 | $213 | $185,097 | 0.174 | **$32,207** |
| | | | | | | | **Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)** | | **$2,547,860** |

**Comments: Groundwater pumping rate increases over time because it is assumed that groundwater levels continue to decline at the long-term historic rate.**

**Table 8-10 DWR Table 16 – Annual Costs of Avoided Projects**

(All benefits should be in 2012 dollars)

**Proposal Title: Kings Basin Water Authority Implementation Grant**

**Project Title: Project C - Bakman Water Company Water Supply Reliability and Conservation Project**

| | Costs | | | | Discounting Calculations | |
|---|---|---|---|---|---|---|
| (a) | (b) | (c) | (d) | (e) | (f) | (g) |
| Year | **Alternative (Avoided Project Name):** Construct a new well and grid main to system<br>**Avoided Project Description:** The "Avoided Project" would include abandoning Well 8A (not installing treatment) and constructing a new well and associated grid main pipeline to connect it to Bakman's system | | | | Discount Factor | Discounted Costs (e) x (f) |
| | Avoided Capital Costs | Avoided Replacement Costs | Avoided Operations and Maintenance Costs *(1)* | Total Cost Avoided for Individual Alternatives (b) + (c) + (d) | | |
| 2012 | $1,046,200 | $0 | $0 | $1,046,200 | 1.000 | **$1,046,200.00** |
| 2013 | $0 | $0 | $12,480 | $12,480 | 0.943 | **$11,768.64** |
| 2014 | $0 | $0 | $12,480 | $12,480 | 0.890 | **$11,107.20** |
| 2015 | $0 | $0 | $12,480 | $12,480 | 0.840 | **$10,483.20** |
| 2016 | $0 | $0 | $12,480 | $12,480 | 0.792 | **$9,884.16** |
| 2017 | $0 | $0 | $12,480 | $12,480 | 0.747 | **$9,322.56** |
| 2018 | $0 | $0 | $12,480 | $12,480 | 0.705 | **$8,798.40** |
| 2019 | $0 | $0 | $12,480 | $12,480 | 0.665 | **$8,299.20** |
| 2020 | $0 | $0 | $12,480 | $12,480 | 0.627 | **$7,824.96** |
| 2021 | $0 | $0 | $12,480 | $12,480 | 0.592 | **$7,388.16** |
| 2022 | $0 | $0 | $12,480 | $12,480 | 0.558 | **$6,963.84** |
| 2023 | $0 | $0 | $12,480 | $12,480 | 0.527 | **$6,576.96** |
| 2024 | $0 | $0 | $12,480 | $12,480 | 0.497 | **$6,202.56** |
| 2025 | $0 | $0 | $12,480 | $12,480 | 0.469 | **$5,853.12** |
| 2026 | $0 | $0 | $12,480 | $12,480 | 0.442 | **$5,516.16** |
| 2027 | $0 | $0 | $12,480 | $12,480 | 0.417 | **$5,204.16** |
| 2028 | $0 | $0 | $12,480 | $12,480 | 0.394 | **$4,917.12** |
| 2029 | $0 | $0 | $12,480 | $12,480 | 0.371 | **$4,630.08** |
| 2030 | $0 | $0 | $12,480 | $12,480 | 0.350 | **$4,368.00** |
| 2031 | $0 | $0 | $12,480 | $12,480 | 0.331 | **$4,130.88** |
| 2032 | $0 | $0 | $12,480 | $12,480 | 0.312 | **$3,893.76** |
| 2033 | $0 | $0 | $12,480 | $12,480 | 0.294 | **$3,669.12** |
| 2034 | $0 | $0 | $12,480 | $12,480 | 0.278 | **$3,469.44** |
| 2035 | $0 | $0 | $12,480 | $12,480 | 0.262 | **$3,269.76** |
| 2036 | $0 | $0 | $12,480 | $12,480 | 0.247 | **$3,082.56** |
| 2037 | $0 | $0 | $12,480 | $12,480 | 0.233 | **$2,907.84** |
| 2038 | $0 | $0 | $12,480 | $12,480 | 0.220 | **$2,745.60** |
| 2039 | $0 | $0 | $12,480 | $12,480 | 0.207 | **$2,583.36** |
| 2040 | $0 | $0 | $12,480 | $12,480 | 0.196 | **$2,446.08** |
| 2041 | $0 | $0 | $12,480 | $12,480 | 0.185 | **$2,308.80** |
| 2042 | $0 | $0 | $12,480 | $12,480 | 0.174 | **$2,171.52** |
| | | | | | **Total Present Value of Discounted Costs (Sum of Column (g))** | **$1,217,987.20** |
| | | | | | **(%) Avoided Cost Claimed by Project** | **100%** |
| | | | | | **Total Present Value of Discounted Avoided Project Costs Claimed by Alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)** | **$1,217,987.20** |

**Comments:**

*(1)* Includes costs resulting from O&M of the new well system. See Attachment 8 for further discussion.

| Table 8-11 DWR Table 12 – Non-monetized Benefits Checklist<br>Proposal Title: Kings Basin Water Authority Implementation Grant<br>Project Title: Project C - Bakman Water Company Water Supply Reliability and Conservation Project | | |
|---|---|---|
| **No.** | **Question** | **Enter "Yes", "No" or "Neg"** |
| | **Community/Social Benefits**<br>**Will the proposal** | |
| 1 | Provide education or technology benefits? | No |
| 2 | Provide social recreation or access benefits? | No |
| 3 | Help avoid, reduce or resolve various public water resources conflicts? | Yes |
| 4 | Promote social health and safety? | No |
| 5 | Have other social benefits? | Yes |
| | **Environmental Stewardship Benefits:**<br>**Will the proposal** | |
| 6 | Benefit wildlife or habitat in ways that were not quantified in Attachment 7? | No |
| 7 | Improve water quality in ways that were not quantified in Attachment 7? | Yes |
| 8 | Reduce net emissions in ways that were not quantified in Attachment 7? | No |
| 9 | Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4? | No |
| | **Sustainability Benefits:**<br>**Will the proposal** | |
| 10 | Improve the overall, long-term management of California groundwater resources? | Yes |
| 11 | Reduce demand for net diversions for the regions from the Delta? | No |
| 12 | Provide a long-term solution in place of a short-term one? | No |
| 13 | Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources? | Yes |
| 14 | Improve water supply reliability in ways not quantified in Attachment 7? | No |
| 15 | Other (If the above listed categories do not apply, provide non-monetized benefit description)? | No |

**Table 8-12 DWR Table 19 – Annual Costs of Project**

(All costs should be in 2012 Dollars)

**Proposal Title: Kings Basin Water Authority Implementation Grant**

**Project Title: Project C - Bakman Water Company Water Supply Reliability and Conservation Project**

| | Initial Costs Grand Total Cost from Table 7 (row (i), column (d)) | Adjusted Grant Total Cost[1] | Annual Costs [2] | | | | | | Discounting Calculations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Admin | Operation | Maintenance | Replacement | Other | Total Costs (a) +…+ (g) | Discount Factor | Discounted Project Costs (h) x (i) |
| Year | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| 2012 | $2,907,000 | $0 | $0 | $0 | $0 | $0 | $0 | $2,907,000 | 1.000 | **$2,907,000** |
| 2013 | | $0 | $6,240 | $6,240 | $1,440 | $0 | $0 | $13,920 | 0.943 | **$13,127** |
| 2014 | | $0 | $6,240 | $6,240 | $1,440 | $0 | $0 | $13,920 | 0.890 | **$12,389** |
| 2015 | | $0 | $6,240 | $6,240 | $1,440 | $38,000 | $0 | $51,920 | 0.840 | **$43,613** |
| 2016 | | $0 | $6,240 | $6,240 | $1,440 | $0 | $0 | $13,920 | 0.792 | **$11,025** |
| 2017 | | $0 | $6,240 | $6,240 | $1,440 | $0 | $0 | $13,920 | 0.747 | **$10,398** |
| 2018 | | $0 | $6,240 | $6,240 | $1,440 | $38,000 | $0 | $51,920 | 0.705 | **$36,604** |
| 2019 | | $0 | $6,240 | $6,240 | $1,440 | $0 | $0 | $13,920 | 0.665 | **$9,257** |
| 2020 | | $0 | $6,240 | $6,240 | $7,440 | $0 | $0 | $19,920 | 0.627 | **$12,490** |
| 2021 | | $0 | $6,240 | $6,240 | $7,440 | $38,000 | $0 | $57,920 | 0.592 | **$34,289** |
| 2022 | | $0 | $6,240 | $6,240 | $7,440 | $0 | $0 | $19,920 | 0.558 | **$11,115** |
| 2023 | | $0 | $6,240 | $6,240 | $7,440 | $0 | $0 | $19,920 | 0.527 | **$10,498** |
| 2024 | | $0 | $6,240 | $6,240 | $7,440 | $38,000 | $0 | $57,920 | 0.497 | **$28,786** |
| 2025 | | $0 | $6,240 | $6,240 | $7,440 | $0 | $0 | $19,920 | 0.469 | **$9,342** |
| 2026 | | $0 | $6,240 | $6,240 | $7,440 | $0 | $0 | $19,920 | 0.442 | **$8,805** |
| 2027 | | $0 | $6,240 | $6,240 | $7,440 | $38,000 | $0 | $57,920 | 0.417 | **$24,153** |
| 2028 | | $0 | $6,240 | $6,240 | $7,440 | $0 | $0 | $19,920 | 0.394 | **$7,848** |
| 2029 | | $0 | $6,240 | $6,240 | $7,440 | $0 | $0 | $19,920 | 0.371 | **$7,390** |
| 2030 | | $0 | $6,240 | $6,240 | $7,440 | $38,000 | $0 | $57,920 | 0.350 | **$20,272** |
| 2031 | | $0 | $6,240 | $6,240 | $7,440 | $0 | $0 | $19,920 | 0.331 | **$6,594** |
| 2032 | | $0 | $6,240 | $6,240 | $7,440 | $0 | $0 | $19,920 | 0.312 | **$6,215** |
| 2033 | | $0 | $6,240 | $6,240 | $7,440 | $38,000 | $0 | $57,920 | 0.294 | **$17,028** |
| 2034 | | $0 | $6,240 | $6,240 | $7,440 | $0 | $0 | $19,920 | 0.278 | **$5,538** |
| 2035 | | $0 | $6,240 | $6,240 | $7,440 | $0 | $0 | $19,920 | 0.262 | **$5,219** |
| 2036 | | $0 | $6,240 | $6,240 | $7,440 | $38,000 | $0 | $57,920 | 0.247 | **$14,306** |
| 2037 | | $0 | $6,240 | $6,240 | $7,440 | $0 | $0 | $19,920 | 0.233 | **$4,641** |
| 2038 | | $0 | $6,240 | $6,240 | $7,440 | $0 | $0 | $19,920 | 0.220 | **$4,382** |
| 2039 | | $0 | $6,240 | $6,240 | $7,440 | $38,000 | $0 | $57,920 | 0.207 | **$11,989** |
| 2040 | | $0 | $6,240 | $6,240 | $7,440 | $0 | $0 | $19,920 | 0.196 | **$3,904** |
| 2041 | | $0 | $6,240 | $6,240 | $7,440 | $0 | $0 | $19,920 | 0.185 | **$3,685** |
| 2042 | | $0 | $6,240 | $6,240 | $7,440 | $0 | $0 | $19,920 | 0.174 | **$3,466** |
| | | | | | | | | **Total Present Value of Discounted Costs (Sum of column (j))** | | **$3,305,369** |
| | | | | | | | | **Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries** | | |

**Comments:**

(1) If any, based on opportunity costs, sunk costs and associated costs

(2) The incremental change in O&M costs attributable to the project

# Project D: City of San Joaquin Water Supply Reliability and Conservation Project

## Monetized Benefits

The monetized project benefits include reduced groundwater pumping costs due to lower demands and the avoided cost to install a new well. These benefits were quantified in Section 7 – Technical Justification of Projects, and are monetized using the DWR Method. The guidelines and assumptions used in the analysis include the following:

1. Without-Project and With Project. Without the project none of the costs will be incurred and no benefits will be realized. With the project all the costs will be incurred and all benefits are expected to be realized.
2. Period of Analysis: The period of analysis is 30 years which is the life expectancy of the water meters and well rehabilitation.
3. Sunk Costs: The project does not include sunk costs.
4. Opportunity Costs: The project does not include opportunity costs.
5. Discount Rate: A 6% discount rate was used in the analysis.
6. Dollar Value Base Year: All values are based on 2012 dollars.

### Reduced Groundwater Pumping

The installation of water meters is expected to reduce water demands by 20% since customers will purchase water on a volumetric basis. This will reduce cost to pump, operate and maintain groundwater wells. Groundwater pumping is expected to decrease by 147 AF/year. The City performed a water rate study (**Attachment 3x**) in 2009, and determined that they need $45/month/connection to cover fixed and variable costs. Historical water usage has averaged about 1.1 AF/connection based on population and water use data. Using these two values delivered potable water is valued at $45/month x 12 months/1.1 AF = $490/AF. The City has a long-term goal of reducing fixed costs to 30% of total water costs to meet guidelines established by the California Urban Water Conservation Council; however, fixed costs are currently estimated to be 40% of total costs. As a result, variable costs for delivering groundwater are estimated to be ($490 x 60%) = $294/AF, which is the value of local potable water, and was used in the economic analysis. Groundwater pumping is the least expensive and most likely alternative water supply, and is therefore considered appropriate for the economic analysis.

See DWR Economic **Table 8-13** (DWR Table 15 City of San Joaquin) for a summary of the fiscal benefits associated with these items.

### Avoided Well Installation

The City has a fire flow concern within the area of Well 4. Rehabilitating an out of service well is proposed to contribute directly to the fire flow concern. California Department of Public

Health (CDPH) also confirms the acceptability of reintroducing this well into the system to provide redundancy and increased fire flow (see **Attachment 7j – CDPH Letter**). To achieve a similar benefit, the likely alternative would be for the City to drill a new well to provide fire flow and water supply reliability. This is the only likely alternative since groundwater is the only water supply available to the City. The estimated costs to install the new well are documented in **Attachment 8b**. The unit prices are based on recent municipal wells constructed in the area.

See DWR Economic **Table 8-14** (DWR Table 16 City of San Joaquin) for a summary of the fiscal benefits associated with these items.

## Non-Monetized Benefits

Non-monetized benefits are listed in **Table 8-15** (DWR Table 12 City of San Joaquin)**.** A brief discussion of each non-monetized benefit is provided below.

**Benefit No. 1: Education or Technology Benefits:**
The installation of water meters is an excellent opportunity to engage residents in a conversation about water conservation and shared resources. This benefit will be achieved through the following methods:

- Educational flyers and workshops
- Installation of water meters
- Implementation of metered rate structure
- Grace period during which customers will be billed under the old flat rate structure, but provided a bill that indicates what their metered rate would be. This will allow a period of four to six months during which consumers can learn about water use efficiency and begin to take corrective action to reduce their water consumption and water bill (e.g. fix leaks, install low-flow fixtures, improve landscape irrigation, etc.).

**Benefit No. 3: Help Avoid, Reduce or Resolve Various Public Water Resources Conflicts:**
The installation of water meters provides opportunities for public involvement in water management by making water use personal. Some methods by which the public will be engaged in this effort are through:

- Outreach to effect changes in personal behavior as it relates to resource use
- Interactive workshops with opportunities for hands-on learning, including gardening and landscaping
- Opportunities to learn about the use of low-flow fixtures, improved irrigation technologies and practices, etc.

By installing water meters, the City of San Joaquin will support statewide efforts to comply with the requirements of SBx7-7, the Water Conservation Act of 2009, which calls for a 20% reduction in water use by 2020.

**Benefit No 4: Promote Social Health and Safety:**
By installing water meters, the City of San Joaquin will improve water supply reliability via a reduction in overdraft conditions. This will improve the long-term sustainability of the community's water resource, thereby ensuring improved health and fire protection.

**Benefit No. 5: Other Social Benefits:**
San Joaquin is a severely disadvantaged community which is comprised almost entirely of minority populations. Based on the 2010 census, 95.6% identify as Hispanic or Latino; 0.8% as African American; 1.3% as Native American; and 0.9% as Asian. Improving the long-term sustainability of San Joaquin's water supply will increase the viability of the community.

**Benefit No. 8: Reduce Net Emissions:**
The installation of water meters will result in reduced groundwater pumping costs (electricity) for the City of San Joaquin and associated reductions in greenhouse gases.

**Benefit No. 10: Improve Overall, Long-Term Management of California Groundwater Resources:**
The installation of water meters is anticipated to reduce water consumption in the City of San Joaquin by approximately 147 AF/year.

**Benefit No. 13: Promote Energy Savings:**
Installation of water meters will reduce groundwater pumping costs on a permanent basis. The reduction is power usage is estimated to be 57,800 kwh/year.

**Benefit No 14: Improve Water Supply Reliability:**
The estimated reduced usage of water will result in the avoidance of costs related to water treatment and wear and tear on pumps and motors, reducing the potential for supply uncertainty now caused by aging wells and pumps.

During times of peak use, the overall reduction in water use will improve water supply reliability and ensure the sustainability of the drinking water system that serves the residents of the small severely disadvantaged City of San Joaquin.

The rehabilitated well will increase the City's water supply and allow the City to meet peak demands and required fire flowrates.

**Benefit No 15: Other non-monetized benefits:**
Leadership of The City of San Joaquin has a water conservation philosophy. Leadership recognizes that to best serve its residents, wise water use by all, residents and businesses, must become a priority. The population of the City increased by nearly 30% during a ten year period, 2000 to 2010. Continued growth is expected. Establishing a mindset, governance and common

practice now, before more growth takes place, will lay a foundation for conservative water practices.

The City of San Joaquin would also like to become a model city for other disadvantaged communities in water conservation and resources sustainability, including the use of smart meters. The City Manager actively participates in San Joaquin Valley rural community support and resource providers like the Self Help Enterprises (SHE) and the Small Community Network (SCN), accesses services and resources provided by agencies like the Kings IRWMP, and takes advantage of trainings and other services as they become available. Leaders of the City of San Joaquin intentionally network with other rural disadvantaged communities and have provided assistance and support to the leaders of other small communities like the unincorporated community of Easton. Groundwork for becoming a model rural city has already been laid. The City projects a sharing and cooperative attitude toward other communities that multiplies the positive effects of investments made in San Joaquin.

## Project Costs

### Construction and Engineering Costs

The total estimated costs for engineering, surveying, permitting, land acquisition, construction management and construction are presented in detail in Attachment 4 – Budget. These costs must be expended before the project can operate.

#### Administration Costs

The project administrative costs will include office staff time to implement the volumetric rate structure for the water meters. This is estimated to take about 40 hours per year. Using a burdened hourly rate of $50, the administration costs will be 40 hours x $50/hour = $2,000.

#### Operation Costs

The project operational duties will require approximately 30 hours/year for a City staff member. Assuming a burdened hourly rate of $50/hour, the total operational costs will be 30 hours x $50 = $1,500/year.

#### Maintenance Costs

It is assumed that maintenance is performed on 14 meters per year at a cost of $100/meters. Therefore, annual maintenance costs would be $1,400/year.

#### Replacement Costs

The project does not include replacement costs. The project life is based on the lifespan of the meters and rehabilitated well.

#### Monitoring Costs

No monitoring costs are associated with this project. Meter readings and associated administrative costs are included in administration costs above.

The lifecycle project costs are provided in DWR Economic **Table 8-16** (DWR Table 19 City of San Joaquin).

## Benefit Cost Analysis

A financial analysis was performed over a 30-year period using a six percent discount rate. The costs (initial, administration, operation, and maintenance) and benefits (reduced groundwater pumping and avoided well construction) were calculated over a 30-year period. The project benefit cost ratio is provided below:

$$\frac{\text{Project Benefits}}{\text{Project Costs}} = \frac{\$1,235,000}{\$862,000} = 1.43$$

**Table 8-13 DWR Table 15 – Annual Benefit**

(All benefits should be in 2012 dollars)

**Proposal Title: Kings Basin Water Authority Implementation Grant**

**Project Title: Project D - City of San Joaquin Water Supply Relability and Conservation Project**

| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
|---|---|---|---|---|---|---|---|---|---|
| **Year** | **Type of Benefit** | **Measure of Benefit (Units)** | **Without Project** | **With Project** | **Change Resulting from Project (e) – (d)** | **Unit $ Value [1]** | **Annual $ Value [1] (f) x (g)** | **Discount Factor [1]** | **Discounted Benefits [1] (h) x (i)** |
| **2012** | Reduced Water Deliveries | $/AF | - | - | - | - | - | 1.000 | **-** |
| **2013** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.943 | **$40,755** |
| **2014** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.890 | **$38,464** |
| **2015** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.840 | **$36,303** |
| **2016** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.792 | **$34,229** |
| **2017** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.747 | **$32,284** |
| **2018** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.705 | **$30,469** |
| **2019** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.665 | **$28,740** |
| **2020** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.627 | **$27,098** |
| **2021** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.592 | **$25,585** |
| **2022** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.558 | **$24,116** |
| **2023** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.527 | **$22,776** |
| **2024** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.497 | **$21,479** |
| **2025** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.469 | **$20,269** |
| **2026** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.442 | **$19,102** |
| **2027** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.417 | **$18,022** |
| **2028** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.394 | **$17,028** |
| **2029** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.371 | **$16,034** |
| **2030** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.350 | **$15,126** |
| **2031** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.331 | **$14,305** |
| **2032** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.312 | **$13,484** |
| **2033** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.294 | **$12,706** |
| **2034** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.278 | **$12,015** |
| **2035** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.262 | **$11,323** |
| **2036** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.247 | **$10,675** |
| **2037** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.233 | **$10,070** |
| **2038** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.220 | **$9,508** |
| **2039** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.207 | **$8,946** |
| **2040** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.196 | **$8,471** |
| **2041** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.185 | **$7,995** |
| **2042** | Reduced Water Deliveries | $/AF | 147 | 0 | -147 | $294 | $43,218 | 0.174 | **$7,520** |
| | | | | | | | **Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)** | | **$594,896** |

**Comments:**

*(1) Complete these columns if dollar value is being claimed for the benefit.*

**Table 8-14 DWR Table 16 – Annual Costs of Avoided Projects**

(All avoided costs should be in 2012 dollars)

**Proposal Title: Kings Basin Water Authority Implementation Grant**

**Project Title: Project D - City of San Joaquin Water Supply Relability and Conservation Project**

| | Costs | | | | Discounting Calculations | |
|---|---|---|---|---|---|---|
| (a) | (b) | (c) | (d) | (e) | (f) | (g) |
| Year | Alternative (Avoided Project Name): Construct a new well and grid main to system<br>Avoided Project Description: The "Avoided Project" would include abandoning Well 4 and constructing a new well | | | | Discount Factor | Discounted Costs (e) x (f) |
| | Avoided Capital Costs | Avoided Replacement Costs | Avoided Operations and Maintenance Costs *(1)* | Total Cost Avoided for Individual Alternatives (b) + (c) + (d) | | |
| 2012 | $612,100 | $0 | $0 | $612,100 | 1.000 | **$612,100** |
| 2013 | $0 | $0 | $2,000 | $2,000 | 0.943 | **$1,886** |
| 2014 | $0 | $0 | $2,000 | $2,000 | 0.890 | **$1,780** |
| 2015 | $0 | $0 | $2,000 | $2,000 | 0.840 | **$1,680** |
| 2016 | $0 | $0 | $2,000 | $2,000 | 0.792 | **$1,584** |
| 2017 | $0 | $0 | $2,000 | $2,000 | 0.747 | **$1,494** |
| 2018 | $0 | $0 | $2,000 | $2,000 | 0.705 | **$1,410** |
| 2019 | $0 | $0 | $2,000 | $2,000 | 0.665 | **$1,330** |
| 2020 | $0 | $0 | $2,000 | $2,000 | 0.627 | **$1,254** |
| 2021 | $0 | $0 | $2,000 | $2,000 | 0.592 | **$1,184** |
| 2022 | $0 | $0 | $2,000 | $2,000 | 0.558 | **$1,116** |
| 2023 | $0 | $0 | $2,000 | $2,000 | 0.527 | **$1,054** |
| 2024 | $0 | $0 | $2,000 | $2,000 | 0.497 | **$994** |
| 2025 | $0 | $0 | $2,000 | $2,000 | 0.469 | **$938** |
| 2026 | $0 | $0 | $2,000 | $2,000 | 0.442 | **$884** |
| 2027 | $0 | $0 | $2,000 | $2,000 | 0.417 | **$834** |
| 2028 | $0 | $0 | $2,000 | $2,000 | 0.394 | **$788** |
| 2029 | $0 | $0 | $2,000 | $2,000 | 0.371 | **$742** |
| 2030 | $0 | $0 | $2,000 | $2,000 | 0.350 | **$700** |
| 2031 | $0 | $0 | $2,000 | $2,000 | 0.331 | **$662** |
| 2032 | $0 | $0 | $2,000 | $2,000 | 0.312 | **$624** |
| 2033 | $0 | $0 | $2,000 | $2,000 | 0.294 | **$588** |
| 2034 | $0 | $0 | $2,000 | $2,000 | 0.278 | **$556** |
| 2035 | $0 | $0 | $2,000 | $2,000 | 0.262 | **$524** |
| 2036 | $0 | $0 | $2,000 | $2,000 | 0.247 | **$494** |
| 2037 | $0 | $0 | $2,000 | $2,000 | 0.233 | **$466** |
| 2038 | $0 | $0 | $2,000 | $2,000 | 0.220 | **$440** |
| 2039 | $0 | $0 | $2,000 | $2,000 | 0.207 | **$414** |
| 2040 | $0 | $0 | $2,000 | $2,000 | 0.207 | **$414** |
| 2041 | $0 | $0 | $2,000 | $2,000 | 0.220 | **$440** |
| 2042 | $0 | $0 | $2,000 | $2,000 | 0.207 | **$414** |
| | | | | | **Total Present Value of Discounted Costs (Sum of Column (g))** | **$639,788** |
| | | | | | **(%) Avoided Cost Claimed by Project** | **100%** |
| | | | | | **Total Present Value of Discounted Avoided Project Costs Claimed by Alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)** | **$639,788** |

**Comments:**

*(1)* Includes costs resulting from avoided pumping costs. See Attachment 8 for further discussion.

| Table 8-15 DWR Table 12 – Non-monetized Benefits Checklist<br>Proposal Title: Kings Basin Water Authority Implementation Grant<br>Project Title: Project D - City of San Joaquin Water Supply Relability and Conservation Project | | |
|---|---|---|
| **No.** | **Question** | **Enter "Yes", "No" or "Neg"** |
| | **Community/Social Benefits**<br>**Will the proposal** | |
| **1** | **Provide education or technology benefits?** | **Yes** |
| 2 | **Provide social recreation or access benefits?** | **No** |
| **3** | **Help avoid, reduce or resolve various public water resources conflicts?** | **Yes** |
| 4 | **Promote social health and safety?** | **Yes** |
| 5 | **Have other social benefits?** | **Yes** |
| | **Environmental Stewardship Benefits:**<br>**Will the proposal** | |
| 6 | **Benefit wildlife or habitat in ways that were not quantified in Attachment 7?** | **No** |
| 7 | **Improve water quality in ways that were not quantified in Attachment 7?** | **No** |
| 8 | **Reduce net emissions in ways that were not quantified in Attachment 7?** | **Yes** |
| 9 | **Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?** | **No** |
| | **Sustainability Benefits:**<br>**Will the proposal** | |
| 10 | **Improve the overall, long-term management of California groundwater resources?** | **Yes** |
| 11 | **Reduce demand for net diversions for the regions from the Delta?** | **No** |
| 12 | **Provide a long-term solution in place of a short-term one?** | **No** |
| 13 | **Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?** | **Yes** |
| 14 | **Improve water supply reliability in ways not quantified in Attachment 7?** | **Yes** |
| 15 | **Other** | **Yes** |

**Table 8-16 DWR Table 19 – Annual Costs of Project**

(All costs should be in 2012 Dollars)

**Proposal Title: Kings Basin Water Authority Implementation Grant**

**Project Title: Project D - City of San Joaquin Water Supply Relability and Conservation Project**

| | Initial Costs Grand Total Cost from Table 7 (row (i), column (d)) | Adjusted Grant Total Cost[1] | Annual Costs [2] | | | | | | Discounting Calculations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Admin | Operation | Maintenance | Replacement | Other | Total Costs (a) +…+ (g) | Discount Factor | Discounted Project Costs (h) x (i) |
| Year | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| 2012 | $794,066 | $794,066 | $0 | $0 | $0 | $0 | $0 | $794,066 | 1.000 | **$794,066** |
| 2013 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.943 | **$4,621** |
| 2014 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.890 | **$4,361** |
| 2015 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.840 | **$4,116** |
| 2016 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.792 | **$3,883** |
| 2017 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.747 | **$3,660** |
| 2018 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.705 | **$3,453** |
| 2019 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.665 | **$3,258** |
| 2020 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.627 | **$3,072** |
| 2021 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.591 | **$2,898** |
| 2022 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.558 | **$2,734** |
| 2023 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.526 | **$2,579** |
| 2024 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.497 | **$2,433** |
| 2025 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.468 | **$2,296** |
| 2026 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.442 | **$2,166** |
| 2027 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.417 | **$2,043** |
| 2028 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.393 | **$1,927** |
| 2029 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.371 | **$1,818** |
| 2030 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.350 | **$1,715** |
| 2031 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.330 | **$1,618** |
| 2032 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.312 | **$1,527** |
| 2033 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.294 | **$1,440** |
| 2034 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.277 | **$1,359** |
| 2035 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.262 | **$1,282** |
| 2036 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.247 | **$1,209** |
| 2037 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.233 | **$1,141** |
| 2038 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.220 | **$1,076** |
| 2039 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.207 | **$1,015** |
| 2040 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.195 | **$958** |
| 2041 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.184 | **$903** |
| 2042 | $0 | $0 | $2,000 | $1,500 | $1,400 | $0 | $0 | $4,900 | 0.174 | **$852** |
| | | | | | | | | **Total Present Value of Discounted Costs (Sum of column (j))** | | **$861,479** |
| | | | | | | | | **Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries** | | |

**Comments:**

(1) If any, based on opportunity costs, sunk costs and associated costs

(2) The incremental change in O&M costs attributable to the project

## Project E: City of Kerman Residential Water Meter Project

The monetized project benefits include reduced groundwater delivery costs due to lower demands. The lower demands result from the installation of water meters and a volumetric pricing policy. These benefits were quantified in Section 7 – Technical Justification of Projects, and are monetized using the DWR Method. The guidelines and assumptions used in the analysis include the following:

1. Without-Project and With Project. Without the project none of the costs will be incurred and no benefits will be realized. With the project all the costs will be incurred and all benefits are expected to be realized.
2. Period of Analysis: The period of analysis is 30 years which is the life expectancy of the water meters and well rehabilitation.
3. Sunk Costs: The project does not include sunk costs.
4. Opportunity Costs: The project does not include opportunity costs.
5. Discount Rate: A 6% discount rate was used in the analysis.
6. Dollar Value Base Year: All values are based on 2012 dollars.

**Reduced Groundwater Pumping**

The new water meters are expected to reduce water demands by 20% since water users will be buying water on a volumetric basis. The estimated reduction in pumpage is 162 AF/year. The value of potable water in Kerman is reflected in their Master Fee Schedule for 2012-2013 (**Attachment 8c**). The fee schedule includes a fixed monthly meter rate, which varies by meter size, and a volumetric rate of $0.765/1,000 gallons. The fixed meter fees (assuming a 1-inch meter and 1 AF/household/year) account for approximately 50% of a typical water bill. The volumetric charge is sufficient to cover all variable charges from delivering local groundwater including pumping, treatment, energy, etc. The volumetric rate of $0.765/1,000 gallons equates to $249/AF, which is the value of local potable water, and was used in the economic analysis. Groundwater pumping and delivery is the least expensive and most likely alternative water supply, and is therefore considered appropriate for the economic analysis.

See **Table 8-17** (DWR Table 15 City of Kerman) for a summary of the fiscal benefits associated with these items.

### Non-Monetized Benefits

Non-monetized benefits are listed in **Table 8-18** (DWR Table 12 City of Kerman). A brief discussion of each non-monetized benefit is provided below.

**Benefit No. 3: Help avoid, reduce or resolve various public water resources conflicts?**

The project will achieve or help achieve compliance with State legislation AB2572 and SBx7-7. Installation of meters is required by AB2572 and with installation of meters; the City should achieve the majority of the required 20% water consumption reduction required by SBx7-7.

**Benefit No. 5: Have other social benefits?**

The project will benefit the entire region, but most specifically the customers within the City of Kerman Service area. This project will benefit the residents by encouraging water conservation, which will lower many of the customers' monthly bills.

**Benefit No. 7: Improve water quality in ways that were not quantified in Attachment 7**

The City of Kerman relies on groundwater to meet 100% of its potable water demands. As with all groundwater sources, this resource has been and will continue to be exposed to a multitude of potential activity contaminants. The City has experienced wide-spread groundwater impacts by uranium which is naturally occurring in the upper aquifers. Additionally, the there have been numerous occurrences of groundwater contamination from industrial operations throughout the San Joaquin Valley. A water quality benefit attained through implementation of this project is the stabilization of the groundwater table and help assures containment of contamination plumes. By preventing continued overdraft, groundwater gradients will not be exacerbated and promoting migration of contaminants from remediation operations.

**Benefit No. 10: Improve the overall, long-term management of California groundwater resources?**

Installation of meters encourages conservation and also aids in leak detection. By reducing demand and groundwater extraction and reducing leaks, this project is contributing to the improved management of the groundwater resource for the entire region. Furthermore, by treating the contaminated groundwater to a safe drinking water level, the groundwater is being beneficially used, rather than pumped, treated to a lower level and discharged into the canal system. By utilizing the groundwater supply for beneficial use, additional pumping solely for remediation purposes will be reduced. The City of Kerman is located in the Kings Groundwater sub-basin, which is overdraft by an estimated 120,000 to 150,000 AF/year.

**Benefit No. 13: Promote Energy Savings:**
Installation of water meters will reduce groundwater pumping costs on a permanent basis, and thereby reduce the energy needed to pump the groundwater.

## Project Costs

**Construction and Engineering Costs**

The total estimated costs for engineering, surveying, permitting, land acquisition, construction management and construction are presented in detail in Attachment 4 – Budget. These costs must be expended before the project can operate.

**Administration Costs**

This function will essentially be conducted by the Water Division's certified water distribution system water operator and a supporting Administrative Secretary. It is approximated that the Water Operators and Clerk will dedicate 5% of their time to the administration for all residential, commercial, and industrial, and irrigation meters annually. Of this time, 75% of all meters in the city are residential and applicable to the costs for this project. Of this value, one third will be directly attributed to the project itself. Salaries for the Operators and Administration Secretary are $57,744 and $44,456, respectively. Applying the above described factors results with a combined annual administration cost of $1,280, or rounded to $1,300, for the installed 693 meters.

**Operation Costs**

This function will primarily be supported by the Water Division's Manager. It is approximated that this position will dedicate 5% of their time to operations for all residential, commercial, industrial, and irrigation meters annually. Of this time, 75% of all meters in the city will be residential and applicable to the costs for this project. Of this value, one-third will be directly attributed to the project itself. The Annual salary for this position is $75,972. Applying the previously described factors an annual cost of $950 will be attributed to operation of the installed 1,400 meters.

**Maintenance Costs**

This function will be performed by the Water Division's Certified Water Distribution Worker. It is approximated that this position will dedicate the same amount of time as operations requires. The annual salary for this position is $44,340. Applying the previously described factors an annual cost of $550 will be attributed to operation of the installed 693 meters.

**Replacement Costs**

The project does not include replacement costs. The project life is based on the lifespan of the meters, which is assumed to be 30 years, based on experience in the nearby City of Clovis.

**Monitoring Costs**

No monitoring costs are associated with this project. Meter readings and associated administrative costs are included in administration costs above.

The lifecycle project costs are provided in **Table 8-19** (DWR Table 19 City of San Joaquin).

## Benefit-Cost Analysis

A financial analysis was performed over a 30-year period using a six percent discount rate. The costs (initial, administration, operation, and maintenance) and benefits (reduced groundwater pumping and avoided well construction) were calculated over a 30-year period. The project benefit cost ratio is provided below:

$$\frac{\text{Project Benefits}}{\text{Project Costs}} = \frac{\$\ 555{,}000}{\$1{,}005{,}000} = 0.55$$

**Table 8-17 DWR Table 15 – Annual Benefit**

(All benefits should be in 2012 dollars)

**Proposal Title: Kings Basin Water Authority Implementation Grant**

**Project Title: Project E - City of Kerman Residential Water Meter Project**

| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
|---|---|---|---|---|---|---|---|---|---|
| **Year** | **Type of Benefit** | **Measure of Benefit (Units)** | **Without Project** | **With Project** | **Change Resulting from Project (e) – (d)** | **Unit $ Value [1]** | **Annual $ Value [1] (f) x (g)** | **Discount Factor [1]** | **Discounted Benefits [1] (h) x (i)** |
| **2012** | Reduced Water Deliveries | $/AF | - | - | - | - | - | 1.000 | **-** |
| **2013** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.943 | **$38,039** |
| **2014** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.890 | **$35,901** |
| **2015** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.840 | **$33,884** |
| **2016** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.792 | **$31,948** |
| **2017** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.747 | **$30,132** |
| **2018** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.705 | **$28,438** |
| **2019** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.665 | **$26,825** |
| **2020** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.627 | **$25,292** |
| **2021** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.592 | **$23,880** |
| **2022** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.558 | **$22,509** |
| **2023** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.527 | **$21,258** |
| **2024** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.497 | **$20,048** |
| **2025** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.469 | **$18,919** |
| **2026** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.442 | **$17,829** |
| **2027** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.417 | **$16,821** |
| **2028** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.394 | **$15,893** |
| **2029** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.371 | **$14,965** |
| **2030** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.350 | **$14,118** |
| **2031** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.331 | **$13,352** |
| **2032** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.312 | **$12,585** |
| **2033** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.294 | **$11,859** |
| **2034** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.278 | **$11,214** |
| **2035** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.262 | **$10,569** |
| **2036** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.247 | **$9,963** |
| **2037** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.233 | **$9,399** |
| **2038** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.220 | **$8,874** |
| **2039** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.207 | **$8,350** |
| **2040** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.196 | **$7,906** |
| **2041** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.185 | **$7,463** |
| **2042** | Reduced Water Deliveries | $/AF | 162 | 0 | -162 | $249 | $40,338 | 0.174 | **$7,019** |
| | | | | | | | **Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)** | | **$555,253** |

**Comments:**

| Table 8-18 DWR Table 12 – Non-monetized Benefits Checklist<br>Proposal Title: Kings Basin Water Authority Implementation Grant<br>Project Title: Project E - City of Kerman Residential Water Meter Project | | |
|---|---|---|
| **No.** | **Question** | **Enter "Yes", "No" or "Neg"** |
| | **Community/Social Benefits**<br>**Will the proposal** | |
| 1 | Provide education or technology benefits? | No |
| 2 | Provide social recreation or access benefits? | No |
| 3 | Help avoid, reduce or resolve various public water resources conflicts? | Yes |
| 4 | Promote social health and safety? | No |
| 5 | Have other social benefits? | Yes |
| | **Environmental Stewardship Benefits:**<br>**Will the proposal** | |
| 6 | Benefit wildlife or habitat in ways that were not quantified in Attachment 7? | No |
| 7 | Improve water quality in ways that were not quantified in Attachment 7? | Yes |
| 8 | Reduce net emissions in ways that were not quantified in Attachment 7? | No |
| 9 | Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4? | No |
| | **Sustainability Benefits:**<br>**Will the proposal** | |
| 10 | Improve the overall, long-term management of California groundwater resources? | Yes |
| 11 | Reduce demand for net diversions for the regions from the Delta? | No |
| 12 | Provide a long-term solution in place of a short-term one? | No |
| 13 | Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources? | No |
| 14 | Improve water supply reliability in ways not quantified in Attachment 7? | No |
| 15 | Other (If the above listed categories do not apply, provide non-monetized benefit description)? | No |

**Table 8-19 DWR Table 19 – Annual Costs of Project**

(All costs should be in 2012 Dollars)

**Proposal Title: Kings Basin Water Authority Implementation Grant**

**Project Title: Project E - City of Kerman Residential Water Meter Project**

| | Initial Costs Grand Total Cost from Table 7 (row (i), column (d)) | Adjusted Grant Total Cost[1] | Annual Costs [2] | | | | | | Discounting Calculations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Admin | Operation | Maintenance | Replacement | Other | Total Costs (a) +…+ (g) | Discount Factor | Discounted Project Costs (h) x (i) |
| Year | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| 2012 | $966,579 | $0 | $0 | $0 | $0 | $0 | $0 | $966,579 | 1.000 | **$966,579** |
| 2013 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.943 | **$2,640** |
| 2014 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.890 | **$2,492** |
| 2015 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.840 | **$2,352** |
| 2016 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.792 | **$2,218** |
| 2017 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.747 | **$2,092** |
| 2018 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.705 | **$1,974** |
| 2019 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.665 | **$1,862** |
| 2020 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.627 | **$1,756** |
| 2021 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.592 | **$1,658** |
| 2022 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.558 | **$1,562** |
| 2023 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.527 | **$1,476** |
| 2024 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.497 | **$1,392** |
| 2025 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.469 | **$1,313** |
| 2026 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.442 | **$1,238** |
| 2027 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.417 | **$1,168** |
| 2028 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.394 | **$1,103** |
| 2029 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.371 | **$1,039** |
| 2030 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.350 | **$980** |
| 2031 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.331 | **$927** |
| 2032 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.312 | **$874** |
| 2033 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.294 | **$823** |
| 2034 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.278 | **$778** |
| 2035 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.262 | **$734** |
| 2036 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.247 | **$692** |
| 2037 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.233 | **$652** |
| 2038 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.220 | **$616** |
| 2039 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.207 | **$580** |
| 2040 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.196 | **$549** |
| 2041 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.185 | **$518** |
| 2042 | | $0 | $1,300 | $950 | $550 | $0 | $0 | $2,800 | 0.174 | **$487** |
| | | | | | | | | **Total Present Value of Discounted Costs (Sum of column (j))** | | **$1,005,121** |
| | | | | | | | | **Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries** | | |

**Comments:**

(1) If any, based on opportunity costs, sunk costs and associated costs

(2) The incremental change in O&M costs attributable to the project

The five proposed project are part of an integrated effort to make more efficient use of local water supplies and mitigate groundwater overdraft. The KBWA considers them a single project with five separate components. Following is a summary of benefits and costs for the five project components.

**Table 8-20 – Total Project Costs and Benefits (values rounded to 1,000s)**

| Project | Total Present Value of Project Costs | Total Present Value of Project Benefits |
|---|---|---|
| Fresno Irrigation District - Southwest Groundwater Banking Project | $9,360,000 | $18,180,000 |
| Laguna Irrigation District - Recharge Basin 11 | $1,311,000 | $4,814,000 |
| Bakman Water Company - Water Supply Reliability and Conservation Project | $3,305,000 | $3,766,000 |
| City of San Joaquin - Water Supply Reliability and Conservation Project | $861,000 | $1,235,000 |
| City of Kerman - Kerman Residential Water Meter Project - Phase III | $1,005,000 | $555,000 |
| Total | $15,842,000 | $28,550,000 |

This provides an overall benefit cost ratio of 1.8.

The Proposal Benefits and Costs Summary is provided in **Table 8-21** (DWR Table 20 Kings Basin Water Authority).

## Table 8-21 DWR Table 20 – Proposal Benefits and Costs Summary

**Proposal Title: Kings Basin Water Authority Implementation Grant**

| Project | Project Proponent | Total Present Value Project Costs [1] | Total Present Value Project Benefits | | | From Section D1 – Cost-Effectiveness Analysis, Cost Savings | From Section D2 – Briefly describe the main Non-monetized benefits |
|---|---|---|---|---|---|---|---|
| | | | From Section D3 – Monetized [2] | From Section D4 – Flood Damage Reduction [3] | Total | | |
| (a) | (b) | (c) | (d) | (e) | (f) = (d) + (e) | (g) | (h) |
| Southwest Groundwater Banking Project | Fresno Irrigation District | $9,360,000 | $18,180,000 | $0 | $18,180,000 | | 60 acre wetland creation, improve groundwater supplies through blending |
| Recharge Basin 11 Project | Laguna Irrigation District | $1,311,000 | $4,814,000 | $0 | $4,814,000 | | 50 acre wetland creation, improve groundwater supplies through blending |
| Water Supply Reliability and Water Conservation Project | Bakman Water Company | $3,305,000 | $3,766,000 | $0 | $3,766,000 | | Reduced emissions from lower groundwater pumping, Improved water reliability |
| Water Supply Reliability and Conservation Project | City of San Joaquin | $861,000 | $1,235,000 | $0 | $1,235,000 | | Reduced emissions from lower groundwater pumping, Improved water reliability |
| Residential Water Meter Project | City of Kerman | $1,005,000 | $555,000 | $0 | $555,000 | | Reduced emissions from lower groundwater pumping |
| | | $15,842,000 | $28,550,000 | $0 | $28,550,000 | | |

*(1) From Table 19, or RWMG method*

*(2) From Table 15 or RWMG method*

*(3) From Table 18 or RWMG method*