# Jordanelle Dam

# **Application for**

# Low Impact Hydropower Recertification

For the

# LIHI Certificate #29 – Jordanelle Project, Utah



June 2023

## Jordanelle Dam

# 2023 Application for Low Impact Hydro Recertification

# For the Jordanelle Dam Project

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## **1. Facility Information**

### a. Introduction

The Jordanelle Project is located on the Provo River in Wasatch County, north of Heber City, Utah. The Project is not licensed by the Federal Energy Regulatory Commission (FERC) but is authorized through a lease of power privilege from the Department of the Interior (DOI), Bureau of Reclamation's (USBR) Central Utah Project (CUP).

A lease of power privilege grants a non-federal entity the right to utilize, consistent with the CUP purpose, waterpower head and storage at and/or operationally in conjunction with the CUP, for non-federal electric power generation and sale by the entity. The general authority for lease of power privilege under USBR legal statutes includes among others, the Town Sites and Power Development Act of 1906 and the Reclamation Project Act of 1939. Jordanelle Dam was not primarily built for energy production. The dam is used for the delivery of water downstream for municipal, industrial, irrigation, and water quality purposes in Salt Lake City and the northern Utah County. Other uses include flood control, recreation, fish and wildlife enhancement, and power generation.

Jordanelle Dam is a rolled earthfill structure with a fuse plug emergency spillway and outlet works. The rolled earth embankment section has a structural height of 300 feet and a crest length of 3,820 feet. The emergency fuse plug spillway is located near the left abutment and consists of an unlined inlet channel, a concrete lined trapezoidal channel, an earthen plug section, a concrete chute, and a 9.5-foot by 10-foot concrete double box conduit.

The powerhouse is a reinforced concrete structure located partially within the rock berm at the toe of the dam, west of the existing outlet works. The penstock is constructed from the 72-inch-diameter connection in the outlet conduit and then routed to the powerhouse where it bifurcates into two 66-inch-diameter pipes feeding the turbines (see figure 4). The floor of the powerhouse is set at an elevation below the tailwater elevation. This elevation requires maintenance to be performed on the turbines with tail bay gates installed. Maintenance can be accomplished without the need to de-water the tailrace. The turbines, generators, and all mechanical equipment are located at this level.

The turbines discharge into a tailrace channel below the turbine floor. The tailrace is used to divert water into three locations. The Timpanogas Canal, future JSSD Water Treatment Plant, and Provo river. The radial gates divert water into the Provo River. These are owned by the USBR but are maintained and operated by CUWCD.

The major equipment located on the turbine floor includes two horizontal Francis turbine/generator units with a total installed capacity of 13 MW; turbine controllers; turbine inlet valves located on the penstock to each turbine; a hydraulic power unit for each unit and valve; and sump pumps. The powerhouse arrangement includes a control room area. A control

room is required to house the control panels, switchgear, motor control center, panel boards, batteries, and battery chargers. The control room is isolated from the turbine floor and sound-proofed to provide a quiet space for the operator. It is located above the turbine floor to protect the equipment from potential flooding and is located near the plant substation to minimize conduit and cable runs.

The hydro project operates in a run-of-release mode and is sited at a reservoir controlled by the USBR which is operated for irrigation, water supply, flood control, and other purposes. The hydro project itself is not responsible for reservoir management and does not have any effect on the operation of the Jordanelle Dam and reservoir.

### b. Overview Maps and Images

### i. Project Location

The Jordanelle Dam is located at River Mile 49 on the Provo River in Wasatch County, approximately four miles north of Heber City, Utah and 45 minutes east of Salt Lake City.



Figure 1. Project Location.



Figure 2. Bodies of water upstream and downstream from project.

#### ii. Dam Overview:

See Figure 3 below for the Dam works and powerhouse.



Figure 3. Dam and Powerhouse overview.

Lower Level Outlet Works Tunnel 826' Long x 114" Diameter Concrete Lined Tunnel ————

Selective Level Outlet Works Tunnel 460' Long x 84" Diameter \_\_\_\_\_ Concrete Lined Tunnel

Outlet Works Tunnel Downstream of Gate Chamber 892' Long x 114" Diameter

72" Diameter Carbon Steel Tie In increases to 84" then runs 107' to the Hydro Plant

Bifurcates to 2x 66" Diameter pipes that feed into 2x Turbines

Bifurcates to 2x 60' Long x 78" Diameter Carbon Steel Pipe

2x 78" Diameter Butterfly Valves with 2x 78" Fixed Cone Valves

Figure 4. Penstock and Water Conveyance Structure.



Figure 5. Area of land and water Acres within project boundary.

#### iii. Powerhouse

The powerhouse is approximately 5,870 square feet. The outlet of Unit 1 is on the left when looking downstream. The outlet of Unit 2 is on the right when looking downstream.



Figure 6. Powerhouse

#### iv: Tailrace

This view shows the downstream side of the powerhouse. There are Regulating Gates to the southeast and Radial Gates to the southwest.



Figure 7. Tailrace

#### v: Radial Gates

This view shows the Radial Gates downstream to the southwest of the powerhouse. These are used to hold the tail bay at a constant elevation for the hydro plant and for the nearby regulating gates. One radial gate is automated to hold the tail bay at a selected elevation as needed by the hydro plant. This elevation is typically set at 4.10 feet. The other two radial gates are manually adjusted to pass higher flows downstream.



Figure 8. Radial Gates

#### vi: Regulating Gates

This view shows the Regulating Gates downstream to the southeast of the powerhouse. Two of the Regulating Gates divert water into the Timpanogas Canal. The third gate will be used for diversions into the future Jordanelle Special Service District (JSSD) Water Treatment Plant.



#### Figure 9. Regulating Gates.

#### v: Intake

Jordanelle Dam has two intake structures. One is the Low Level Outlet Works shown below in Figure 7. The second is the Selective Level Outlet Works found blow in Figure 8. The intake is designed to pull water from the bottom of the reservoir during high flows and during the winter. The Selective Level Outlet is used to pull water from June through October for water quality.



Figure 10. Low Level Outlet Works.



Figure 11. Selective-Level Outlet Works.



Figure 12. Selective-Level Outlet Works additional view.

vi: Cut and cover area above steel penstock



Figure 13. Area above Penstock



c. Description of Zone of Effect (ZoE)

Figure 14. Zones of Effect.

#### i. Zone 1 - Impoundment

Zone 1 is the Impoundment ZoE. The dam and Jordanelle Reservoir are described in the "dam or diversion" and "impoundment and watershed" portions of Table 1a.

#### ii. Zone 2 – Tailrace and Downstream Reach

Zone 2 is the Tailrace and Downstream Reach ZoE. Information on the tailrace and downstream reach can be found in Table 1a.

|   | Zone:                              | 1: Impoundment   | 2. Tailrace and<br>Downstream Reach |
|---|------------------------------------|--|-------------------------------------|
| River Mile (RM) at upper and<br>lower extent of Zone: |                                    | RM 53.25 – RM 49   | RM 49 – RM 37                       |
| Crit  | terion                             | Standard Selected<br>(type in one numbered standard and PLUS ij<br>applicable) |                                     |
| Α   | Ecological Flows                   | 1  | 2                                   |
| В   | Water Quality                      | 3  | 3                                   |
| С   | Upstream Fish Passage              | 1  | 1                                   |
| D   | Downstream Fish Passage            | 4  | 4                                   |
| Е   | Shoreline and Watershed Protection | 1  | 1                                   |
| F   | Threatened and Endangered Species  | 2  | 3                                   |
| G   | Cultural and Historic Resources    | 1  | 1                                   |
| Н   | Recreational Resources             | 1  | 1                                   |

#### **Standards Selection Matrix**

## **Facility Information Table**

| Item           | Information Requested                                 | Response (include references to       |  |
|----------------|---|---------------------------------------|--|
|                |   | further details)                      |  |
| Name of the    | Facility name (use FERC project name or               | Jordanelle Dam HydroPower Project     |  |
| Facility       | other legal name)                                     |                                       |  |
| Reason for     | 1. To participate in state RPS program                | (select and describe only applicable  |  |
| applying for   | 2. To participate in voluntary REC market             | reasons)                              |  |
| LIHI           | (e.g., Green-e)                                       | 1. 🗆                                  |  |
| Certification  | 3. To satisfy a direct energy buyer's                 | State Program:                        |  |
|                | purchasing requirement                                | Click or tap here to enter text.      |  |
|                | 4. To satisfy the facility's own corporate            | 2. 🖂                                  |  |
|                | sustainability goals                                  | 3. 🗆                                  |  |
|                | 5. For the facility's corporate marketing             | 4. 🗆                                  |  |
|                | purposes  | 5. 🗆                                  |  |
|                | 6. Other (describe)                                   | 6. 🗆                                  |  |
|                |   | describe: Click or tap here to enter  |  |
|                |   | text.                                 |  |
|                |   |                                       |  |
|                | If applicable, amount of annual generation            | Amount of MWh participating:          |  |
|                | (MWh and % of total generation) for which             | Average Annual Generation of 43,000   |  |
|                | RECs are currently received or are expected           | MWh per year                          |  |
|                | to be received upon LIHI Certification                | % of total MWh generated: <u>100%</u> |  |
| Location       | River name (USGS proper name)                         | Provo River                           |  |
|                | Watershed name - Select region, click on the          | HUC Number and Name: 16020203 -       |  |
|                | area of interest until the 8-digit HUC number         | Provo                                 |  |
|                | appears. Then identify watershed name and             |                                       |  |
|                | HUC-8 number from the map at:                         |                                       |  |
|                | https://water.usgs.gov/wsc/map_index.html             |                                       |  |
|                | Nearest town(s), <u>county(ies)</u> , and state(s) to | Heber City, Wasatch County, and       |  |
|                | dam   | Utah                                  |  |
|                | River mile of dam above mouth                         | River Mile 49                         |  |
|                | Geographic latitude and longitude of dam              | Lat: 40.596601°                       |  |
|                |   | Long: -111.423586°                    |  |
| Facility Owner | Application contact names                             | Rex Mathis, Will Garner, Eli Johnson; |  |
|                |   | and Devin Mckrola                     |  |
|                | Facility owner company and authorized                 | Central Utah Water Conservancy        |  |
|                | owner representative name.                            | District; Authorized Representative   |  |
|                | For recertifications: If ownership has                | Devin Mckrola                         |  |
|                | changed since last certification, provide the         |                                       |  |
|                | effective date of the change.                         |                                       |  |

| ltem   | Information Requested                         | Response (include references to       |
|--|---|---------------------------------------|
|  | FERC licensee company name (if different      | Not licensed by the EEPC              |
|  | from owner)                                   | Not licensed by the PERC              |
| Regulatory                                     | FERC Project Number (e.g., P-xxxxx),          | N/A                                   |
| Status   | issuance and expiration dates, or date of     |                                       |
|  | exemption                                     |                                       |
|  | FERC license type (major, minor, exemption)   | N/A                                   |
|  | or special classification (e.g., "qualified   |                                       |
| conduit", "non-jurisdictional")                |   |                                       |
| Water Quality Certificate identifier, issuance |   | N/A                                   |
|  | date, and issuing agency name. Include        |                                       |
|  | information on amendments.                    |                                       |
|  | Hyperlinks to key electronic records on FERC  | N/A                                   |
|  | e-Library website or other publicly           |                                       |
|  | accessible data repositories                  |                                       |
| Powerhouse                                     | Date of initial operation (past or future for | July, 2008                            |
|  | pre-operational applications)                 |                                       |
| Total installed capacity (MW)                  |   | 13 MW                                 |
| For recertifications: Indicate if installed    |   |                                       |
|  | capacity has changed since last certification |                                       |
|  | Average annual generation (MWh) and           | 43,000 MWh. This has increased        |
|  | period of record used                         | since the last recertification from   |
|  | For recertifications: Indicate if average     | 39,000 MHh.                           |
|  | annual generation has changed since last      |                                       |
|  | certification                                 |                                       |
|  | Mode of operation (run-of-river, peaking,     | Run-of-Release                        |
|  | pulsing, seasonal storage, diversion, etc.)   |                                       |
|  | For recertifications: Indicate if mode of     |                                       |
|  | operation has changed since last              |                                       |
|  | certification                                 |                                       |
|  | Number, type, and size of                     | Two Horizontal Francis Turbines with  |
|  | turbine/generators, including maximum and     | Ideal Electric Horizontal Synchronous |
|  | minimum hydraulic capacity and maximum        | Generators. Max Flow: 345 cfs ; Max   |
|  | and minimum output of each turbine and        | Head: is 270 ft; Max Gen: 6.5 MW;     |
|  | generator unit                                | Min flow: 125 cfs; Min Head: 200 ft;  |
|  |   | Min Gen: 1.78 MW                      |
|  | Trashrack clear spacing (inches) for each     | Selective Level Outlet Works: 3       |
|  | trashrack                                     | inches                                |
|  |   | Low Level: 6-1/2 inches               |
|  | Approach water velocity (ft/s) at each intake | 10 ft/s or less depending on gate     |
|  | if known                                      | opening                               |

| Item      | Information Requested                           | Response (include references to     |
|-----------|---|-------------------------------------|
|           |   | further details)                    |
|           | Dates and types of major equipment              | None                                |
|           | upgrades  |                                     |
|           | For recertifications: Indicate only those       |                                     |
|           | since last certification                        |                                     |
|           | Dates, purpose, and type of any recent          | None                                |
|           | operational changes                             |                                     |
|           | For recertifications: Indicate only those       |                                     |
|           | since last certification                        |                                     |
|           | Plans, authorization, and regulatory            | None                                |
|           | activities for any facility upgrades or license |                                     |
|           | or exemption amendments                         |                                     |
| Dam or    | Date of original dam or diversion               | Original Dam Complete in April of   |
| Diversion | construction and description and dates of       | 1993                                |
|           | subsequent dam or diversion structure           |                                     |
|           | modifications                                   |                                     |
|           | Dam or diversion structure length, height       | Length: 3,820 ft; Height: 300; No   |
|           | including separately the height of any          | flash boards, inflatable dams, etc. |
|           | flashboards, inflatable dams, etc. and          |                                     |
|           | describe seasonal operation of flashboards      |                                     |
|           | and the like                                    |                                     |
|           | Spillway maximum hydraulic capacity             | 5,510 cfs                           |

| Item            | Information Requested                          | Response (include references to        |  |
|-----------------|--|--|--|
|                 |  | further details)                       |  |
|                 | Length and type of each penstock and water     | See Figure 4: Upstream of the Gate     |  |
|                 | conveyance structure between the               | Chamber, there are two separate        |  |
|                 | impoundment and powerhouse                     | concrete lined tunnels: Low Level      |  |
|                 |  | Outlet Works which consists of a 826'  |  |
|                 |  | Long by 114" Diameter Tunnel and       |  |
|                 |  | the Selective Level Outlet Works       |  |
|                 |  | which consists of a 460' Long x 84"    |  |
|                 |  | Diameter Tunnel. From the Gate         |  |
|                 |  | Chamber Downstream, there is a         |  |
|                 |  | 892' Long x 114" Diameter concrete     |  |
|                 |  | lined tunnel which continues into a    |  |
|                 |  | 114" diameter tunnel with a 72" tie    |  |
|                 |  | in made of carbon steel. The 72" tie   |  |
|                 |  | in increases to a 107' Long x 84"      |  |
|                 |  | diameter carbon steel penstock. This   |  |
|                 |  | penstock then bifurcates from an 84"   |  |
|                 |  | diameter into 2x 66" diameter pipes    |  |
|                 |  | made of carbon steel. Each 66"         |  |
|                 |  | diameter pipe feeds a 300 cfs          |  |
|                 |  | turbine. The initial 114" Diameter     |  |
|                 |  | tunnel bifurcates from a 114"          |  |
|                 |  | Diameter inlet to 2x 78" Diameter      |  |
|                 |  | outlets made of carbon steel, both     |  |
|                 |  | going to butterfly valves, followed by |  |
|                 |  | regulating fixed cone valves.          |  |
|                 | Designated facility purposes (e.g., power,     | Jordanelle Dam is not primarily built  |  |
|                 | navigation, flood control, water supply, etc.) | for energy production. The dam is      |  |
|                 |  | used for the delivery of water         |  |
|                 |  | downstream for municipal, industrial,  |  |
|                 |  | irrigation, and water quality purposes |  |
|                 |  | in Salt Lake City and northern Utah    |  |
|                 |  | County. Other uses include flood       |  |
|                 |  | control, recreation, fish and wildlife |  |
|                 |  | enhancement, and power                 |  |
|                 |  | generation.                            |  |
| Conduit         | Date of conduit construction and primary       | N/A                                    |  |
| Facilities Only | purpose of conduit                             |  |  |
| -               | Source water                                   | N/A                                    |  |
|                 | Receiving water and location of discharge      | N/A                                    |  |
|                 |  |  |  |

| Item          | Information Requested                          | Response (include references to         |
|---------------|--|---|
|               |  | further details)                        |
| Impoundment   | Authorized maximum and minimum                 | 5,902 minimum elevation to 6,166        |
| and Watershed | impoundment water surface elevations           | feet at full capacity before moving     |
|               | For recertifications: Indicate if these values | into flood control elevations. Spill    |
|               | have changed since last certification          | elevation is 6,182 feet. 6,086 to 6,166 |
|               |  | feet is the elevation range in which    |
|               |  | power can be generator through the      |
|               |  | hydro plant. No changes since           |
|               |  | original certification                  |
|               | Normal operating elevations and normal         | The elevation ranges from 6,166 feet    |
|               | fluctuation range                              | down to 6,096 feet. The normal          |
|               | For recertifications: Indicate if these values | fluctuation range is 70 feet. No        |
|               | have changed since last certification          | change since last certification.        |
|               | Gross storage volume and surface area at       | Approximately 314,000 Acre Feet of      |
|               | full pool                                      | gross storage volume. The surface       |
|               | For recertifications: Indicate if these values | area is 3,024 Acres. No change since    |
|               | have changed since last certification          | last certification.                     |
|               | Usable storage volume and surface area         | N/A. to the hydro project. Run-of-      |
|               | For recertifications: Indicate if these values | release.                                |
|               | have changed since last certification          |   |
|               | Describe requirements related to               | The dam has a minimum stream flow       |
|               | impoundment inflow and outflow, elevation      | of 125 cfs which requires the dam to    |
|               | restrictions (e.g., fluctuation limits,        | release 150 cfs to be released from     |
|               | seasonality) up/down ramping and refill rate   | November 15th through April 15th        |
|               | restrictions.                                  | annually. This is due to multiple       |
|               |  | turnouts between the dam and            |
|               |  | where the flows are measured. Flows     |
|               |  | above this are dictated by water        |
|               |  | rights and flood control. The           |
|               |  | minimum stream flow is controlled       |
|               |  | through the hydro plant.                |
|               | Upstream dams by name, ownership               | There are 3 small dams 36 river miles   |
|               | (including if owned by an affiliate of the     | upstream to Jordanelle Dam              |
|               | applicant's company) and river mile. If FERC   | frequently referred to as the Upper     |
|               | licensed or exempt, please provide FERC        | Lakes (see figure 2). Trial Lake Dam,   |
|               | Project number of these dams. Indicate         | Lost Lake Dam, and Washington Lake      |
|               | which upstream dams have downstream fish       | Dam. These are located at the head      |
|               | passage.                                       | waters of the Provo River and flow      |
|               |  | downstream to the Jordanelle            |
|               |  | Reservoir. They are primarily used for  |
|               |  | irrigation purposes. The dams are       |
|               |  | owned by the USBR and are operated      |
|               |  | and maintained by the CUWCD.            |

| Item       | Information Requested                          | Response (include references to      |  |
|------------|--|--------------------------------------|--|
|            |  | further details)                     |  |
|            | Downstream dams by name, ownership             | Deer Creek Dam, 18 river miles       |  |
|            | (including if owned by an affiliate of the     | downstream, is owned by the Bureau   |  |
|            | applicant's company), river mile and FERC      | of Reclamation and is operated and   |  |
|            | number if FERC licensed or exempt. Indicate    | maintained by the Provo River Water  |  |
|            | which downstream dams have upstream fish       | Users. There are two small diversion |  |
|            | passage  | dams between Deer Creek Reservoir    |  |
|            |  | and Utah Lake. These are the         |  |
|            |  | Olmsted Diversion and Murdock        |  |
|            |  | Diversion. Central Utah Water        |  |
|            |  | Conservancy District controls the    |  |
|            |  | Olmsted Diversion and Provo River    |  |
|            |  | Water Users controls the Murdock     |  |
|            |  | Diversion.                           |  |
|            | Operating agreements with upstream or          | Jordanelle and Deer Creek operating  |  |
|            | downstream facilities that affect water        | agreement between the two            |  |
|            | availability and facility operation            | facilities.                          |  |
|            | Area of land (acres) and area of water         | 4.66 acres. The land is owned by the |  |
|            | (acres) inside FERC project boundary or        | USBR and is maintained and operated  |  |
|            | under facility control. Indicate locations and | by the CUWCD. The hydro plant is     |  |
|            | acres of flowage rights versus fee-owned       | owned and operated by the CUWCD      |  |
|            | property.                                      | through a lease of power privilege   |  |
|            |  | through the Department of Interior.  |  |
|            |  | See figure 4.                        |  |
| Hydrologic | Average annual flow at the dam, and period     | 245.6 cfs based on upstream USGS     |  |
| Setting    | of record used                                 | gage data from 2012-2022             |  |
|            | Average monthly flows and period of record     | Jan 79                               |  |
|            | used   | Feb 88                               |  |
|            |  | March 147                            |  |
|            |  | April 348                            |  |
|            |  | May 1,110                            |  |
|            |  | June 769                             |  |
|            |  | July 94                              |  |
|            |  | August 57                            |  |
|            |  | September 68                         |  |
|            |  | October 97                           |  |
|            |  | November 99                          |  |
|            |  | December 85                          |  |
|            |  | 2012-2022 at upstream USGS gage      |  |

| Item            | Information Requested                           | Response (include references to      |
|-----------------|---|--------------------------------------|
|                 |   | further details)                     |
|                 | Location and name of closest stream gaging      | Upstream: USGS #10155000 PROVO       |
|                 | stations above and below the facility           | RIVER NEAR HAILSTONE, UT.            |
|                 |   | Downstream: USGS #10155200           |
|                 |   | PROVO RIVER AT RIVER ROAD            |
|                 |   | BRIDGE NR HEBER CITY, UT             |
|                 | Watershed area at the dam (in square            | 270 square miles at downstream       |
|                 | miles). Identify if this value is prorated from | USGS gage                            |
|                 | gage locations and provide the basis for        |                                      |
|                 | proration calculation.                          |                                      |
|                 | Other facility specific hydrologic information  | N/A                                  |
|                 | (e.g., average hydrograph)                      |                                      |
| Designated      | Numbers and names of each zone of effect        | Zone 1: Impoundment                  |
| Zones of Effect | (e.g., "Zone 1: Impoundment")                   | Zone 2: Tailrace/downstream reach    |
|                 | River mile of upstream and downstream           | Zone 1: The project is located at RM |
|                 | limits of each zone of effect                   | 49. The impoundment goes upstream    |
|                 | (e.g., "Zone 1 Impoundment: RM 6.3 - 5.1")      | 4 RM.                                |
|                 |   | Zone 2: The project is located at RM |
|                 |   | 49 and goes downstream to the        |
|                 |   | mouth of Deer Creek Reservoir which  |
|                 |   | is 12 RM downstream.                 |
| Pre-Operational | Facilities Only                                 |                                      |
| Expected        | Date generation is expected to begin            | N/A                                  |
| operational     |   |                                      |
| date            |   |                                      |
| Dam, diversion  | Description of modifications made to a pre-     | N/A                                  |
| structure or    | existing conduit, dam or diversion structure    |                                      |
| conduit         | needed to accommodate facility generation.      |                                      |
| modification    | This includes installation of flashboards or    |                                      |
|                 | raising the flashboard height.                  |                                      |
|                 | Date the modification is expected to be         |                                      |
|                 | completed                                       |                                      |
| Change in       | Description of any change in impoundment        | N/A                                  |
| water flow      | levels, water flows or operations required      |                                      |
| regime          | for new generation                              |                                      |

## 2. Criteria Discussion

#### **A: Ecological Flows**

Zone 1 gets Standard A-1, under the LIHI criterion that focuses on riverine reaches, and the fact that the hydro project does not control releases from the dam. Zone 2 gets Standard A-2, Agency Recommendation due to the minimum flow/target flow requirements.

Jordanelle Reservoir is part of the Bonneville Unit of the Central Utah Project (CUP). Its primary purpose is to store surplus flows of the Provo River and water from Strawberry Reservoir exchanged through Utah Lake for Municipal and Industrial use in Salt Lake, Wasatch, Summit and northern Utah County. Additional project purposes include flood control, recreation, Heber Valley irrigation storage, and Fish and Wildlife enhancement. Existing reservoir storage and release patterns are not modified by the project. The project is able to utilize all of the flow released from the reservoir up to 600 cfs during periods when the reservoir is at elevation 6037 feet or higher. Whenever reservoir elevation and/or release flow fall outside the plant's operating range and subject to the downstream water quality criteria, releases would be made via the existing outlet works valves to increase dissolved oxygen by aerating the water. The plant operates only at reservoir elevations that fall within the turbine limits and where Watershed Management Plan requirements are met. Reservoir releases are the same as at present, varying from a minimum flow requirement of 125 cfs from October through March up to as much as 2,400 cfs from April to September. Tail water elevations would continue to be controlled by the Timpanogos Canal diversion dam on the Provo River several hundred feet downstream of Jordanelle Dam.

Minimum flows are based on the ULS-FEIS Final Surface Water Hydrology Technical Study using baseline flow data from 1950 before the dam was completed in 1993 through 1999. The construction of the dam did not change these flows. A habitat flow study was also conducted in 2004 in the downstream reach to evaluate these effects on different flow regimes and develop modeling tools to satisfy requirements under the 1992 federal Central Utah Project Completion Act. <sup>1</sup>

Jordanelle Hydro Plant is a run of the river establishment and releases are only made for water rights, flood control, or to maintain minimum downstream flows.

The water is operated and controlled by the CUWCD. All water goes through the hydro plant except for flows above 600 cfs, when maintenance work is being performed, or when the units trip offline.

The power generated from the hydro plant is purchased by contract agreement to Heber Light and Power.

<sup>&</sup>lt;sup>1</sup> <u>https://www.mitigationcommission.gov/watershed/provoriver/pdf/provo\_flow\_study\_2004.pdf</u>

Flows are monitored at Hailstone USGS gage, Upper Midway Bridge USGS gage station, and Charleston USGS gage.

- Upstream USGS gage #10155000, Provo River near Hailstone UT <u>https://waterdata.usgs.gov/monitoring-</u> <u>location/10155000/#parameterCode=00065&period=P7D</u>
- Downstream USGS Gage #10155200, Provo River below Jordanelle Dam near Heber, UT <u>https://waterdata.usgs.gov/monitoring-</u> <u>location/10155200/#parameterCode=00060&period=P365D</u>

Flows are reviewed daily within the CUWCD Water Accounting processes, and are discussed in bi-weekly meetings with the Provo River Commissioner. Expected flow releases are shown in the table below.

| Month     | Average<br>(cfs) | Maximum<br>(cfs) | Minimum<br>(cfs) |
|-----------|------------------|------------------|------------------|
| January   | 138              | 150              | 125              |
| February  | 141              | 278              | 125              |
| March     | 186              | 1204             | 125              |
| April     | 206              | 768              | 127              |
| May       | 648              | 1333             | 234              |
| June      | 909              | 1643             | 318              |
| July      | 634              | 1427             | 326              |
| August    | 482              | 915              | 288              |
| September | 330              | 508              | 224              |
| October   | 157              | 172              | 133              |
| November  | 144              | 164              | 126              |
| December  | 141              | 162              | 126              |
| Average   | 344              | 516              | 210              |

Figure 15. Annual expected Provo River Flows near Jordanelle Dam.



#### Figure 16. Image shows the last two years of USGS gage data from Feb 21' – 22

#### B: Water Quality

Both Zones get Standard B-3, Site-Specific Studies.

Waters within the project reach are designated as Class 1C, 2A, 3A, and 4:

- 1C: Protected for domestic water supply purposes with prior treatment processes as required by Utah Department of Environmental Quality.
- 2A Protected for primary contact recreation such as swimming.
- 3A Protected for cold water species of game fish and other cold-water aquatic life, including the necessary aquatic organisms in their food chain.
- 4 Protected for agricultural uses including stock watering and irrigation of crops.

The impoundment (state assessment Unit ID: UT-L-16020203-003 00) and downstream reach (assessment Unit ID: UT16020203-004 00) are both listed as impaired for pH with TMDL required but not developed yet.<sup>2</sup> The hydro operation does not impact pH levels in the river.

<sup>&</sup>lt;sup>2</sup> See <u>https://documents.deq.utah.gov/water-quality/monitoring-reporting/integrated-report/DWQ-2022-002386.pdf</u> (pdf page 99 "Jordanelle Reservoir", and pdf page 117 "Provo River-4").

The following Public Water Systems (PWS) along the Wasatch Front have formed the Watershed Protection Coalition (Coalition) and have initiated a cooperative project to develop their Drinking Water Source Plan (DWSP) for the Provo River Basin Watershed: Central Utah Water Conservancy District Jordan Valley Water Conservancy District Metropolitan Water District of Salt Lake & Sandy

The members of the Coalition, all of whom are active signing and funding members of the Provo River Watershed Council (PRWC), are working together to protect regional surface water resources. By working together in cooperation with other agencies and programs, the Coalition is able to maximize efficiency, and jointly manage potential contamination sources. Nearly all of the surface water sources, and watershed protection zones fall in areas outside of the PWSs jurisdiction. For this reason, as well as to reduce duplicated efforts, a cooperative, large-scale approach is needed to develop a DWSP plan for all surface water sources attributed to the Coalition. This cooperative approach allows the PWSs to participate in the approval process for new potential contamination sources proposing to locate within the designated watershed protection zones, for surface water sources located outside the respective PWSs boundaries.

The Provo River is a major source of public drinking water for the growing areas of Salt Lake, Utah, Wasatch, and Summit Counties. The Central Utah Water Conservancy District (CUWCD), the Jordan Valley Water Conservancy District (JVWCD), and the Metropolitan Water District of Salt Lake & Sandy (MWDSLS) all divert water from the Provo River to water treatment facilities for treatment and delivery for potable use. The preservation of high source water quality is an important part of a multiple barrier approach to improve the overall quality of drinking water and also reduces the costs of treatment.

See the attachment 1. Provo River Basin Drinking Water Source Protection Plan PRWC for details.

The Jordanelle Reservoir Water Quality Technical Advisory Committee (JTAC) was formed in 1981 with the purpose of developing a reservoir management plan for Deer Creek and Jordanelle Reservoir. JTAC was created with the representation of over twenty federal, state, and local agencies as well as private companies. The Watershed Management Plan for these reservoirs was finalized in 1984 and directs JTAC (now Provo River Watershed Council) to conduct a water-sampling program that monitors the condition of water quality throughout the year. It also requires that the resulting data be analyzed and presented in annual reports.

Water temperature can be adjusted from the selective level inlet structure to provide for water quality and fish and wildlife benefits. Water is released from the dam through a selective level (SLOW) and or low level (LLOW) inlet structure through piping and tunnels to the outlet works. The outlet works consists of two 72 inch fixed cone valves and a bypass jet flow valve. Water is mixed from different reservoir depths to control and meet water quality standards for

phosphorus, temperature, and dissolved oxygen levels in water discharged to the Provo River downstream of Jordanelle Dam.

Water temperature in the Provo River downstream of Jordanelle Dam has been maintained between 50 and 55 degrees F by making flow releases through the gates in the SLOW when the reservoir is above elevation 6070 feet. When the reservoir is below elevation 6070 feet, releases made from the SLOW may have to be supplemented by releases from the LLOW to maintain the temperature requirements in the Provo River.

#### C: Upstream Fish Passage

Both Zones get Standard C-1, Not Applicable/De Minimis Effect.

The Jordanelle Dam Hydropower Plant is located at the base of Jordanelle dam. The impoundment (Zone 1) does not have any barriers for upstream migration within the Zone.

The hydropower plant does not change the status of the operation of the dam. Also, there are no migratory fish in the area. The river drains to Utah Lake which then drains to the Jordan River and ultimately to the Great Salt Lake which has no outlet to the ocean. Any resident fish that may have historically moved from Utah Lake up the river, are blocked by multiple diversion structures downstream that serve as fish passage barriers. Deer Creek Reservoir, just downstream of the project was constructed in 1941, prior to Jordanelle dam construction in 1993 and would have blocked any migratory species, if present, from reaching Jordanelle.

Four game fishes are known to exist in the Provo River below Jordanelle Dam. These are brown trout, rainbow trout, Bonneville cutthroat trout (Oncorhynchus clarki Utah), and mountain whitefish (Prosopium williamsoni). Other native fishes include leatherside chub (Gila copei), redside shiner (Richardsonius balteatus), mountain sucker (Catostomus platyhynchus), Utah sucker, mottled sculpin (Cottus bairdi), and longnose dace (Rhinichthus cataractae) and June sucker (Chasmistes liorus). Bonneville cutthroat trout and leatherside chub are both Utah State sensitive species.

Resident species such as trout that may migrate locally have access to several tributaries in the tailrace/downstream reach between Jordanelle and Deer Creek dams that provide suitable spawning and rearing habitat without the need for upstream passage at the dam to complete their life cycles (Figure 16.) In addition, the dam is not controlled by the hydro operation.



Figure 17. Image shows tributaries in the impoundment and downstream between Jordanelle and Deer Creek Dam.

#### **D: Downstream Fish Passage**

Both Zones get Standard D-4, Acceptable Mitigation.

As noted above, the outlet works consist of two 72 inch fixed cone valves and a bypass jet flow valve. The dam was built with the understanding that downstream fish passage would not be provided because of the high velocity water released from the valves. Prior to construction of the hydro project, fish were unable to swim past the fixed cone valves. After power plant construction, fish are generally still unable to swim past the turbines and dam. Operating procedures established by the Bureau of Reclamation in 1993 for the selective level outlets works of the reservoir only allow velocities in excess of 10 feet per second in an emergency. Normal operations on any given gate are always less than 10 feet per second. The addition of the power plant did not change this criteria but it serves to reduce water velocity when water is

discharged through the powerhouse rather than the dam outlet. The 2005 environmental assessment for the Jordanelle Dam Hydroelectric Project<sup>3</sup> was reviewed by federal, state, and local wildlife agencies. No comments were received from any of these agencies concerning fish passage.

Fish that can be found in the impoundment are Brown Trout, Kokanee Salmon, Rainbow Trout, Smallmouth Bass, Utah Chub, Wiper, Yellow Perch, Black Crappie, Cutthroat Trout/Bonneville, Largemouth Bass, Splake, Tiger Muskie, and Utah Sucker. The fishery is managed under the Jordanelle reservoir fishery management plan.<sup>4</sup> Rainbow trout, cutthroat trout, kokanee, splake, muskie and wiper are often stocked in the reservoir by the Utah Division of Wildlife Resources.

Resident species such as trout that may migrate locally have access to several tributaries in the impoundment above Jordanelle dam that provide suitable spawning and rearing habitat without the need for downstream passage at the dam for these species to complete their life cycles (see Figure 16 above). In addition, the dam is not controlled by the hydro operation.

The Provo River Restoration Project<sup>5</sup> mitigates past impacts of the CUP and other federal Reclamation projects by improving fish and riparian habitats in the 10-mile reach of the Provo River downstream of Jordanelle dam. The project is under the direction of the Utah Reclamation Mitigation and Conservation Commission and was planned, designed and constructed to restore and create a functional riparian ecosystem. Certain magnitudes, patterns and timing of water need to be released from Jordanelle Dam in order to scour and deposit fine sediments from the stream onto adjacent floodplain and near-bank surfaces; to moisten the soil; to support germination and growth of seedling plants through a flow recession rate that is slow enough to prevent desiccation of developing seedlings because of low groundwater levels; and to support aquatic invertebrate, plant and fish communities.

The State lists the impoundment and downstream reach as a "blue ribbon fishery.<sup>6</sup> Blue Ribbon fisheries are waters that provide highly-satisfying fishing and outdoor experiences for diverse groups of anglers and enthusiasts. Blue Ribbon status indicates that a water has been reviewed by Utah Division of Wildlife Resources biologists and the Advisory Council and has:

- 1. Fishing quality
- 2. A quality outdoor experience
- 3. Quality fish habitat
- 4. Economic benefits

<sup>4</sup> <u>https://site.utah.gov/stateparks/wp-</u>

<sup>&</sup>lt;sup>3</sup> <u>https://www.doi.gov/sites/doi.gov/files/jordanelledamhydro-fea.pdf</u>

content/uploads/sites/13/2018/01/JordanelleFisheryManagementPlan Final.pdf

<sup>&</sup>lt;sup>5</sup> <u>https://www.mitigationcommission.gov/prrp/prrp.html</u>

<sup>&</sup>lt;sup>6</sup> <u>https://wildlife.utah.gov/blue-ribbon-fisheries.html</u>

#### **E: Shoreline and Watershed Protection**

Both Zones get Standard E-1, Not Applicable/De Minimis Effect.

The shoreline surrounding Zone 1 and 2 are not controlled by the Jordanelle Hydro Plant. The shoreline of Zone 1 is controlled and maintained by the Jordanelle State Park under a reservoir management plan developed by USBR.<sup>7</sup> Land cover and land use around the reservoir are shown in Figure 17.



Figure 18. Reservoir Vegetative Cover and Land Use.

The shoreline of Zone 2 is controlled and maintained by Wasatch County. The reach is bounded on the east and west by major roads with little development. The Provo River Basin Drinking Water Source Protection Plan (Attachment 1) discusses Watershed Protection in detail. The Provo River Restoration Project maintains, monitors, and improves the shorelines and habitats in this reach.

<sup>&</sup>lt;sup>7</sup> https://stateparks.utah.gov/stateparks/wp-content/uploads/sites/26/2015/03/2012BORRMPJordanelle.pdf

#### F: Threatened and Endangered Species

Zone 1 gets Standard F-2, Finding of No Negative Effect and Zone 2 gets Standard F-3, Recovery Planning and Action.

The US Fish and Wildlife Service's IPaC report for the project area (Attachment 2) lists the federal threatened Canada lynx, yellow-billed cuckoo, and Ute ladies' tresses, along with the candidate monarch butterfly. Federally protected migratory birds that may be present at some times of year include bald eagle and ten other species. While the Canada lynx has been spotted in the project area once since 2004, no critical habitat for the species occurs in the area. Project operations are unlikely to affect the cuckoo or ladies' tresses given the small project footprint and lack of appropriate habitat. Additional species of greatest conservation need listed in the state's mapping tool<sup>8</sup> include:

- Western toad
- Lewis's woodpecker
- Northern leopard frog
- Greater sage grouse
- Mountain marshsnail
- Columbia spotted frog
- Green river pebblesnail
- American white pelican
- Black swift
- Bear lake springsnail
- Southern leatherside chub
- Whooping crane

Project operations are unlikely to affect any of these species given that it does not manage the impoundment operations, the small project footprint associated with the hydro operation, and lack of appropriate habitat as discussed in the 2005 environmental assessment for the hydro project.<sup>9</sup>

Zone 2 also includes the June sucker Recovery Implementation Program.<sup>10</sup> This was initiated in 2002 to support recovery of this federally threatened fish which is found in Utah Lake and

8

https://utahdnr.maps.arcgis.com/apps/FilterGallery/index.html?appid=f602a8ae57fd4661a8e42bd40d99dc3c&cat egories=%2Fcategories%2Fsensitive%20species#viewType=VIEW\_IN\_MAP&viewId=2d3b77d2b46e42509605c05b8 1fd3a00

<sup>&</sup>lt;sup>9</sup> <u>https://www.doi.gov/sites/doi.gov/files/jordanelledamhydro-fea.pdf</u>

<sup>&</sup>lt;sup>10</sup> <u>https://www.junesuckerrecovery.org/about-us</u>

lower tributaries well downstream of the project area. The Recovery Program coordinates and funds ongoing recovery actions in addition to management, monitoring, and research in support of June sucker recovery. The Recovery Program participants include:

- Utah Department of Natural Resources
- Utah Reclamation Mitigation and Conservation Commission
- U.S. Department of Interior
- U.S. Bureau of Reclamation
- Central Utah Water Conservancy District
- Prover River Water Users Association
- Provo Reservoir Water Users Company
- Outdoor and Environmental Interests

The Recovery Program takes an adaptive management approach wherein biological information is gathered, reviewed, and incorporated into the Recovery Program on a continual basis. The Recovery Program works to balance and accommodate water resource needs of the human population with June sucker recovery efforts. The Recovery Program has two main goals:

1. Recover the June sucker to the extent that it no longer requires protection under the Endangered Species Act; and

2. Allow for the continued operation of existing water facilities and future water development of water resources for human use.

Since its inception the Recovery Program has implemented multiple recovery actions, highlighted by securing in-stream flows, establishing a captive rearing and stocking program, initiating habitat restoration efforts, and making progress towards the management of nonnative fish species. See the 2016-2021 June sucker sufficient progress letter final for further details (Attachment 3). CUWCD continues to work cooperatively with the agencies and stakeholders listed above to support the species recovery as required in the current LIHI condition 1:

• **Condition 1:** The facility owner shall continue to work proactively with the USFWS on the June Sucker Recovery Program. As part of its annual compliance letter to LIHI, the owner shall provide a statement confirming that it has released the committed flows identified in its June Sucker Recovery Implementation Program (JSRIP) from the Jordanelle Project for the recovery of the June sucker during the prior year, within the limits of the owners Lease of Power Privilege agreement with the Bureau of Reclamation. Also, verification shall be provided annually that the owner has discussed and reached agreement with the USFWS pertaining to these releases as part of the JSRIP.

#### **G:** Cultural and Historic Resources

Both Zones get Standard G-1, Not Applicable/De Minimis Effect.

A 2004 letter report prepared by Sagebrush Archaeological Consultants entitled Jordanelle Dam Hydroelectric Project was provided as part of the original LIHI application (Attachment 4). It reported that a prior USBR survey in 1987 prior to dam construction did not find any cultural or historic resources in the area to be occupied by the hydro project. The 2004 report included a field survey of that area and the transmission corridor and found no cultural resources. The Utah State Historic Preservation Office (SHPO) received the report and concurred with the report's conclusion that no historic properties are affected by the project (see attachment). Tribal Consultation was also conducted at the same time of project development. No tribes indicated any trust resources associated with the project.

#### **H: Recreational Resources**

Both Zones get Standard H-1, Not Applicable/De Minimis Effect.

The hydro plant, dam and surrounding areas are private property with no recreational activities allowed due to public safety and security concerns. However, Jordanelle State Park<sup>11</sup> allows for numerous activities: boating, fishing, picnic, camping, water activities at three distinct recreational areas – Hailstone, Rock Cliff, and Ross Creek.

Fishing access downstream is allowed within approximately ¼ mile of the project<sup>12</sup>. The Provo River is a destination for fishing both upstream and downstream of the hydro plant. The river and reservoir are classified as blue ribbon fisheries as determined by the Utah Division of Wildlife Resources.

<sup>&</sup>lt;sup>11</sup> <u>https://stateparks.utah.gov/parks/jordanelle/</u>

<sup>&</sup>lt;sup>12</sup> <u>https://www.gohebervalley.com/Provo-River</u>

3.0 Attestation and Waiver Form

#### ATTESTATION

As an Authorized Representative of the Jordanelle Hydroelectric Project, the Undersigned attests that the material presented in the application is true and complete.

The Undersigned acknowledges that the primary goal of the Low Impact Hydropower Institute's certification program is public benefit, and that the LIHI Governing Board and its agents are not responsible for financial or other private consequences of its certification decisions.

The Undersigned further acknowledges that if LIHI Certification of the applying facility is granted, the LIHI Certification Mark License Agreement must be executed prior to the final certification decision and prior to marketing the electricity product as LIHI Certified® (which includes selling RECs in a market that requires LIHI Certification).

The Undersigned further agrees to hold the Low Impact Hydropower Institute, the Governing Board, and its agents harmless for any decision rendered on this or other applications, from any consequences of disclosing or publishing any submitted certification application materials to the public, or on any other action pursuant to the Low Impact Hydropower Institute's certification program.

#### FOR RE-CERTIFICATION:

Authorized Representative:

Name: Devin McKrola

Title: Bonneville O&M Manager

Vein Makola Authorized Signature:

Date: May 17, 2023.

LIHI Handbook 2<sup>tol</sup> Edition – Revision 2.05, 01/01/2022

## 4. Facility and Stakeholder Contact Forms

| Facility Owner:   |   |  |
|---|---|--|
| Name and Title  | Devin McKrola, Bonneville O&M Manager           |  |
| Company   | Central Utah Water Conservancy District (CUWCD) |  |
| Phone   | 801 - 226 - 7100 ext 101                        |  |
| Email Address   | Devin@CUWCD.gov                                 |  |
| Mailing Address   | 1426 E 750 N Suite 400. Orem, UT 84097          |  |
| Facility Operator (if d   | ifferent from Owner):                           |  |
| Name and Title  | Rex Mathis, Facility OM Lead-CUP M&I            |  |
| Company   | Central Utah Water Conservancy District (CUWCD) |  |
| Phone   | 801 - 319 - 6857                                |  |
| Email Address   | Rex@CUWCD.gov                                   |  |
| Mailing Address   | 1426 E 750 N Suite 400. Orem, UT 84097          |  |
| Compliance Contact (responsible for LIHI Program requirements): |   |  |
| Name and Title  | Eli Johnson, Engineering Technician III         |  |
| Company   | Central Utah Water Conservancy District (CUWCD) |  |
| Phone   | 801 - 850 - 3381                                |  |
| Email Address   | Eli@CUWCD.gov                                   |  |
| Mailing Address   | 1426 E 750 N Suite 400. Orem, UT 84097          |  |
| Party responsible for accounts payable:                         |   |  |
| Name and Title  | Shawn Lambert, Chief Financial Officer          |  |
| Company   | Central Utah Water Conservancy District (CUWCD) |  |
| Phone   | 801 - 226 - 7100 ext 138                        |  |
| Email Address   | Shawn@CUWCD.gov                                 |  |
| Mailing Address   | 1426 E 750 N Suite 400. Orem, UT 84097          |  |

Agency Contacts

|                 | Agency Contact                             | Area of Responsibility<br>(check applicable boxes) |
|-----------------|--|--|
| Agency Name     | United States Department of The Interior   | Flows  |
|                 |  | ✓ Water Quality                                    |
|                 |  | Fish/Wildlife                                      |
|                 |  | ✓ Watershed  |
|                 |  | ✓ T&E Species                                      |
|                 |  | Cultural/Historic                                  |
|                 |  | Recreation   |
| Name and Title  | Wesley James, Program Coordinator          |  |
| Phone           | 801 - 379 - 1137                           |  |
| Email Address   | wsjames@usbr.gov                           |  |
| Mailing Address | 302 East Lakeview Parkway. Provo, UT 84606 |  |

| Agency Contact  |  | Area of Responsibility<br>(check applicable boxes) |
|-----------------|--|--|
| Agency Name     | Central Utah Project (CUP)                 | Flows  |
|                 |  | <ul> <li>Water Quality</li> </ul>                  |
|                 |  | ✓ Fish/Wildlife                                    |
|                 |  | Watershed  |
|                 |  | T&E Species  |
|                 |  | Cultural/Historic                                  |
|                 |  | Recreation   |
| Name and Title  | Walter Findlay, Program Coordinator        |  |
| Phone           | 801 - 379 - 1084                           |  |
| Email Address   | wfindlay@usbr.gov                          |  |
| Mailing Address | 302 East Lakeview Parkway. Provo, UT 84606 |  |

| Agency Contact  |                                  | Area of Responsibility<br>(check applicable boxes) |
|-----------------|----------------------------------|--|
| Agency Name     | Jordanelle State Park            | Flows  |
|                 |                                  | Water Quality                                      |
|                 |                                  | ✓ Fish/Wildlife                                    |
|                 |                                  | ✓ Watershed  |
|                 |                                  | T&E Species  |
|                 |                                  | <ul> <li>Cultural/Historic</li> </ul>              |
|                 |                                  | Recreation   |
| Name and Title  | Jason Whittaker, Park Manager    |  |
| Phone           | 435 - 649 - 9540                 |  |
| Email Address   | jasonwhittaker@utah.gov          |  |
| Mailing Address | 515 UT-319, Heber City, UT 84032 |  |