

# **A Brief Background Summary of the J-2 Regulating Reservoirs Project**

## **J-2 Regulating Reservoirs Overview**

The J-2 Regulating Reservoirs Project (J-2 Project) is a collaborative effort of the Central Nebraska Public Power and Irrigation District (CNPPID), the Platte River Recovery Implementation Program (PRRIP or Program), the Nebraska Department of Natural Resources (NDNR), and several Natural Resource Districts (NRD) through the NDNR. The CNPPID, PRRIP, and NDNR executed a Water Service Agreement on July 9, 2013 to advance the project through construction. The CNPPID is responsible for the land acquisition, permitting, design, and construction of the project and will operate the reservoirs to provide water management benefits to all parties. All parties contribute some cash but the bulk of the cash comes from the PRRIP and the NDNR, with the PRRIP as the largest contributor. The PRRIP will receive the benefit of water retiming to reduce deficits to U.S. Fish and Wildlife Service target flows and generate Short Duration High Flows (SDHF). NDNR and the NRDs will receive the benefit of water retiming to augment stream flow to cover stream depletions from post-1997 water developments. The CNPPID will receive the benefit of mitigation of hydrocycling flow variations resulting from power production, improved power generation efficiencies during the irrigation season, and reduced fluctuations in Johnson Lake levels. The CNPPID will own the land and all facilities associated with the J-2 Project.

The J-2 Project is located about 2 miles downstream of the existing J-2 Return, straddling the Gosper-Phelps county line between the Phelps Canal on the south and the south channel of the Platte River on the north. The footprint will be roughly 1,200 acres with a combined capacity of about 18,000 acre-feet in both cells, based on the feasibility-level design. The yield of the J-2 Project to reduce stream flow shortages to target flows (referred to as the score) has been accepted by the Program's Governance Committee as 40,800 acre-feet, of which 30,600 acre-feet is allocated to the Program, with the remainder to NDNR and the NRDs.

- **Three-party Water Service Agreement among CNPPID, PRRIP, and NDNR (with sub-agreements with NRDs)**
- **Land Footprint: ~1,200 acres**
- **Storage capacity: ~18,000 acre-feet**
- **Score: 40,800 acre-feet (PRRIP 30,600 acre-feet)**

## **J-2 Regulating Reservoir History**

The need for retimed water<sup>1</sup> in the lower portion of the CNPPID system for the purpose of enhanced flow regulation for irrigation and power generation has been identified since the conception of the district. Plans and figures including such elements were part of the districts conceptual plans until the mid-1930s but were not included in the final plans for a variety of reasons. Before the current J-2 Project concept, the retimed water concept had been revisited as recently as the 1980s and 1990s by CNPPID itself, the Bureau of Reclamation, and the Central Platte NRD in various manifestations of the Prairie Bend Project, and the Upper Big Blue NRD as part of the Landmark Project.

The concept of regulating retimed water in the CNPPID system was identified during the Cooperative Agreement phase of the Program. It is evaluated in the Platte River Water Supply/Water Conservation Plan of 1999 and included in the Reconnaissance Water Action Plan of 2000. Alternatives contained in the Reconnaissance Water

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<sup>1</sup> Retimed water refers to stream flow that can be controlled in the J-2 Project. Water will be diverted into the J-2 Project during excesses to target flows, instream flows and appropriations and then released during shortages to target flows, or "retimed".

Action Plan of 2000 were evaluated in the Final Environmental Impact Statement of 2006, and the Reconnaissance Water Action Plan of 2000 in its entirety was incorporated in the Water Plan in the Program Document of 2006.

Under the auspices of the Program, the Water Management Study was initiated in 2007 with both Phases I and II completed in 2008. The Water Management Study (Boyle/AECOM) identified the importance of additional storage capacity in meeting U.S. Fish and Wildlife Service target flow and Program SDHF requirements. A number of alternatives oriented toward additional storage associated with the CNPPID system were identified, evaluated, and screened in these analyses. The alternatives covered a wide range including retimed water at various locations along the Supply Canal from the diversion in North Platte, storage in sites at various locations along the Phelps Canal below the J-2 Return, Elwood Reservoir, and reservoirs on Plum Creek downstream of Johnson Lake. The screening process quickly focused attention on storage closest to the associated habitat and eliminated Plum Creek alternatives. New storage (or retimed water) in the vicinity of the J-2 Return or downstream looked more attractive than Elwood reservoir options, but the Elwood options were not eliminated entirely.

The Water Action Plan was updated in 2009 to include the results of these and other investigations. The CNPPID regulating reservoir was emerging as a preferred option for its significant yield potential and utilization of retimed water rather than transferring water away from irrigated agriculture. With the emergence of the J-2 Regulating Reservoirs concept, a pre-feasibility study was initiated in 2009 (Olsson and Black & Veatch) in cooperation with CNPPID and completed in 2010 to further investigate the J-2 Regulating Reservoirs (including on-channel and off-channel options) and Elwood options. This study led to the strong preference of J-2 Regulating Reservoirs over Elwood options, and identifying a new site not identified in the previous study. That site is the one under consideration today. Concurrently with the J-2 Regulating Reservoirs pre-Feasibility Study, a pre-feasibility study of the Elm Creek Reservoir was undertaken (Olsson and Black & Veatch) in cooperation with the Central Platte NRD. Both Pre-Feasibility Studies concluded in 2010 with the clear decision that J-2 Project was the preferred alternative from a yield, operational, and cost standpoint.

A full Feasibility Study of the J-2 Regulating Reservoirs launched in 2010 (Olsson and Black & Veatch) and concluded in 2012. The preferred site was subjected to geotechnical investigations, a surface cultural resource survey, and considerable operational and design analyses. The J-2 Regulating Reservoirs were determined to be technically feasibility and financially viable.

To review and assess the 2012 J-2 Regulating Reservoirs Feasibility Study, an independent contractor was solicited, selected, and tasked with the review (RJH). This work commenced in 2012 and concluded in early 2013. The results of the review confirmed that the site was suitable and preferable to any other potential sites in the vicinity of the identified site. Several design concepts required revision with consequent cost revisions, but the J-2 Regulating Reservoirs project was technically feasible with the revised conceptual design and remained financially viable. With this confirmation, negotiations on the Water Service Agreement concluded, the agreement executed, and the J-2 Project initiated. RJH has been retained by the CNPPID to continue in service to the project to provide design, construction oversight, and Program Management services.

Within the recent nearly two-decade history of just the Cooperative Agreement and Implementation phases of the Program, the retimed water concept in association with the CNPPID system or other canal systems have been the subject of over six separate investigations of progressively greater refinement, by at least three independent, well-qualified consultants. Dozens of alternatives have been analyzed and evaluated at total study costs in excess of \$2,000,000. This is by any standard a thorough and complete vetting of alternatives, resulting in the selection of the J-2 Regulating Reservoirs alternative at the current location and in its current configuration.

- **Conceptually identified in Water supply and Conservation Study (1999) and included in Reconnaissance-Level Water Action Plan (2000)**
- **Incorporated into Program Water Plan (2006)**

- Concept identified as a preferred alternative in 2008 Water Management Study – numerous alternatives were examined.
- Prefeasibility Study by Olsson Associates and Black & Veatch in 2010 – refined alternatives. Prefeasibility study of Elm Creek Reservoir completed concurrently. Costs and yields of Elm Creek Reservoir did not compare favorably to J-2 Project. Decision to pursue J-2 Project.
- Feasibility Study by Olsson Associates and Black & Veatch in 2012 – locked in on location.
- Independent review and assessment of design by RJH Consultants Inc. in 2013 – thoroughly reviewed concept and location.
- Water Service Agreement – NDNR, PRRIP, and CNPPID executed in July 2013.

### **Buy and Dry Alternative Estimate**

One of the attractive features of the J-2 Regulating Reservoirs is that it relies on retiming of water to develop its score. Irrigated agriculture is not adversely impacted by the project beyond the 1,000 acres of irrigated land taken out of production under the project footprint. If a “buy and dry” approach to developing the same water supply were followed, significantly more irrigated land would be impacted. Consumptive use of irrigation water is approximately 12 inches per acre in the central Platte valley. Depending on the source of supply and location of the parcels converted from irrigated to dry-land agriculture and factoring in the impact of ground water lags that cause water to arrive at the river at times of excess, ratios of 1 acre to produce 1 acre-foot to 3 acres to produce 1 acre-foot would be reasonable estimates. This produces estimated dry-up of between 30,000 and 90,000 acres just to produce the PRRIP portion of the J-2 Regulating Reservoir yield. This level of reduction in irrigated acres would have a significant impact to the economy of Central Nebraska.

- Average consumptive irrigation water requirement in CNPPID area is approximately 12 inches/acre.
- At a 1:1 ratio, most applicable if the source of supply is surface water, 30,000 acres would have to be removed from irrigation to replace the PRRIP J-2 Project score of approximately 30,000 ac-ft.
- A ratio of 3:1 may be more appropriate if the source of supply is ground water given that river depletions vary by parcel location, there is a lag in accretions, and increases in discharge will not always occur during times of target flow shortage. At a 3:1 ratio, 90,000 acres would need to be removed from irrigation to replace the J-2 Project score of approximately 30,000 acre-feet.