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right. CVP water is water purchased from the Bureau of Reclamation, and non-CVP water is water from another source. CVP water would likely be necessary to irrigate fields during the irrigation season. Water Cost estimates presented in this newsletter are revised from the numbers presented at public meetings previously.

The Bureau sets costs for CVP surface water supplies and transfers of the CVP supplies by the acre-foot (AF). Because the study area is outside the CVP service area, the Bureau charges an additional \$40.80 surcharge. The conceptual canal layout requires that surface water be “wheeled” through existing canal systems. Wheeling means that the water is conveyed by a separate canal system before it is delivered to the service area.

Non-CVP water includes a base cost estimated to be \$30.00/AF, a Warren Act charge of \$21.39/AF. An additional cost may be incurred from administrative costs incurred by the water rights holder.

Estimated Groundwater Costs

To help determine how feasible the delivery of surface water is, the cost to pump groundwater was estimated to compare to surface water costs. Costs to pump groundwater were estimated by assuming a 1,500 gallon per minute well that cost \$250,000 to install, and an electricity cost of \$0.15 per kilowatt hour. Electricity costs were estimated to be \$34 per acre-foot, while operations and maintenance costs of the well were estimated to be \$5,000 per year with 620 acre-feet of water produced each year, which results in an operations and maintenance cost of \$8 per acre-foot. To finance a \$250,000 well over 40 years with a 5% interest rate, the annual payment would be \$14,600 per year, which when spread over 620 acre-feet per year, results in a capital cost of \$24 per acre-foot.

Total Groundwater Costs	
Item	Cost
Annualized Capital	\$24/AF
O&M	\$8/AF
Electricity	\$34/AF
TOTAL	\$66/AF

The total cost to operate the well was estimated at \$66 per acre-foot. This number will vary widely between well sizes and well conditions, and smaller wells will generally have a higher operating cost per acre-foot, but smaller capital costs.

Surface Water Costs

The cost of surface water to be delivered was estimated as a part of the feasibility study. The final cost of surface water was contingent on a number of factors, including: the original contracted cost of water, institutional costs and fees associated with transferring the water to the new area with the Bureau of Reclamation (Bureau), physical costs to move the water to the area through wheeling, estimated costs to pay for the developed infrastructure, and anticipated maintenance and operations. This newsletter describes these costs in detail and provides the total estimated cost.

Wheeling and Charges

Wheeling costs and charges levied by the Bureau vary by the type of water. Central Valley Project (CVP) water costs significantly more than non-CVP water, as presented in the table to the

Surface Water Purchase, Fees, and Wheeling	
Item	Cost
CVP (Project) Water	
Effective Transfer Rate	\$24.92/AF
Restoration Fund	\$9.79/AF
Surcharge	\$40.80/AF
Wheeling fee	\$11.00/AF
TOTAL	\$86.56/AF
Non-CVP Water	
Cost of water estimate	\$30.00/AF
Warren Act charge	\$21.39/AF
TOTAL	\$51.39/AF



Glenn County Groundwater Reliability and Recharge Pilot Program

Canal Infrastructure Cost Estimate

The cost of the infrastructure needed to deliver surface water was based on the detailed conceptual canal layout, described in the fourth newsletter, which identifies the plan to deliver surface water to the study area. The conceptual canal layout was designed to reduce infrastructure costs by using gravity feeds and existing drainages as much as possible.

The table to the right presents the estimated infrastructure costs. The materials and construction are estimated to cost just under five million dollars. Engineering and project administration, other related overhead and a cost contingency bring the final total estimated cost to \$8,700,000.

To finance the \$8,700,000 infrastructure over 30 years with a 5% interest rate, an estimated annual payment of \$566,000 would be necessary. The conceptual canal layout has been developed to deliver a predicted 13,670 acre-feet per year. Dividing the annual cost by the predicted water deliveries results in an estimated \$42 cost per acre-foot of delivered water to pay for infrastructure. Power costs to deliver surface water were estimated to be \$6 per acre-foot, and operations and maintenance costs were estimated to be \$14 per acre-foot.

Table of Estimated Infrastructure Costs			
Cost	Quantity	Units	Estimated Cost
Ditch Earthwork	15,000	Cubic Yard	\$110,000
Lining	163,000	Square foot	\$820,000
Culverts	440	Feet	\$160,000
Low Head Pipelines	12,100	Feet	\$1,060,000
Easements	457,000	Square foot	\$140,000
Turnouts	56	each	\$290,000
Control Gates and Remote Sensors	12	each	\$405,000
South Pumps	3	each	\$810,000
North Pumps	2	each	\$540,000
In-System Pumps	2	each	\$300,000
Regulating Reservoir	1	each	\$35,000
Misc.	1	Lump sum	\$300,000
Subtotal			\$4,970,000
Engineering and Admin.	20%		\$990,000
Other Overhead	15%		\$750,000
Subtotal (rounded)			\$6,700,000
Contingency (rounded)	30%		\$2,000,000
Total (rounded)			\$8,700,000

Contact Us

Lisa Hunter
 C/O Glenn County
 Department of Agriculture
 PO Box 351
 Willows, CA 95988

Phone:
 (530) 934-6501

Email:
wateradv@countyofglenn.net

Total Estimated Costs

Total costs of surface water delivered using the conceptual canal layout are a compilation of wheeling fees, Bureau charges, infrastructure costs, and maintenance and operations costs.

- **CVP water would cost \$148.56 per acre-foot.**
- **Non-CVP water would cost \$113.39 per acre-foot.**

For comparison, the total estimated costs to pump groundwater are provided in this section. Costs to pump groundwater include capital, operations and maintenance, and electricity costs.

- **Groundwater would cost \$66.00 per acre-foot.**