EXECUTIVE SUMMARY

RIVERTON EAST IRRIGATION PROJECT

LEVEL II FEASIBILITY STUDY

Wyoming Water Development Commission

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NOVEMBER 2001
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LEVEL II FEASIBILITY STUDY

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PROJECT NO. 00-099-1
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I. Introduction

A. General

The Riverton East Irrigation Project (REIP) is located in Fremont County in west central Wyoming. The project is situated on the east side of the Wind River within the Wind River Indian Reservation and lies opposite and north of the City of Riverton. The confluence of the Little Wind River with the Wind River is adjacent to the south end of the project.

The climate in the project area is semi-arid with 7.74 inches of average annual precipitation with nearly half occurring as spring showers in April, May, and June. Typically, the area receives about 30 inches of snowfall per year. Average high temperatures of 89 degrees Fahrenheit occur in July while average lows of -1 degree Fahrenheit occur in January.

Fremont County's economy consists primarily of agriculture, government, and service industries. Gas and oil production has increased in recent years and plays an important role in both the County and Reservation's economy. Growth has been slow to moderate and is forecast to continue at about the same rate.

B. Purpose

As a result of the general adjudication of Wind/Bighorn River Water, the Shoshone and Arapaho Tribes were awarded an 1868 right for 17,544 ac-ft of water to develop 3,814 acres of irrigated land. The lands became known as the Riverton East Irrigation Project, and are referred to as one of the Futures Projects. This study will review the project and determine the feasibility of developing it.

C. Sponsor Involvement

The Tribes have been very active in the study through the involvement of the Tribal Water Engineers (TWE) office and the Water Resources Board (WRB). The TWE office has facilitated access to the project lands, made their project files and maps available for review and inspection, and actively provided input into layout and sizing of the project. Members of the WRB have attended the numerous meetings providing their support for the work and interjecting constructive ideas.

D. Authority

Nelson Engineering (NE), of Jackson, Wyoming, was retained by the Wyoming Water Development Commission to complete the Level II Feasibility Analysis for the REIP. A contract was executed June 2, 2000, and field work began shortly thereafter.
II. Needs Analysis and Demands

A. Market Research

In order to determine if a need exists for additional agricultural acreage in the Riverton area, NE contacted and interviewed several individuals in the year 2000 who are involved in agri-business. Entities contacted included:

- Coors Intermountain, Worland, Wyoming
- Holly Sugar Corporation, Worland, Wyoming
- Hidden Valley Alfalfa Cubes, Riverton, Wyoming
- Busch Agricultural Resources, Inc., Powell, Wyoming
- Fremont County Hay Producers, Riverton, Wyoming
- First Interstate Bank, Riverton, Wyoming
- Agricultural Extension Service, Riverton, Wyoming
- Wyoming Business Council, Riverton, Wyoming
- Agricultural Department, University of Wyoming, Laramie, Wyoming
- Agricultural Department, Utah State University, Logan, Utah

Interviews and research indicated that generally there is a need for additional agricultural production in the Riverton area. Markets appear to support an additional 4,000 acres of agricultural production in the Riverton area. Primary need for crops include the following:

- Sugar Beets
- Alfalfa Hay
- Alfalfa Cubes
- Malt Barley

B. Land Requirement

This project size is based on maximizing the number of acres planted into sugar beets and malt barley each year while maintaining at least a four-year planting cycle on alfalfa. Pasture fills in the remaining acreage as necessary. A result of the general adjudication of water in the Wind/Big Horn River was an allocation of water for the REIP and delineation of specific lands that met the test for Most Practically Irrigable Acres. Not only were the lands specifically identified, but acreage amounts were set based on the lands qualifying for arability and engineering feasibility. The acreage delineated for the Riverton East Project was 3,814 acres irrigated and a total project of 4,223 acres including roads, farmsteads, and wasteland. Applying a logical cropping pattern to this project area results in the following tabulation:

<table>
<thead>
<tr>
<th>Crop</th>
<th>Percent</th>
<th>Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa</td>
<td>25</td>
<td>953</td>
</tr>
<tr>
<td>Malt Barley</td>
<td>25</td>
<td>953</td>
</tr>
<tr>
<td>Pasture</td>
<td>25</td>
<td>955</td>
</tr>
<tr>
<td>Sugar Beets</td>
<td>25</td>
<td>953</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>3,814 acres</td>
</tr>
</tbody>
</table>
C. Water Requirement

Crop Irrigation Requirements (CIR) are increased 35% for on-farm inefficiency and 15% for delivery system inefficiency to arrive at a diversion requirement. Diversion requirements for average and maximum demands are compared to river system flows during the driest 10% of the time in the following table. The lower decile flows are based on historical records.

Table ES.1 Lowest 10th Percentile Flows vs Project Diversions

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>USGS STA 6288</td>
<td>USGS STA 62361</td>
<td>USGS STA 62355</td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>4,185</td>
<td>25,265</td>
<td>12,199</td>
<td>532</td>
<td>1,281</td>
</tr>
<tr>
<td>May</td>
<td>4,594</td>
<td>32,802</td>
<td>19,179</td>
<td>1,753</td>
<td>3,114</td>
</tr>
<tr>
<td>June</td>
<td>7,159</td>
<td>72,261</td>
<td>27,762</td>
<td>2,849</td>
<td>4,158</td>
</tr>
<tr>
<td>July</td>
<td>4,587</td>
<td>47,703</td>
<td>14,756</td>
<td>2,940</td>
<td>3,723</td>
</tr>
<tr>
<td>August</td>
<td>4,440</td>
<td>21,338</td>
<td>8,510</td>
<td>2,409</td>
<td>2,987</td>
</tr>
<tr>
<td>September</td>
<td>4,568</td>
<td>22,127</td>
<td>7,783</td>
<td>1,144</td>
<td>1,791</td>
</tr>
<tr>
<td>October</td>
<td>8,725</td>
<td>27,692</td>
<td>12,712</td>
<td>23</td>
<td>119</td>
</tr>
</tbody>
</table>

Annual Diversion (Acre-Ft) 11,650 17,173
Annual Diversion (Acre-Ft/Acre) 3.05 4.50

D. Other Resource Demands

A detailed soils evaluation and land classification was completed for project lands. The land classification was completed in conformance with USBR criteria. In addition, reconnaissance level environmental, cultural, and geological evaluations have been completed. Bedrock location and depth was mapped as a constraint for irrigation. Several species of wildlife regulated by the federal government may be impacted by the project. They are bald eagles, black-footed ferrets, and mountain plover. Thorough surveys evaluating impacts to species will have to be completed if the project is implemented. Other primary concerns are related to reducing river flows and resulting impacts on the fishery, particularly sauger and burbot. Areas where a high potential for cultural sites or artifacts might exist were located so that project development could avoid them.
III. Project Alternatives

Project features were subjected to alternative analysis in effort to arrive at a decision as to the best choice for that particular component or feature. In each case, a number of criteria were developed to judge alternatives, with final selection being based on the alternative that compared most favorably against the criteria. Project features that were subjected to the analysis included:

- Proposed Irrigated Lands
- Diversion and Pump Station Sites
- Energy Source for Pumps
- Pipe Materials
- Wind River Bridge Location

Proposed irrigated lands evaluation started with tracts that were previously identified through the court proceedings as the most Practically Irrigable Lands. Extensive soils sampling was completed and classification was re-evaluated with some lands being eliminated and makeup acreages being identified.

Pump station sites were evaluated based on river channel conditions and proximity to the service area.

Three energy sources were considered for project pumping.

Three piping materials were considered for the distribution system. Not only was initial cost considered, but long-term curability and leakage potential of the pipe joints.

Three bridge locations were considered. Tentative selection was based on bridge length, length of connecting roadways, river channel geometry, and proximity to project lands.

Final project configuration and layout were completed after the preferred alternative(s) for the foregoing features were identified.

IV. Proposed Project

The proposed project plan is illustrated on Drawing No’s. ES-1 and ES-2.

The project is entirely-pumped irrigation for a total of 3,814 acres. Roads, farmsteads, and wastelands bring the project to about 4,223 acres. Pump stations are located as shown in the drawings. Each pump station contains three(3) pumps, each capable of developing 40% of the maximum demand for its particular service area plus a delivery head of 10 feet at the highest delivery point. Pumps will be equipped with variable frequency drives (VFD) so that flow rates can be varied with demand. Two booster pump stations are employed to provide water to the higher lands. On-farm pumping to develop sprinkler pressure will be necessary on most fields; those costs are not included in these project costs. Proposed pipe materials are high-density polyethylene (HDPE). HDPE pipe is available in sizes up to 60-inch diameter and the joints are thermally welded, thus reducing the potential for leakage. Existing access to project lands is limited. Future access to the project lands would be over 20 miles of gravel roads that would be constructed or improved as part of the project. A proposed bridge across the Wind River, located on the line between Sections 33 and 34, T2N, R5E, together with 2,000 feet of roadway extension, could tie directly into Hoot Owl Road, a Fremont County Road. The bridge and road extension could possibly be a cooperative effort between the project and Fremont County.
Three options for pumping energy have been considered:

- Natural gas
- Commercial electricity
- Federal Pick-Sloan electricity

Although initial costs are least for extending natural gas pipelines to the pump plants, long-term operating costs favor use of federal power provided through the Pick-Sloan Program. Energy costs in the latter case have been estimated at $0.01076/kilowatt-hour (KWH). In addition, the project may have to construct a transmission line to bring the power to the project or pay ‘wheeling’ charges to deliver the power. By comparison, commercial electricity costs $0.06292/KWH plus an annual facility charge of $13.28/Brake Horsepower (BHP). Project lands are situated in both High-Plains Power and Pacific Power & Light service areas. Estimated project costs are summarized in Table ES.2.

Assigned costs are assessed one time to Pick-Sloan Power projects as a means of repaying costs of the hydro-power generating facility. Costs are estimated at the rate of $790/kilowatt of demand. REIP incorporates an estimated 2,115 kilowatts of demand for a total charge of $1,679,850.00. Typically, assigned costs are integrated back into initial project costs as illustrated herein. Assigned costs may also be waived for a particular project depending on the specific terms and conditions of the legislation.

Table ES.2 Estimated Project Costs

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of Final Designs and Specifications (8.5%)</td>
<td>$521,377</td>
</tr>
<tr>
<td>Permitting and Environmental Mitigation</td>
<td>$15,000</td>
</tr>
<tr>
<td>Legal Fees</td>
<td>$20,000</td>
</tr>
<tr>
<td>Acquisition of Access and Rights-of-Way</td>
<td>$15,000</td>
</tr>
<tr>
<td>Cost of Project Components</td>
<td></td>
</tr>
<tr>
<td>Pipe Cost, HDPE Pipe</td>
<td>$2,717,141</td>
</tr>
<tr>
<td>Pump Station Cost</td>
<td>$741,419</td>
</tr>
<tr>
<td>Road and Bridge Costs</td>
<td>$1,991,289</td>
</tr>
<tr>
<td>Electric Distribution Lines</td>
<td>$684,000</td>
</tr>
<tr>
<td>Construction Cost Subtotal #1</td>
<td>$6,133,850</td>
</tr>
<tr>
<td>Engineering Costs = CCS #1 X 10%</td>
<td>$613,385</td>
</tr>
<tr>
<td>Construction Cost Subtotal #2</td>
<td>$6,747,235</td>
</tr>
<tr>
<td>Contingency CCS #2 X 15%</td>
<td>$1,012,085</td>
</tr>
<tr>
<td>Construction Cost Total</td>
<td>$7,759,320</td>
</tr>
<tr>
<td>Estimated Project Cost Subtotal</td>
<td>$8,330,697</td>
</tr>
<tr>
<td>Assigned Costs</td>
<td>$1,679,850</td>
</tr>
<tr>
<td>Estimated Project Cost</td>
<td>$10,001,547</td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Estimated Project Cost Total (Rounded)</td>
<td>$10,002,000</td>
</tr>
</tbody>
</table>

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V. Annual Costs

A thorough evaluation of annual costs was beyond the scope of this study, however, a preliminary evaluation of Operation, Maintenance, and Repair (OM&R) costs was made and the results are illustrated in Table ES.3 Total annual cost analysis would have to include project debt retirement also.

**Table ES.3 Estimated OM&R Costs - REIP**

<table>
<thead>
<tr>
<th>Project Items</th>
<th>Annual Operation &amp; Maintenance</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe Distribution System based on HDPE pipe</td>
<td>$13,585</td>
<td>.5% x initial cost</td>
</tr>
<tr>
<td>Pump Stations; power and maintenance</td>
<td>59,702</td>
<td></td>
</tr>
<tr>
<td>Electric Distribution Lines</td>
<td>10,260</td>
<td>1.5% x initial cost</td>
</tr>
<tr>
<td>Road and Bridge</td>
<td>9,956</td>
<td>.5% x initial cost</td>
</tr>
<tr>
<td>Wheeling Costs (10 mills/KWH)</td>
<td>51,330</td>
<td></td>
</tr>
<tr>
<td><strong>Estimated Annual Cost</strong></td>
<td><strong>$144,800 (Rounded)</strong></td>
<td><strong>$38/Acre</strong></td>
</tr>
</tbody>
</table>

Energy charges are based on project pumping of 2,427 hours per irrigation season. It should be noted that no wheeling charges have been negotiated with a transmission line company, and the costs at the rate of 10 mills/KWH are estimates only. Further analysis may indicate it is more economically feasible to construct transmission facilities as part of the initial project cost. No depreciation has been considered or included in this annual OM&R summary.

VI. Conclusions and Recommendations

Investigations and evaluations completed as a result of this study have provided a number of conclusions and recommendations that relate to further planning and implementation of REIP. The more significant ones are discussed below:

A. Conclusions

1. Based on the research that was completed in 2000, it appears there is sufficient market demand to support developing an additional 3,800 acres of agricultural land in the Riverton area.

2. There are sufficient lands of acceptable quality in the REIP area to sustain long-term irrigation.
3. Based on historical data, there is enough water, on a monthly average basis, in the Little
Wind River and Big Wind River systems to support the REIP proposal.

4. Diversion depletions for the REIP on the Wind River System poses daily and weekly
impacts that are presently unquantified.

5. The REIP could be implemented with minimal cultural impacts.

6. The REIP could be implemented with minor impacts to terrestrial wildlife and habitat.
Some enhancements would materialize as a result of implementation.

7. The most cost-effective source for energy to run the pumping plants is Pick-Sloan
Power.

8. Natural gas could be used as an energy source to run the pump plants; it is technically
feasible. However, the lost revenue from the consumed gas exceeds the apparent cost
of utilizing Pick-Sloan Power, unless wheeling costs become excessively high at about
30 mils/kw.

9. A new bridge across the Wind River is necessary to provide ready access from the
project area to markets.

B. Recommendations

1. Project proponents need to further investigate the prospects of obtaining Pick-Sloan
Power for project pumping. Discussions should be held with USBR to determine what
additional work needs to be done to qualify the project as a Pick-Sloan Project.
Concurrently, discussions need to be held with Wyoming’s Congressional delegation to
determine the prospects for special legislation that would provide Pick-Sloan Power for
the project.

   a. Energy costs, assigned costs, and wheeling costs should be negotiated and re-
evaluated in the context of the project worth.

2. Project proponents need to evaluate how producers will be selected to farm under the
project.

3. If land is to be leased or sold as add-on units, an Ability to Pay analysis needs to be
completed.

4. A more detailed hydrological analysis is required to determine daily and weekly
impacts to the Wind River System as a result of project diversions.

5. Discussions should be held with Fremont County relative to cost sharing the access and
placement of a bridge over the Wind River through the SCR program.