

UTAH DIVISION OF WATER RESOURCES

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*Executive Summary*  
*Bear River Development Report*

Consultant Job No. 233-18-01



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Prepared by:



In Association with:



## EXECUTIVE SUMMARY

### BACKGROUND AND PURPOSE

In 1991, the Utah State Legislature passed the Bear River Development Act (Act), Utah Code 73-26, which directs the Utah Division of Water Resources (DWRe) to develop the surface waters of the Bear River and its tributaries. The Act indicates that DWRe will develop up to 220,000 acre-feet of water. The Act also indicates that the developed water will be distributed by the following four Water Districts (Districts) in the amounts shown:

- Bear River Water Conservancy District (BRWCD): 60,000 acre-feet
- Cache Water District (CWD): 60,000 acre-feet
- Jordan Valley Water Conservancy District (JVWCD): 50,000 acre-feet
- Weber Basin Water Conservancy District (WBWCD): 50,000 acre-feet

DWRe has continued planning and studying aspects associated with future development of the Bear River as authorized in the Act. This current feasibility report provides a conceptual plan for an overall Bear River Development (BRD) system. The overall study area is shown on Figure ES-1. The study area extends over roughly seventy-five miles through Cache, Box Elder, and Weber counties.

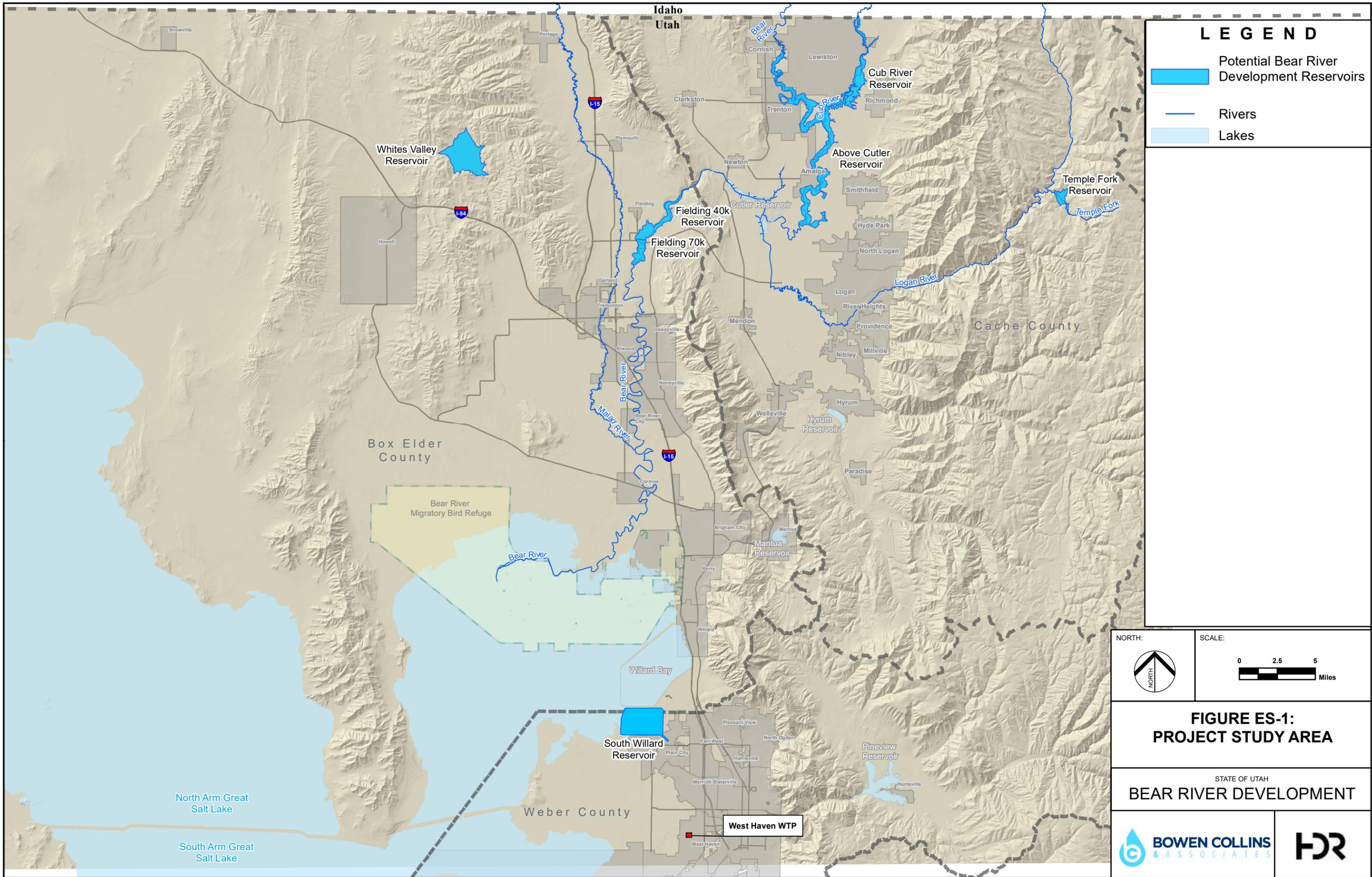
As development within Weber and Box Elder counties has increased, DWRe recognizes the need to acquire land and rights-of-way, as authorized in the Act, to reduce future impacts to the surrounding communities. The feasibility study provides updated information about potential reservoir sites and pipeline alignments, as well as updated cost estimates.

### PREVIOUS STUDIES

Planning and studies for the development or storage of the Bear River have been ongoing for several decades. Some of the results from these earlier studies may be out-of-date while other studies were preliminary in nature or written to reflect earlier assumptions for operation or construction. The main components of the BRD planning have remained consistent: diversion of the Bear River, use of reservoir(s) to make the supply reliable, and diversion upstream of areas where water quality degradation occurs (Malad River).

### WATER DEMAND

The Districts and DWRe are continually updating water demand projections. Water from the BRD is currently projected to be needed by 2045-2050. The projections of the potential “build-out” demand for the four Districts indicate the eventual need for more than 400,000 acre-feet of water beyond existing supplies. This increased demand will have to be met through a combination of agricultural water conversion to municipal and industrial (M&I) use, reductions in per capita water use through water conservation efforts and efficiency projects, and development of new supplies like the BRD.



It is challenging to project future water demands and the needed supplies due to the difficulty in projecting many factors including population growth, water conservation efforts, agricultural to M&I use conversion, and climate change impacts. These factors will all affect the timing and volume of water needed by the Districts to serve future populations within their service areas.

The Division of Water Resources has hired a consultant to develop regional water conservation goals. The current projected need for a Bear River Development project of 2045-2050 does not take into account these new conservation goals. Once the conservation goals have been developed, projections may need to be adjusted reflect the impact of these goals.

## **RESERVOIR SITE INVESTIGATIONS**

As part of this study effort, six potential reservoir sites identified in previous studies were evaluated in more depth. Preliminary subsurface (geology/geotechnical) investigations were performed at each of the sites. Additional analysis of each of the sites also included general site conditions and information, hydrology, and conceptual layouts and sizing of reservoirs, outlet works, spillways, and other facilities.

## **RESERVOIR STORAGE AND COMBINATIONS OF RESERVOIRS**

As part of this study, the hydrologic data for the Bear River was updated for inclusion in operational models. The modeling for this study included a 30-year period of record from 1981 to 2010. This data includes two of the worst droughts of the last 60 years. The modeling data was needed to update potential facility sizing requirements, water supply reliability, and cost estimates. The modeling included instream flow assumptions, revised reservoir capacity assumptions, and climate change-influenced hydrologic datasets. The climate change datasets were developed to estimate future water supply conditions. Thirteen different combinations of potential reservoir sites were evaluated to determine the most effective and the least-costly potential reservoir combinations.

## **COST ESTIMATES**

Cost estimates were produced for the 13 reservoir combinations. The cost estimates range from approximately \$1.5 billion to \$2.8 billion. The Act currently requires that the State will fund the planning, studies, design and construction and environmental mitigation costs of the BRD System. The Act also requires that the funding will be repaid by the Districts “within a period not to exceed 50 years” at an interest rate set by the Utah Board of Water Resources. For the purposes of this study, an interest rate of 4.0% was assumed. Additional costs will be incurred by the Districts to deliver and treat water from the BRD.

The cost estimates include reservoirs, pipelines, and other facilities to deliver raw water from storage or diversions to delivery points for the four Districts. Treatment, operation, and maintenance costs are not included. Those costs are not part of the overall funding provided by the State and will be paid for by the Districts.

In order to show the potential costs for each District, the breakdown of costs for Scenario J, which provides the entire needed water supply at the lowest cost, are included in Table ES-1. The overall

cost estimate for Scenario J is about \$1.7 billion. The table includes the potential capital cost, cost per acre-foot, and annual repayments for each District. Scenario J is shown on Figure ES-2.

**Table ES-1  
Potential Costs by District  
Scenario J**

District	BRD Allocation (acre-foot)	Capital Cost	Capital Cost per acre-foot	Annual Repayment	Annual Cost per acre-foot
Bear River Water Conservancy District	60,000	\$ 470,400,000	\$ 7,840	(\$21,897,214)	\$ 365
Cache Water District	60,000	\$ 470,400,000	\$ 7,840	(\$21,897,214)	\$ 365
Jordan Valley Water Conservancy District	50,000	\$ 392,000,000	\$ 7,840	(\$18,247,679)	\$ 365
Weber Basin Water Conservancy District	50,000	\$ 392,000,000	\$ 7,840	(\$18,247,679)	\$ 365
<b>Total</b>	<b>220,000</b>	<b>\$ 1,724,800,000</b>	<b>\$ 7,840</b>	<b>(\$80,289,786)</b>	<b>\$ 365</b>

**Notes:**

1. Repayments based on 50-year repayment (see Act) at an assumed interest rate of 4.0%.
2. Annual costs do not include costs for treatment or normal operation and maintenance (O&M) costs.

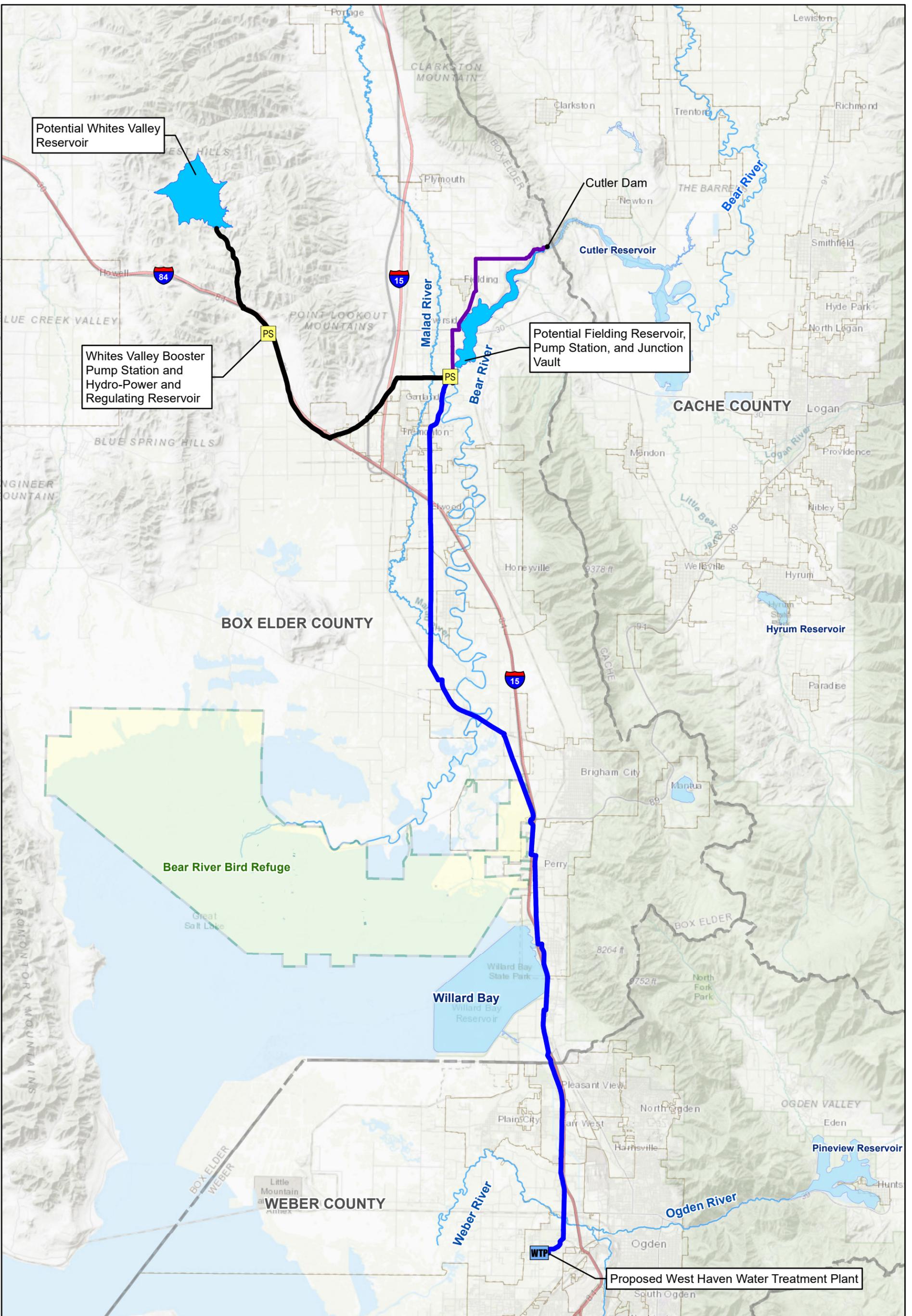
## ENVIRONMENTAL REVIEW

Existing environmental data was collected to identify the major environmental constraints in the study area for potential pipeline routings and reservoir sites. This was supplemented by a preliminary field reconnaissance of the study area. Data included identification of habitat for wildlife and threatened and endangered species, water resources (including wetlands and floodplains), cultural and historic resources, and socioeconomic considerations.

## POTENTIAL EFFECTS OF THE BEAR RIVER DEVELOPMENT ON LAKE LEVELS OF GREAT SALT LAKE

The BRD System is expected to deliver 220,000 acre-feet annually. Not all the diverted water is expected to be depleted from the watershed. Much of the BRD water is expected to return to the watershed in the form of “return flows”. A preliminary analysis was completed to estimate the amount of BRD water that could potentially return to the watershed, and not be depleted from the watershed.

Path: P:\State of Utah\Division of Water Resources\Bear River Project\Phase 2-2014\GIS\Projects\Report Figures\Fig ES-2 Overall Bear River Project Facilities.mxd  
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**LEGEND**

- PS Pump Station
- WTP Water Treatment Plant
- Potential Reservoirs



- Recommended Raw Water Pipeline Alignments:
- Fielding to Cutler
  - Fielding to Whites
  - Fielding to Willard

**FIGURE ES-2: OVERALL BEAR RIVER DEVELOPMENT SYSTEM, SCENARIO J**  
**BEAR RIVER DEVELOPMENT**

State of Utah  
 Division of Water Resources



While the Bear River Development Act indicates that the BRD water can be used for both M&I and agricultural uses, it is expected that most of the BRD water will be used for M&I use. Thus, the analysis assumed that the water will be used for M&I purposes.

Recent estimates of return flow percentages for municipal systems in northern Utah were used to estimate the potential return flow percentages of BRD water for each District. Using the estimated return flow percentages for each District, it is estimated that, at full development of 220,000 acre-feet, approximately 85,600 acre-feet will be depleted from the watershed. Current modeling efforts indicate that the depletion of about 85,600 acre-feet from the GSL Watershed will reduce the lake level by an average of 8.5 inches and by as much as 14 inches in some years, depending on the level of the lake.

A White Paper titled “Impacts of Water Development on Great Salt Lake and the Wasatch Front” (February 2016) was produced through a collaborative effort between Utah State University, Salt Lake Community College, and the Utah Divisions of Water Resources and Wildlife Resources. The results of the potential depletion and resulting impact to the level of the lake from the BRD are included in the White Paper.

## **RIGHT-OF-WAY ACQUISITION**

One of the primary charges of the Bear River Development Act (Act) is to identify the feasibility of potential corridors for a transmission pipeline for the BRD System. In addition, the Act specifically authorizes DWRe to acquire “land and rights-of-way” for a pipeline corridor. Rapid growth continues in both Weber and Box Elder counties and undeveloped land is quickly increasing in value. Early acquisition of rights-of-way is expected to reduce future impacts to the surrounding communities and reduce costs. A review of potential reservoir sites indicates that there is limited space available that can provide the storage capacity needed.

## **IMPLEMENTATION**

### **Bear River Development Schedule**

The overall development of the Bear River includes facilities as described to develop a water supply of 220,000 acre-feet. Current water demand studies indicate water will be needed by 2045-50. This could change as the Districts and DWRe update use and demand forecasts. Due to the enormity of completing the BRD System, including real estate acquisition, environmental studies, and design and construction, it is essential to continue the planning process to assure completion of the development when it is needed.

Because of the cost and potential impacts of the BRD, the Districts will utilize existing water supplies and increased conservation to stretch the need for the BRD as far into the future as possible. In the meantime, DWRe needs to continue planning for the BRD in two important areas: environmental compliance and right-of-way acquisition.

**Environmental Compliance Plan.** Bear River Development (BRD), including necessary storage reservoirs, pump stations, and pipelines, will require environmental and other permitting and agency coordination. Both state and federal level permits and approvals are anticipated for the BRD. Along with federal permits and clearances, state environmental permitting requirements are

administered under state rules that have generally been developed to comply with federal regulations. Certain regulations would apply depending on the selected reservoir site(s). Federal permitting actions could include compliance with the Clean Water Act and the National Forest Management Act (NFMA).

Compliance with the National Environmental Policy Act (NEPA; 42 U.S.C. §4321 et seq) is also anticipated. The purpose of NEPA is to ensure that environmental factors are weighted equally when compared to other factors in the decision-making process undertaken by federal agencies. Because of the potential for large direct wetland impacts from some of the BRD reservoir sites, and pipeline alignments, and based on the potential for significant cost savings through advanced mitigation activities, early environmental baseline studies and mitigation banking activities are recommended.

**Right-of-Way Acquisition.** As discussed above and as authorized in the BRD Act, DWRe has begun initial acquisition of real property for corridor preservation through critical areas. While the need for water through BRD is not currently anticipated for a few decades, early acquisition of rights-of-way can preserve corridor options and reduce future impacts to surrounding communities. DWRe has identified a list of priority parcels to acquire and has begun the process of obtaining critical parcels for corridor preservation.

### **Additional Studies for Next Steps**

It is important to continue studying issues that either could affect, or be impacted by, the development of the Bear River as outlined in the Bear River Development Act. Recommendations for some possible next steps for additional studies include the following:

- Additional Climate Change Modeling
- Modeling of Great Salt Lake
- Additional Pipeline Corridor Options

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