

**Section 5A**  
**Identification, Evaluation, and Selection of**  
**Water Management Strategies**

**5A.1.4 Cost Estimates**

The cost estimates of this study are expressed in three major categories: (1) construction costs or capital (structural) costs, (2) other (non-structural) project costs, and (3) annual costs. Construction costs are the direct costs incurred in constructing facilities, such as those for materials, labor, and equipment. “Other” project costs include expenses not directly associated with construction activities of the project, such as costs for engineering, legal counsel, land acquisition, contingencies, environmental studies and mitigation, and interest during construction. Capital costs and other project costs comprise the total project cost. Operation and maintenance, energy costs, and debt service payments are examples of annual costs. Major components that may be part of a preliminary cost estimate are listed in Table 5A.1-2. Details regarding all cost components are presented in Volume II of this report, Section 5A.

To estimate capital costs, tables of unit costs for each major component in the capital costs were developed through an internal review of bid documents and project cost audits of projects that HDR has implemented in the past. The cost tables report all-inclusive costs to construct, including the construction, infrastructure and control equipment, and all other materials, labor, and installation costs. Unit costs were developed for pump stations, intake structures, pipelines, wells, reservoir structures, channel dams and any other structural component called for in a water supply option.

**Table 5A.1-2.**  
**Major Project Cost Categories**

<b>Capital Costs (Structural Costs)</b>	<b>Other Project Costs (Non-Structural Costs)</b>
1. Pump Stations	1. Engineering (Design, Bidding and Construction Phase Services, Geotechnical, Legal, Financing, and Contingencies)
2. Pipelines	2. Land and Easements
3. Water Treatment Plants	3. Environmental - Studies and Mitigation
4. Water Storage Tanks	4. Interest During Construction
5. Off-Channel Reservoirs	
6. Well Fields	

a. Injection b. Recovery c. ASR Wells 7. Dams and Reservoirs 8. Relocations 9. Water Distribution 10. Other Items	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center;"><b>Annual Project Costs</b></th> </tr> <tr> <td style="width: 10px; text-align: center;">1.</td> <td>Debt Service</td> </tr> <tr> <td style="text-align: center;">2.</td> <td>Operation and Maintenance (excluding pumping energy)</td> </tr> <tr> <td style="text-align: center;">3.</td> <td>Pumping Energy Costs</td> </tr> <tr> <td style="text-align: center;">4.</td> <td>Purchase Water Cost (if applicable)</td> </tr> </table>	<b>Annual Project Costs</b>		1.	Debt Service	2.	Operation and Maintenance (excluding pumping energy)	3.	Pumping Energy Costs	4.	Purchase Water Cost (if applicable)
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As previously mentioned, “other” (non-structural) project costs are costs incurred in a project that are not directly associated with construction activities. These include costs for engineering, legal counsel, financing, contingencies, land, easements, surveying and legal fees for land acquisition, environmental and archaeology studies, permitting, mitigation, and interest during construction. These costs are added to the capital costs to obtain the total project cost. A standard percentage applied to the capital costs is used to calculate a combined cost that includes engineering, financial, legal services, and contingencies. Details are presented in Volume II.

Annual costs are those that the project owner can expect to incur if the project is implemented. These costs include repayment of borrowed funds (debt service), operation and maintenance costs of the project facilities, pumping power costs, and water purchase costs, when applicable.

Debt service is the estimated annual payment that can be expected for repayment of borrowed funds based on the total project cost, an assumed finance rate, and the finance period in years. As specified in TWDB Exhibit B, Section 1.71, debt service for all projects was calculated assuming an annual interest rate of 6 percent and a repayment period of 40 years for reservoir projects and 30 years for all other projects. The debt service factor of 0.06646 or 0.07265 for 40- or 30-year repayment periods is applied, respectively, to the total estimated project costs.

Operation and maintenance costs for dams, pump stations, pipelines, and well fields (excluding pumping power costs) include labor and materials required to operate the facilities and provide for regular repair and/or replacement of equipment. In accordance with TWDB guidelines, operation and maintenance costs are calculated at 1 percent of the total estimated construction costs for pipelines, distribution, facilities, tanks and wells, at 1.5 percent of the total estimated construction costs for dams and reservoirs, and at 2.5 percent for intake and pump

stations. Water treatment plant operation and maintenance costs were based on treatment level and plant capacity. The operation and maintenance costs include labor, materials, replacement of equipment, process energy, building energy, chemicals, and pumping energy.

In accordance with TWDB guidelines, power costs are calculated on an annual basis using the appropriate calculated power load and a power rate of \$0.06 per kWh. The amount of energy consumed is based upon the pumping horsepower required.

The raw water purchase cost, if applicable, is included if the water supply option involves purchase of raw or treated water from an entity. This cost varies by source.

A cost estimate summary for each individual option is presented with total capital costs, total project costs, and total annual costs. The level of detail is dependent upon the characteristics of each option. Additionally, the cost per unit of water involved in the option is reported as costs per acft and cost per 1,000 gallons of water developed. The individual option cost tables specify the point within the region at which the cost applies (e.g., raw water at the lake, treated water at the municipal and industrial demand center, or elsewhere as appropriate).