

APPENDIX E

CONCEPTUAL INJECTION WELLFIELD COSTS

1. CONCEPTUAL INJECTION WELLFIELD COSTS

General unit costs associated with aquifer storage and recovery were identified in Section 5.7 and Table 5-6. These costs were used to develop the cost per injection wellfield under the ASR scenario. The conceptual injection wellfield is described in Section 6.3.2.3. One wellfield is assumed to include 49 injection wells that inject water at 2,500 gpm for 120 days. The total injection rate associated with each wellfield is 176 mgd. The 176 mgd represents the daily treatment capacity needed per wellfield of 49 wells.

The costs for the new treatment plant option include:

- Construction of a new 176 mgd treatment plant
- Construction of 45 or 96 miles of transmission lines, depending on whether additional transmission infrastructure is needed between injection wells to transport the recovered water to canal (e.g., the Roza/Moxee area).
- Installation of 49 injection/recovery wells

The estimated cost per wellfield for the four areas with the new treatment plant option is expected to range from approximately \$6,000/AF to almost \$6,500/AF (Table E-1).

TABLE E-1

Direct Injection Costs – New Treatment Plant

	Unit	Unit Cost	Quantity	Cost
Treatment plant	1 mgd	\$1,000,000	176	\$176,000,000
Transmission (rural)	Per mile	\$500,000	45 - 96	\$22,727,273 - \$48,000,000
Injection Wells	Per well	\$2,000,000	49	\$98,000,000
Subtotal Cost				\$296,727,273 - \$322,000,000
Contingency (30%)				\$89,018,182 - \$96,600,000
Total Cost				\$385,745,455 - \$418,600,000
Water Injected (AF/yr)				64,962
Unit Cost (\$/AF)				\$5,938 - \$6,444

The costs for the river bank filtration option include:

- Installation of 49 river bank filtration wells
- Construction of 51 or 114 miles of transmission lines, depending on the location of the river bank filtration wells and whether additional transmission infrastructure is needed between injection wells to transport the recovered water to canal (e.g., the Roza/Moxee area).
- Installation of 49 injection/recovery wells

TABLE E-2**Direct Injection Costs – River Bank Filtration**

	Unit	Unit Cost	Quantity	Cost
River Bank Filtration Well	Per well	\$500,000	49	\$24,500,000
Transmission (rural)	Per mile	\$500,000	51 - 114	\$25,500,000 - \$57,000,000
Injection Wells	Per well	\$2,000,000	49	\$98,000,000
Subtotal Cost				\$148,000,000 - \$179,500,000
Contingency (30%)				\$44,400,000 - \$53,850,000
Total Cost				\$192,400,000 - \$233,350,000
Water Injected (AF/yr)				64,962
Unit Cost (\$/AF)				\$2,962 - \$3,592

The estimated cost per wellfield for the four areas with the new treatment plant option is expected to range from approximately \$3,000/AF to almost \$3,600/AF (Table E-2).

The preliminary cost estimates:

- Do not include the use of the Naches Treatment Plant in the Tieton area.
- Assume that there would be no cost associated with the conveyance of recovered water because it would go directly into an existing canal and the injection wells would also be used as recovery wells.
- Assume 6 miles of transmission infrastructure between RBF wells.
- Do not include the costs for pumping associated with conveying RBF water to the ASR wellfields.
- Do not include the costs of pumping the water to individual wells in the injection wellfield, if needed.
- Do not include the cost of upgrading the existing canal system.

The costs are very preliminary and subject to uncertainty because of the need to determine a preferred treatment approach. The costs are estimated to range from \$3,000 to \$6,500 dollars per acre-foot of water depending on the treatment option chosen. The lower \$/AF costs are associated with RBF as the preferred treatment method.